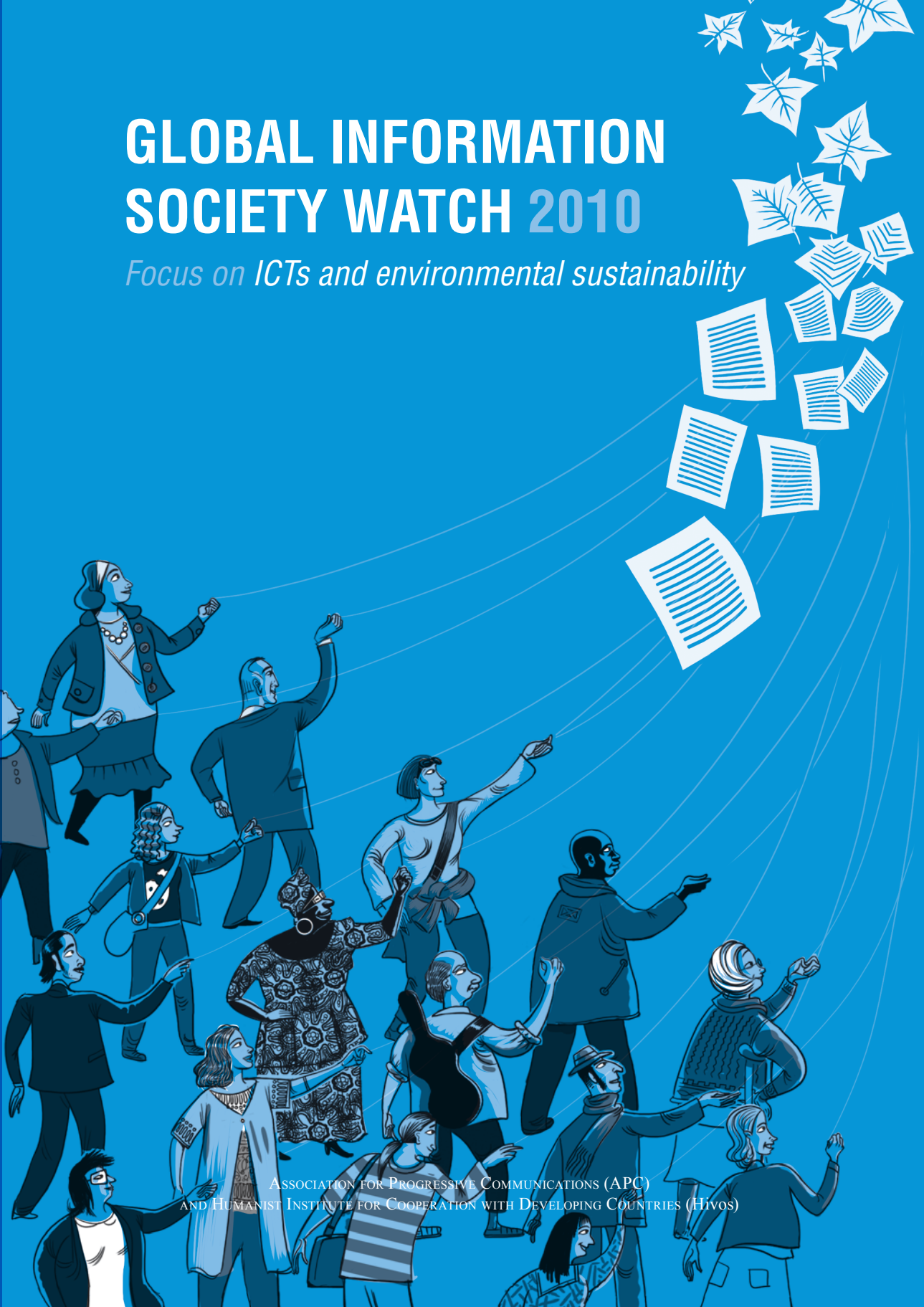
GLOBAL INFORMATION SOCIETY WATCH 2010

Focus on ICTs and environmental sustainability



Association for Progressive Communications (APC)
and Humanist Institute for Cooperation with Developing Countries (Hivos)

Global Information Society Watch

2010

Global Information Society Watch 2010

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Preface

Global negotiations in Copenhagen in 2009 did not make much progress in addressing the critical challenges posed by climate change. Some people argue that information and communications technologies (ICTs) are amongst the most important tools for addressing climate change. At the same time, increased consumption and production of ICTs contribute to harmful emissions and waste. The ICT for development (ICT4D) sector is only just beginning to realise that it needs to consider some of the potential contradictions in its efforts to rapidly expand ICT infrastructure in developing countries. In the developed world, the ubiquitousness of ICTs means that they have become almost invisible – and this "invisibility" extends to their potential for harmful impacts on the environment.

In this context, GISWatch 2010 *makes an important contribution as the voice of global civil society, and is aimed at both beginners and experts in the fields of ICTs and climate change, electronic waste (e-waste), and the use of ICTs for environmental good generally. The reports in this volume do not take a single point of view on ICTs and environmental sustainability: instead there are counterpoints here, arguments and implicit or explicit disagreements that show a vibrant and critical arena that has started to receive attention once again in recent years. They are, importantly, a rallying cry for ICT4D organisations, consumers of electronics, and government and business stakeholders to pay attention to the environment. Business plans, roll-out agendas, and developmental strategies will, many of these reports argue, have to change for a sustainable future.*

Environmental challenges provide an opportunity to place sustainable development at the core of our thinking and practice. Sustainable development involves consideration of economic development, social development and environmental protection. Growth is not always sustainable. Economic growth alone can entrench existing inequalities in access to power and resources, and create new ones, or it can challenge those inequalities: neither is inevitable.

GISWatch 2010 *includes seven thematic reports, dealing with the global ICT footprint, emerging research agendas, sustainability, e-waste, smart technologies, green grassroots technologies, and building advocacy networks, as well as an institutional overview and a consideration of green indicators. There is also, as with* GISWatch 2009*, a mapping section – an exciting new addition to the* GISWatch *report. This year it offers a comparative analysis of "green" media spheres on the web.*

There are six regional reports, from South Asia, East Africa, the Middle East and North Africa, Europe, North America, and Latin America and the Caribbean, which precede 53 individual country reports – five more than last year, despite the relative newness of the topic.

GISWatch *aims to make a critical contribution to building a people-centred information society. Its purpose is to stimulate a collaborative approach to policy advocacy and create a common platform where disparate experiences can be shared, and progress – and lack of progress – assessed. Ultimately, it hopes to impact on policy development processes in countries, regions and at a global level.*

We hope you find GISWatch 2010 *inspiring and challenging.* ■

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Introduction

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As information and communications technologies (ICTs) have become more widespread they have, certainly in more developed nations, become "invisible"; we don't see them because we just accept they are there – often we only understand their significance to our lives when they break down. When only a few people had these gadgets they were novel, but as they became more common, and were eventually assimilated to become part of our modern culture, they became transparent; they're just another part of our everyday life. The implicit association of these technologies with a "modern" lifestyle has in turn become a driver for their adoption in less developed states.

To understand the sustainability of ICTs we must look at the life cycle[1] of the devices themselves, from the sources of raw materials, through production, use, and finally disposal. The ever greater use of ICTs is taking place within a finite environmental system, and that system, like the human system in general, has limits.[2] There are serious questions about how long we will be able to sustainably use today's high-speed digital technologies before the "ecological limits" on production make them either too rare,[3] or too costly, to justify their use as just another "invisible" element of our mass consumption culture.

The greatest technological breakthrough of modern electronics has been the ability of a simple programmable device to perform a wide variety of different functions. This is the true meaning of the term "convergence":[4] rather than having to have many specialised devices we can now use one multi-functional device programmed to undertake different operations. The fact that all these devices are based on the same basic components – at the simplest level they're an assembly of many millions of transistors – means that they are all reliant on the same raw materials for their production. It's not the silicon of the "silicon chip" that's the problem. Silicon is a plentiful mineral, although it does take large quantities of energy to make the very pure silicon required to produce the latest high-speed microprocessors and memory chips. The difficulty is the minute quantities of other rarer metals[5] – such as indium, hafnium, germanium and gallium – that the silicon is combined with to create the unique properties required for a microchip, a memory chip or an imaging device. Although only minute quantities are used in each chip, and even though many more chips are now produced, the critical limitation is that these minerals occur in only a few places around the globe. Some governments are now arguing for strategic policies to protect the supply of these "critical raw materials"[6] and ensure access to these resources in the future. An aspect of the limited supply of these critical materials is that, as scarcity makes prices rise, the shortage of supply is an incentive to their illicit production.

Another important metal in the production of miniaturised digital electronics is tantalum. Half of the world's tantalum supply is mined in Australia, and it is produced as a by-product of other metal mining operations in many states, but between 1% and 10% may be mined illegally in central Africa. This trade in turn supplies the finance that perpetuates the armed conflict[7] in these areas, and the human rights abuses that are the result.[8]

It is not just rare metals that are becoming problematic. There has been much discussion over recent years about "peak oil"[9] – the principle that global oil production will reach a peak of supply and then decline,[10] with dire economic consequences for the globe when this takes place.[11] Theoretically other minerals too can reach peak production,[12] and another metal vital to digital electronics may have reached its production peak: *gold*.[13] As a result of restricted supply, gold prices have remained high and so in many places around the world we now see illegal gold mining taking place – such

1 Leonard, A. (2010) *The Story of Stuff*, Constable, UK; Leonard, A./Free Range Studios (2008) *The Story of Stuff with Annie Leonard*. www.storyofstuff.com

2 Meadows, D. (2004) *Limits to Growth: The 30 Year Update*, Earthscan; Turner, G. (2008) *A Comparison of The Limits to Growth with Thirty Years of Reality: Interim Report*, CSIRO, Australia. www.fraw.org.uk/files/peakoil/csiro_2008.pdf

3 Cohen, D. (2007) Earth Audit, *New Scientist*, No. 2605, 23 May, p. 34-41. www.newscientist.com/article/mg19426051.200-earths-natural-wealth-an-audit.html

4 Wikipedia, *Technological Convergence*. en.wikipedia.org/wiki/Technological_convergence

5 Mobbs, P. (2010) *Limits to Technology – Annotated Presentation Slides*, Free Range Network. www.fraw.org.uk/workshops/limits_to_tech/virtual_presentation.shtml

6 European Commission (2010) *Critical raw materials for the EU*, CEC. ec.europa.eu/enterprise/policies/raw-materials/files/docs/report_en.pdf

7 Global Witness (2009) *Faced with a Gun, What Can You Do?* www.globalwitness.org/media_library_get.php/980/1277197135/report_en_final.pdf

8 Sourt, C. (2008) The Congo's Blood Metals, *The Guardian*, 26 December. www.guardian.co.uk/commentisfree/2008/dec/25/congo-coltan

9 Wikipedia, *Peak Oil*. en.wikipedia.org/wiki/Peak_oil

10 Mobbs, P. (2005) *Energy Beyond Oil*, Matador, UK.

11 Froggatt, A. and Lahn, G. (2010) *Sustainable Energy Security: Strategic risks and opportunities for business*, Lloyds/Chatham House, UK. www.chathamhouse.org.uk/files/16720_0610_froggatt_lahn.pdf

12 Bardi, U. and Pagani, M. (2007) Peak Minerals, *The Oil Drum Europe*, 15 October. www.theoildrum.com/node/3086

13 Evans-Pritchard, A. (2009) Barrick shuts hedge book as world gold supply runs out, *The Telegraph*, 11 November. www.telegraph.co.uk/finance/newsbysector/industry/mining/6546579/Barrick-shuts-hedge-book-as-world-gold-supply-runs-out.html

as in Nigeria, where the environmental pollution created by unregulated gold processing has killed over 100 children.[14]

Next let's consider manufacturing. As with most of the high-volume manufacturing capacity of the globe, a large proportion of the world's high-tech consumer goods are now produced in Asia – China in particular. Asian nations have received much criticism for their lax controls over the production of shoes and clothing in large "sweat shop" factories, but we see a similar style of operation used in the production of electronic consumer goods – albeit within the clean room environment required for the production of microelectronics. While workers in these facilities will receive pay and benefits that are higher than in other types of industry in the region, and so jobs in these factories are in high demand, the psychological pressures of working within this environment are often as high as conventional production facilities. This issue has received coverage recently following the suicide of workers involved in the production of iPods for Apple.[15]

Within electronics production generally the chemicals and materials that are an essential part of the process have implications both for the safety of production workers and the well-being of the local environment.[16] From the hazardous solvents to neurotoxic flame-retardant chemicals, the production of consumer electronics is potentially a very hazardous operation for those involved. As well as the direct hazards during production, the emissions from factories, and from local waste management facilities, can pollute the local environment, soils and water supplies.[17] It can take many years for the slow accumulation of such toxins to take effect, especially the persistent organic pollutants used in many different electronic components, so the overall impact of the recent development of high-tech manufacturing in Asia may not be apparent for some time.

With the rising concern about climate change there is an increasing focus on the amount of electricity that ICTs consume. The more gadgets we have, especially mobile devices that require charging, the greater the demand for electricity.[18] At present, around the globe, the fuel being used to meet much of the demand for new electricity generation is the worst from the point of view of carbon emissions: coal. However, it's not the everyday use of ICTs that's driving their electricity demand.

Though people might focus on the direct use of electricity by devices – because that's the part of the system they can "see" – in terms of the overall life cycle of ICT devices, more energy will have been used during their production. In fact, as the direct energy use of electrical goods reduces, so the energy consumed in production becomes more significant.[19] For example, the memory chip in a laptop computer can take more energy to produce than the laptop itself will consume over its three-year service life.[20] Another example is video display screens where, although the older glass cathode ray displays consume more electricity while in use, the newer flat panel displays require far more energy to be expended during production.[21]

The debate over "green ICTs" demonstrates the complexity of this issue – and the importance of defining our terms and boundaries for measuring impacts. As in the example above, if we simply compare the energy consumption of an old glass cathode ray display to a new flat panel display we are not going to produce a valid impression of the ecological impact, because the bulk of the energy consumption for digital electronics tends to be during the production, not in everyday use.[22] The concentration on carbon emissions is also a distraction as, irrespective of the energy sources used in the manufacturing process, one of the most pressing problems for the future of ICTs is a shortage of the critical raw materials used in their production. Once the most productive sources of these materials are exhausted, which (in the case of metals such as indium or gallium used in flat screen displays) may be only in two or three decades time, the use of these technologies will be restricted too.

14 Yahaya, S. (2010) Nigeria tries to end "gold rush" after child deaths, *Reuters*, 9 June. www.reuters.com/article/idUSTRE6581VD20100609

15 Branigan, T. (2010) Tenth apparent suicide at Foxconn iPhone factory in China, *The Guardian*, 28 May. www.guardian.co.uk/world/2010/may/27/foxconn-suicide-tenth-iphone-china

16 Silicon Valley Toxics Coalition (n.d) *Electronics Industry: A Dazzling Industry With a Dark Side*. www.svtc.org/site/PageServer?pagename=svtc_electronic_industry_overview

17 Brigden, K., Labunska, I., Santillo, D. and Walters, A. (2007) *Cutting Edge Contamination*, Greenpeace. www.greenpeace.org/raw/content/usa/press-center/reports4/cutting-edge-contamination-a.pdf

18 International Energy Agency (2009) *Gadgets and Gigawatts*, OECD/IEA, Paris; *Gadgets and Gigawatts: Summary.* www.iea.org/Textbase/npsum/Gigawatts2009SUM.pdf

19 Williams, E., Ayres, R. and Heller, M. (2002) The 1.7 Kilogram Microchip: Energy and Material Use in the Production of Semiconductor Devices, *Environmental Science and Technology*, 36 (24), p. 5504-5510. www.it-environment.org/publications/1.7%20kg%20microchip.pdf

20 de Decker, K. (2009) The monster footprint of digital technology, *Low Tech Magazine*, 16 June. www.lowtechmagazine.com/2009/06/embodied-energy-of-digital-technology.html

21 Socolof, M., Overly, J. and Geibig, J. (2005) Environmental life-cycle impacts of CRT and LCD desktop computer displays, *Journal of Cleaner Production*, 13, p. 1281-1294.

22 Socolof, M., Overly, J., Kincaid, L. and Geibig, J. (2010) *Desktop Computer Displays: A Life-Cycle Assessment*, US Environmental Protection Agency, EPA-744-R-01-004. www.epa.gov/dfe/pubs/comp-dic/lca

This brings us to the issue of disposal and recycling. The conventional view of resource economists is that recycling extends the lifetime of a resource because we need not dig up as much raw material. Recent work on the ecological economics[23] of resource production shows that this is often not true, because the effect of growing consumption negates, to some extent, the effects of recycling and more efficient production – a process known as the "rebound effect".[24] For digital electronics the problem is more complex because the concentration of the critical raw materials within the electrical goods is in most cases less than their concentration in the natural environment, making reclamation of some resources practically impossible. For certain metals, such as gallium or indium, this means that recycling does not offer a way to significantly extend the life of these resources.

For other metals – such as gold, copper, silver and tin – recycling offers the best option to extend the lifetime of these resources. However, as most consumer electronics are not designed to be disassembled and efficiently recycled, the methods available to economically recover the materials they contain are often crude. In many developed states electrical goods are being banned from landfill disposal, so some sort of reclamation process is required to deal with electronic waste (e-waste). The commonest method to recycle electronics is to crush, fragment and burn them in order to recover the most valuable metals.[25] In developed nations this is done to high environmental standards in specially designed reclamation furnaces. However, the high cost of doing this means that a market has sprung up to ship used electronic goods to developing nations where they are processed using far less rigorous standards.[26] Often devices are manually broken apart to remove the most valuable components, and then much of what is left is burnt on open fires. This is creating a toxic legacy[27] that could last for many generations as the soil, groundwater and local rivers are contaminated with a cocktail of metals, partly burnt plastics and toxic chemicals.

There are ways to address many of these issues. However, they're not "business as usual", and for that reason they require some major institutional changes within the ICT industry. To make the diminishing level of critical raw materials last longer we need to extend the life of all electrical goods. At present digital electronics is only achieving a fraction of the lifetime that could be achieved if devices were designed for a longer life. The difficulty for the electronics industry is that longer life will lead to lower turnover, and that in turn means that the nations who have specialised in the mass production of electrical goods will grow more slowly. Another great step forward would be designing devices in ways that maximise recycling and reuse, and to remove as much of the toxic content of electrical goods as possible so that end-of-life reclamation does not create such toxic waste residues.

While making gadgets last longer has an impact on manufacturers, perhaps the greatest impact will be upon the software community. They too focus on short product lifetimes, planned obsolescence and restricting backwards compatibility to ensure that users must upgrade. However, this "culture of obsolescence" is predominantly the preserve of the proprietary software industry. In terms of the most sustainable life cycle for ICTs, open standards and open intellectual property are far more likely to lead to extended lifetimes because the pressures to continually upgrade are not so great. For this reason the free and open source software and fledgling open source hardware movements offer a greater potential to develop a more sustainable ICT industry.

In the end, this is a design issue: it is a matter of how we choose to build human systems. If we respect the physical boundaries to the natural world then we can make a truly sustainable culture. The difficulty is that recognising these limits inevitably means applying limits to ourselves. ■

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23 Wikipedia, *Ecological Economics*. en.wikipedia.org/wiki/Ecological_economics

24 Sorrel, S. (2007) *The Rebound Effect*, Sussex Energy Group/UK Energy Research Centre. www.ukerc.ac.uk/Downloads/PDF/07/0710ReboundEffect/0710ReboundEffectReport.pdf

25 Sullivan, D. (2006) *Recycled Cell Phones: A Treasure Trove of Valuable Metals*, U.S. Geological Survey. pubs.usgs.gov/fs/2006/3097/fs2006-3097.pdf

26 Brigden, K., Labunska, I., Santillo, D. and Allsopp, M. (2005) *Recycling of Electronic Wastes in China and India: Workplace and Environmental Contamination*, Greenpeace International. www.greenpeace.org/raw/content/international/press/reports/recyclingelectronicwasteindiachinafull.pdf

27 Puckett, J. (2005) *The Digital Dump: Exporting Re-use and Abuse to Africa*, Basel Action Network. www.ban.org/BANreports/10-24-05/documents/TheDigitalDump_Print.pdf

Thematic reports

The carbon footprint of ICTs

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Introduction

The catastrophic British Petroleum (BP) oil gush in the Gulf of Mexico has brought home to many the acute dangers implicit in the desperate search for new sources of fossil fuels. But it also dramatised the extent to which information and communications technologies (ICTs) can be effectively deployed to redress environmental crises and promote public awareness; including, in this case, the provision of the visual links and transmission of data to investigators and the media from the site of the oil gush some five miles below the surface of the ocean. Similarly, ICTs can assist companies such as BP, as well as governments and civic organisations to limit their carbon footprints and promote better environmental safeguards as part of their normal day-to-day operations.

But the responsibility of the ICT industry goes well beyond facilitating the greening of other enterprises. The industry must get its own house in order. Media commentators and leading ICT actors often ascribe the carbon emission problem to others: the petroleum industry, the airlines and automobile sectors and plastics manufacturers, among them. While keeping a spotlight on the worst offenders, the ICT industry's narrative and media analysis must extend beyond the usual suspects to include the first person plural. The sector must attend to its own greening by redressing the increasing industry carbon footprints caused from applications in high-energy call centres, "cloud computing" data centres, ultra-fast servers, complex telecommunications networks, equipment cooling devices and expensive air conditioning, the use of multiple PCs, powerful modems and ubiquitous mobile phones. By examining the role of ICTs in climate change as well as the disposal of ICT waste, the industry will be able to take corrective internal actions while continuing to expose the causes and consequences of climate change outside of the sector itself.

Carbon footprint of the global ICT industry

Global consultants Gartner estimate that ICTs presently account for approximately 0.86 metric gigatonnes of carbon emissions annually, or just about 2% of global carbon emissions.[1] The International Telecommunication Union (ITU) has estimated the contribution of ICTs (excluding the broadcasting sector) to climate change at between 2% and 2.5% of total global carbon emissions. The main contributing sectors within the ICT industry include the energy requirements of PCs and monitors (40%), data centres, which contribute a further 23%, and fixed and mobile telecommunications that contribute 24% of the total emissions.[2]

Other researchers such as Boccaletti, Löffler and Oppenheim present a worrying prognosis, noting:

> Emissions from the manufacture and use of PCs alone will double over the next 12 years as middle-class buyers in emerging economies go digital. Similarly, worldwide growth in the use of mobile phones will triple their carbon footprint by 2020, in large part because of their consumption of silicon and rare metals. But the fastest-increasing contributor to carbon emissions will be as a result of growth in the number and size of data centers, whose carbon footprint will rise more than fivefold between 2002 and 2020 as organizations in all sectors add servers to meet rising demand even as companies and governments alike attempt to become more energy efficient.[3]

E-waste

The methods of disposal, including incineration, of electronic waste (e-waste) are another key environmental issue affecting climate change. Among the discarded artefacts are disused mobile phones, obsolete computer and television equipment, old cables and other ICT hardware. The ITU estimates that between 1996 and 2008 the number of mobile phones in use increased from 145 million to over four billion. Most of these will be discarded within one to three years of their life span. In many countries disused mobile phones, old computers and other electronic junk are discarded into existing general dump sites for domestic waste, where they are liable to be incinerated alongside other solid waste materials. The resulting carcinogenic emissions will add to the alchemy of harmful gases contributing to climate change. At the same time, the failure by manufacturers to maximise the life span of equipment increases the burden of emissions from the manufacturing sector.

ICT adaptation and mitigation strategies

While the prognosis on the ICT industry's own future contribution to climate change is worrying, there is still the overriding positive prospect that ICTs themselves can

1 Gartner (2009) Gartner Estimates ICT Industry Accounts for 2 Percent of Global CO2 Emissions. www.gartner.com/it/page.jsp?id=503867

2 ITU (2009) ICTs and Climate Change, background paper for the ITU Symposium on ICTs and Climate Change, Quito, Ecuador, 8-10 July.

3 Boccaletti, G., Löffler, M. and Oppenheim, J. (2008) How IT can cut carbon emissions, *The McKinsey Quarterly*, October, p. 2. www.mckinsey.com/clientservice/sustainability/pdf/how_it_can_cut_carbon_missions.pdf

facilitate innovations and social and economic restructuring globally to help reduce overall global carbon emissions. Already there are estimates that by the year 2020 ICT applications could help reduce global carbon emissions by 15%, which is significantly higher than the industry's own contribution to carbon output.

The creation of greener and more energy-efficient industrial plants and the greater use of renewable energy in such areas as electricity generation and equipment production, should become the norm through both voluntary compliance and formal regulation to meet agreed industry standards. ICT firms should be directed to take measures to recalibrate their production plants and manufacturing systems, as well as to include technical innovations in their internal systems to make them more energy efficient and environmentally friendly.[4]

The use of audits of social and economic sectors to identify activities that could be digitised or "dematerialised" is another critical adaptation strategy. McKinsey Consultants have found that through ICT applications in the highest energy-consuming industries, including motor vehicle manufacture, shipping, air transport, building and construction, there could be an accumulated reduction in emissions equivalent to 4.52 gigatonnes of carbon equivalents ($GtCO_2e$). The McKinsey study indicated that total energy savings across these industries could amount to over EUR 363 million.[5] This sum could contribute to financing further investments in energy-efficient industrial technologies and in green ICTs.

However, financing the implementation of these innovations, particularly in developing countries, will be a major challenge. The use of taxation on current levels of carbon output may be counterproductive in the existing economic climate. Alternative policies of providing incentives for private sector adoption of energy-efficient innovations should be considered by governments. Additionally, the cap and trade mechanism (by which limits are placed on carbon consumption and any resulting savings traded commercially) may also provide an avenue to safeguard ecosystems while being able to finance the diffusion of energy-efficient technologies and promote other sustainable development objectives. The smart use of universal access funds to source green technology could also provide creative ways to finance or subsidise energy-efficient and pro-poor ICTs, especially in developing countries.

If ICTs are to more effectively influence attitudes and behaviour toward a greener environment, strategies would need to be adopted to link info-literacy with environmental literacy programmes as they are taught in schools and communities. Government information services, corporate public service announcements and advertising campaigns could also more actively promote environmental awareness, including through the popular internet social networking sites where some of the most receptive, youthful audiences reside.

Conclusions

One of the critical challenges of our era is to balance the competing demands for more widespread use of ICTs with their energy-efficient deployment, and safer e-waste disposal at the end of their useful life. We must also face the challenge of using ICTs to help other industries realise greener objectives, whether these are self-imposed or externally regulated. In these ways we could better contribute to meeting crucial human development objectives such as those embodied in the Millennium Development Goals (MDGs) of the United Nations (UN). The technology strategies and targets emanating from governments, the UN Internet Governance Forum and other multilateral and post-World Summit on the Information Society channels should be audited and recalibrated for their implications for environmental sustainability. Even as developing countries seek investors and affordable ICT access for low-income populations, they cannot afford to do so at any cost to the environment. Significant reforms in showcasing sound public policies and incentivising good corporate citizenship should be devised, alongside tough environmental regulations in order to align the needs of private sector investors and governments with the social requirements for the more environmentally responsible use of ICTs. "We", who are the primary users, beneficiaries and custodians of the burgeoning ICT industry, must also seek solutions on our own doorsteps. ■

4 www.euractiv.com/en/climate-change/ict-climate-change-problem-solution/article-180760

5 www.euractiv.com/en/climate-change/study-sheds-light-ict-sector-carbon-footprint/article-173710

ICTs, sustainability and the green economy

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Introduction

The concept of sustainable development has been elaborated and refined in the years since the Brundtland Report on environment and development, which defined sustainable development as "development that meets needs of the present without compromising the ability of future generations to meet their own needs."[1] Although there is no single definition of sustainable development, there is general agreement on certain fundamental principles:

- The goal of sustainable development policy is human well-being for people everywhere, measured in terms of factors such as security, satisfaction of material needs, health, social relations, and freedom of choice and action.
- To meet this goal it is necessary to generate and distribute wealth in ways that reduce poverty and provide a decent standard of living to people everywhere.
- This can only be done in the long run through policies and strategies that balance economic growth with social development and with environmental sustainability.
- Technology and social organisation play critical roles in achieving the long-term balance between human development and the natural environment that is essential for sustainable development.
- Technological, economic and social innovation will be key factors in reducing our "ecological debt". This debt results from the fact that the planet's resources are being consumed at a greater rate than they can be replenished. It would take the resources of 1.5 planets to support our current lifestyle, and two planets under a business-as-usual scenario by mid-century.

ICTs and the environmental crisis

There is no question that the production and use of information and communications technologies (ICTs) contribute to the crisis. The energy consumption of ICTs is on the rise. The ICT sector's contribution to global CO_2 emissions – currently 2-3% – is projected to double by 2020 under business-as-usual scenarios.[2] Furthermore, the ICT sector depends on the extraction of essential and valuable metals such as tantalum, which played a role in funding the bloody civil war in the Democratic Republic of Congo between 1996 and 2003.[3]

At the other end of their life cycles, vast quantities of ICTs become highly specialised waste that includes environmentally hazardous metals like lead, mercury and cadmium, as well as toxic flame retardants and plastics.[4] Developing countries are already hot-spots for electronic waste (e-waste). About 80% of all the e-waste that is diverted – out of a yearly global e-waste production of about 40 million tonnes[5] – is exported to developing countries such as China, India, Pakistan, Vietnam, the Philippines, Malaysia, Nigeria and Ghana.[6] Some of this e-waste is salvageable, but the Basel Action Network, a civil society organisation, found that up to 75% of every shipping container arriving in Lagos ends up being dumped in landfills or by the roadside as garbage. In China and India, extracting valuable minerals from e-waste has become a major, informal industry, dangerous to both health and environment.

Who is responsible? Much of the e-waste exports may be illegal under the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal and Organisation for Economic Co-operation and Development (OECD) directives, but exporting countries are not taking responsibility, leaving recipients with the problem of stopping undesirable imports at the border.[7] Importing e-waste has been illegal in Nigeria since 1988 and in China since 2000, but continues, owing among other things to missing regulations, a lack of awareness or resources among lower-level and local officials, and corruption. Yet even if foreign waste streams are curtailed, ICT use is rapidly increasing in developing countries, and

1 World Commission on Environment and Development (1987) *Our Common Future*, Oxford University Press, Oxford, p. 43.

2 The Climate Group (2008) *SMART 2020: Enabling the Low Carbon Economy in the Information Age*. www.smart2020.org/_assets/files/02_Smart2020Report.pdf

3 Vetter, T. (2009) Resource Wars and Information and Communication Technologies, paper by the International Institute for Sustainable Development. www.iisd.org/pdf/2008/com_resource_wars.pdf

4 Robinson, B. H. (2009) E-waste: An Assessment of Global Production and Environmental Impacts, *Science of the Total Environment* 408 (2), p. 183-191.

5 United Nations Environment Programme (2010) *Recycling – From E-waste to Resources*. www.unep.org/PDF/PressReleases/E-Waste_publication_screen_FINALVERSION-sml.pdf

6 Puckett, J., Westerwelt, S., Gutierrez, R. and Takamiya, Y. (2005) *The Digital Dump: Exporting Re-use and Abuse to Africa*. www.ban.org/Library/TheDigitalDump.pdf

7 Ibid.

their volume of obsolete PCs – to take one example – is expected to exceed that of richer countries by 2018.[8]

At the same time, ICTs have been shown to be a significant driver of economic growth in both developed and developing countries.[9] OECD member countries invested significantly in broadband infrastructure, smart electricity grids, buildings and transportation systems, and e-health and e-education applications as part of the stimulus packages they adopted to restore growth in the aftermath of the 2008-2009 financial and economic crisis.[10] The World Bank has found an increase in economic growth of one percentage point per ten percentage point increase in connectivity, with an even stronger correlation in low- and middle-income countries. Higher broadband penetration raises productivity throughout the economy and increases a country's exports by over four percentage points for every one percentage point increase in internet users. Investments in ICTs can also serve to strengthen economic opportunities and reduce income disparity in rural communities, by providing access to previously unavailable information and services, such as market prices for produce, health, and education.

Digital opportunities in the green economy

The concept of the "green economy" is still evolving, but is gaining traction around the world, as much as a process as an end state. According to the United Nations Environment Programme, greening the economy refers to "the process of reconfiguring businesses and infrastructure to deliver better returns on natural, human and economic capital investments, while at the same time reducing greenhouse gas emissions, extracting and using less natural resources, creating less waste and reducing social disparities."[11]

Although its emergence on the international agenda was triggered by the financial and economic crisis of 2008-2009, the concept of a green economy is a product of paradigm shifts that have taken place in recent decades as economic, social and environmental issues have begun to converge in the context of globalisation. Just as sustainable development policy makers have begun to focus on the role of innovation, market mechanisms, and social entrepreneurship in the achievement of environmental and other objectives, the ICT sector and ICT policy makers have begun to recognise the opportunities emerging from the critical role ICTs can play as a key enabling technology supporting green growth and the development of the green economy.

Over the past five to ten years a consensus has emerged that ICTs can support the development of the green economy in three principal ways:

- By decreasing *direct effects* on the environment of the production, distribution, operation and disposal of ICTs through improved energy and materials efficiency, increased use of renewable energy sources, reduced use of toxic materials, and improved recycling and end-of life disposal of ICTs.
- By increasing the *enabling effects* of ICTs on the development of the green economy through improvements in the efficiency of production, distribution and consumption of goods and services throughout the economy and society; by reducing demand for energy and materials through the whole or partial substitution of virtual products and services for their physical equivalents (dematerialisation).
- By supporting *systemic effects* that result in transformation of the behaviour, attitudes and values of individuals as citizens and consumers; economic and social structures; and governance processes.

Key questions to be resolved

- *Rebound effects:* Will the increased energy and material efficiencies enabled by the internet result in increased consumption? Economic theory and practical experience suggest that this is likely to happen in the absence of measures to suppress demand and/or supply. If so, what are the relative merits of different policy options for dealing with rebound effects?
- *Unintended consequences:* What is the human impact of the openness and dematerialisation enabled by the internet? How and to what extent could unintended consequences for individuals, social relationships, communities, organisations and countries limit the capacity of the digital economy to support the transition to a green economy? What policies, strategies and governance mechanisms are needed to deal efficiently and effectively with unintended consequences?

8 Yu, J., Williams, E., Ju, M. and Yang, Y. (2010) Forecasting Global Generation of Obsolete Personal Computers, *Environmental Science & Technology*, 44 (9), p. 3232-3237.

9 World Bank (2009) *Information and Communications for Development 2009: Extending Reach and Increasing Impact.* go.worldbank.org/NATLOH7HV0

10 OECD (2009) *The Impact of the Crisis on ICTs and their Role in the Recovery.* www.oecd.org/dataoecd/33/20/43404360.pdf.

11 United Nations Environment Programme (n.d.) Green Economy Initiative. www.unep.org/greeneconomy

- *Uncertainties and unforeseen events:* What new kinds of threats and vulnerabilities arise in a world where human, material and natural systems are interconnected and hyperlinked in real time, particularly when artificial intelligences of one kind or another make decisions? What policies and strategies are needed to anticipate uncertainties and respond to the impact of unforeseen events? How can these policies and strategies be shaped so as to avoid creating barriers to the synergistic growth of the digital economy and the green economy?

Final thoughts

We live in a world where constraints of space and time have shrunk, interconnection has increased, and the pace of change has accelerated. These changes have been largely enabled by ICTs. The time has come to use these technologies much more effectively to manage the consequences of the economic and social change, and its impact on the environment. Although the need for a green economy is now widely recognised, international resolve is still lacking.

Governments play an essential role in enabling sustainable development and in the transition to a green economy, but they are slow to implement policies, and powerful economic and political forces often protect the status quo and vested interests that are at odds with the vision of a new economy. Undoing the policies and practices that are behind business as usual clearly is a mammoth task, but ICTs can facilitate the transition. The development of the internet and other ICTs has created a platform and tools for information processing, communications, knowledge sharing, consensus building and decision making that enable all peoples to progress toward the goal of sustainable development. ■

ICTs and climate change research: The emerging development agenda

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Introduction

Climate change is likely to exacerbate the poverty and marginalisation of developing country populations. Yet those same populations increasingly have access to information and communications technologies (ICTs). How can we characterise the research work done so far linking ICTs, climate change and development, and what should be the future research priorities?

The first part of this report will overview the emergence of a development agenda within ICTs and climate change research to date. The second will identify emerging research ideas, including the argument that "e-resilience" represents the key concept linking the ICT, climate change and development fields. Finally, the report will identify emerging themes for future research (and practice).

Understanding work to date

The relation between ICTs and climate change constitutes a relatively new area of enquiry. In the 1990s, there were broad reflections on the linkages between the information society and sustainable development. These became increasingly focused on the role of ICTs in climate change mitigation and monitoring, and more recently, on adaptation. In more detail, we can see three distinctive, yet interrelated strands that have so far characterised research at the intersection of ICTs, climate change and development.

Sustainable development and the environment

Research in this strand addresses the linkages between ICTs and the achievement of environmental sustainability from a global perspective, looking at issues such as achievement of the Millennium Development Goals (MDGs) and the potential of these technologies in natural resource management and monitoring.[1] Although sources in this strand emerged without making explicit reference to climate change, they have set an important foundation for analysis of the role of ICTs vis-à-vis environmental sustainability.

Mitigation

Reflecting increasing global awareness about the effects of CO_2 emissions, this strand is characterised by research that tackles, with increased technical specificity, climate change mitigation. Driven primarily by developed countries' priorities in the field, it focuses on the role of ICTs in reducing CO_2 emissions through carbon displacement (e.g. telework, dematerialisation),[2] and the use of energy-efficient applications in "smart" telecommunications, power, transportation and services industries, among others.[3]

Adaptation

Following publication of the Intergovernmental Panel on Climate Change (IPCC) 2007 report and growing concern over the effects of climate change on vulnerable populations, this research strand is the most recent to emerge. It tackles the priorities of developing countries through adaptation (i.e. recovery and adjustment in the face of climate change). Initial evidence on the potential of ICTs, particularly mobile phones, is starting to be reflected,[4] along with examples of applications that can strengthen local livelihoods, social networks, decision-making processes and dissemination of information relevant to local adaptive strategies.

The ongoing, non-linear evolution of these strands is summarised in Figure 1. The *x axis* reflects the evolving focus of research on the main strands described above. The *y axis* reflects the development of different research approaches: from global to more developing country-relevant (or DC-specific), and from theory to practice.

As Figure 1 suggests, the potential of ICTs to contribute to climate change adaptation in developing countries remains the least researched, particularly in relation to the maintenance of sustainable livelihoods in the midst of a changing climate.[5]

Nonetheless, research is beginning to tackle developing country priorities from new angles, and the concept of "resilience" is rapidly emerging as an issue of increasing relevance.

1 Felleman, J. (1997) *Deep Information: The Role of Information Policy in Environmental Sustainability*, Ablex Publishing Corporation, Greenwich, UK; Cohen, N. (1998) Greening the Internet: Ten Ways E-Commerce Could Affect the Environment and What We Can Do, *Environmental Quality Management*, 9 (1), p. 1-16.

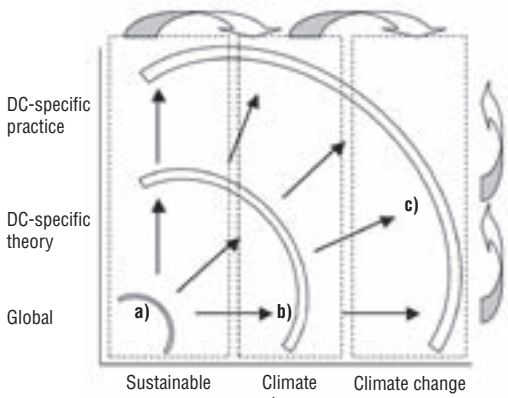
2 ITU (2008) *ITU and Climate Change*. www.itu.int/themes/climate/docs/report/index.html

3 WWF (2002) *Sustainability at the Speed of Light*. assets.panda.org/downloads/wwf_ic_1.pdf; Pamlin, D. and Szomolanyi, K. (2005) *Saving the Climate @ the Speed of Light: First Roadmap for Reduced CO_2 Emissions in the EU and Beyond*. assets.panda.org/downloads/road_map_speed_of_light_wwf_etno.pdf

4 Labelle, R., Rodschat, R. and Vetter, T. (2008) *ICTs for e-Environment: Guidelines for Developing Countries with a Focus on Climate Change*. www.itu.int/ITU-D/cyb/app/docs/itu-icts-for-e-environment.pdf

5 Ospina, A. V. and Heeks, R. (2010) *Unveiling the Links between ICTs & Climate Change in Developing Countries: A Scoping Study*. www.niccd.org/ScopingStudy.pdf

Figure 1. **Additions to literature on ICTs, climate change and development over time**



Emerging research

The effects of climate change magnify existing development challenges, having a greater impact on vulnerable populations.[6] Because of this, the potential effects of climate change must be analysed as part of the broader development stressors and resource constraints which ultimately determine a community's ability to respond, both in the short and long term, to the challenges posed by extreme weather events and climatic uncertainty.

One important area of research will therefore be to understand the links between ICTs and the vulnerability dimensions (livelihoods and finance, socio-political conditions, food security, health, water supply, habitat and migration)[7] that are exacerbated by the effects of climate change. Another will be to look at the flipside of vulnerability: at the contribution of ICTs to the resilience of developing country communities, which underpins their ability to survive and adapt in the face of climate change.

ICTs and resilience: "E-resilience"

Defined as the ability of a system to withstand, recover and change in the face of an external disturbance[8] (such as acute or chronic climate change), resilience constitutes an important property of livelihood systems which, through a set of seven dynamic sub-properties (robustness, scale, redundancy, rapidity, flexibility, self-organisation and learning) can enhance adaptive capacity.

As Figure 2 illustrates, there are therefore two routes to analysing the role of ICTs vis-à-vis climate change adaptation. First, through the dynamic links of ICTs with livelihood assets, institutions and structures, in this way creating capabilities that contribute to adaptive actions. The second, less-explored route, focuses on "e-resilience": "a property of livelihood systems by which ICTs interact with a set of resilience sub-properties, enabling the system to adapt to the effects of climate change."[9]

The "E-resilience Framework" emerges from recognition that the complex linkages existing between climate change, adaptation processes and development outcomes need to be analysed from a systemic perspective.[10] This allows identification of the different components, processes and properties, as well as the interactions that play a role in the realisation of adaptation within vulnerable settings, facilitating the identification and analysis of the potential contribution of ICTs.

Key areas for future research

Emerging experiences from vulnerable communities in Asia, Africa, Latin America and the Caribbean point to use of community radio, mobile phones, the internet and other ICTs as an increasingly important part of climate change responses. They also indicate the value of an e-resilience approach, since this moves beyond shallow surface effects to understand the way in which ICTs can – but often fail to – have a deeper and systemic effect that will help communities and nations to sustain.

6 IPCC (2007) *Fourth Assessment Report (AR4).* www.ipcc.ch; Moser, C. and Satterthwaite, D. (2008) *Towards Pro-Poor Adaptation to Climate Change in the Urban Centres of Low and Middle-Income Countries.* www.iied.org/pubs/pdfs/10564IIED.pdf; Kalas, P. P. and Finlay, A. (2009) *Planting the Knowledge Seed: Adapting to Climate Change using ICTs.* www.bcoalliance.org/Climate-Change

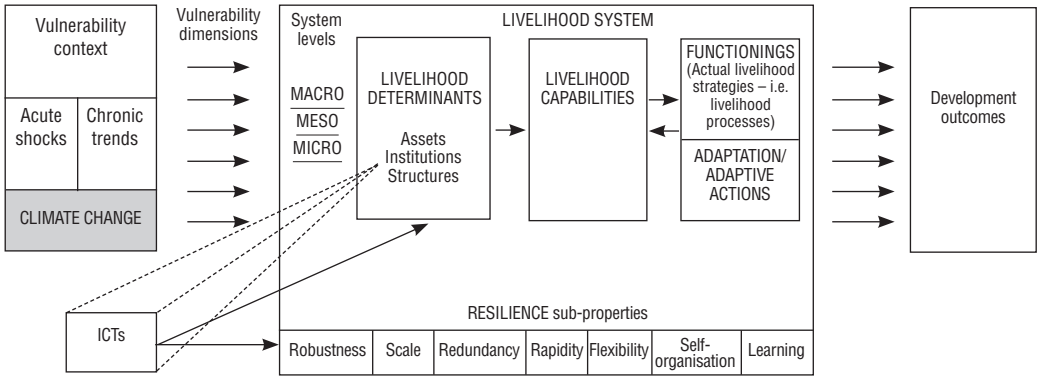
7 These dimensions correspond to areas in which climate change-related manifestations are expected to have the hardest effects on vulnerable contexts, including natural habitats (e.g. desertification, land degradation), scarcer water resources (e.g. melting glaciers, sea level rise), decrease in agricultural production, health threats (e.g. heat- and cold-related illness, vector-borne and infectious diseases), as well as risks to human infrastructure and habitats (e.g. climate-related displacement and migration).

8 Magis, K. (2009) Community Resilience: An Indicator of Social Sustainability, *Society and Natural Resources*, 23, p. 401-416.

9 Ospina, A. V. and Heeks, R. (2010) *Linking ICTs and Climate Change Adaptation: A Conceptual Framework for e-Resilience and e-Adaptation.* www.niccd.org/ConceptualPaper.pdf

10 Nelson, D. R., Adger, N. W. and Brown, K. (2007) Adaptation to Environmental Change: Contributions of a Resilience Framework, *Annual Review of Environment and Resources*, 32, p. 395-419.

Figure 2. **E-resilience Framework**



Where failure occurs, past work in the ICT for development (ICT4D) field indicates it arises from a mismatch between design requirements and on-the-ground realities, including issues such as lack of coordination between communities and local/municipal/national institutions; barriers of access that cause exclusion and marginalisation; and lack of capacity to undertake mitigation, monitoring and adaptation actions.

A key priority for future research will therefore be to understand both the opportunities but also the challenges for ICTs in enhancing community and national resilience, through their effects on the resilience sub-properties, including:

- Fostering *robust* livelihoods that are able to withstand shocks and maintain their performance under climatic fluctuations
- Broadening the *scale* of assets and structures that need to be accessed to cope and adapt to climatic occurrences
- Building *redundancy* and asset diversity
- Enabling *rapidity* in the access and mobilisation of resources needed to cope and adjust to the effect of hazards and variability
- Enabling system *flexibility* to undertake different actions and benefit from potential opportunities that may arise within a changing climate
- Facilitating systemic *self-organisation* in the face of external disturbances
- Generating *learning*, including skills and capacities that help respond to and prepare for future climate uncertainty.

Conclusion

Consideration of the development context, including prevailing vulnerabilities, is pivotal in determining the viability, appropriateness, and ultimately the sustainability of ICT-enabled responses to the changing climate. Further analysis of e-resilience can help improve our understanding of the role of ICTs, and assist in identifying key areas in which these tools have greatest potential to strengthen adaptive capacities and livelihood strategies.

As research at the intersection of ICTs, climate change and development continues to evolve, developing country priorities and perspectives must become a central part of the debate, if the technology's potential is to contribute to more holistic, inclusive responses to the challenges posed by climate change. ■

Tackling e-waste

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Introduction

The 20th century was marked by the impact of information and communications technology (ICT) on social and economic development. The digital revolution, started in the late 1970s, led to explosive production and extensive use of electronic and electrical equipment – one reason that has made the information society affordable. However, this has also meant that ICTs have become commodities, and have over time been designed to reach their end of life sooner. This is creating a massive amount of electronic waste (e-waste) globally, and has presented the challenge of dealing with toxic materials in ICTs that harm lives and the environment.

E-waste, e-scrap or waste electrical and electronic equipment (WEEE) refers to discarded, outdated, obsolete or broken electrical or electronic devices.[1] Many environmental groups claim that developed countries use developing countries or emerging economies as "dumping grounds"[2] for e-waste. These groups often state that growing consumerism and fast improvements in technology are leading to an increase in the amount of dangerous e-waste being dumped on the world's poorest nations.[3]

How much e-waste is generated?

E-waste is one of the fastest growing waste streams today and it is growing at three times the rate of municipal waste globally.[4] As per current estimates, the ICT industry is expected to generate 53 million tonnes of e-waste by 2012.[5] Only 13% of this waste is reported to be recycled with or without adequate safety procedures. This, however, excludes illegal dumping. In the European Union alone, 9.3 million tonnes[6] of electronic equipment was put on the market in 2005. In the United States (US), about 18% of TVs and IT products (a total of 26 million TVs and 205.5 million IT products, including peripherals) and 10% of mobile phones (a total 140.3 million units) were recycled in 2007.[7]

In 2008, over 280 million[8] mobile handsets were sold worldwide in just the first quarter, which suggests a sale of a billion handsets in that year. With limited access to e-waste data in developing countries like India and China, estimated figures are linked to sales figures for consumer electronics. Greenpeace estimates that four million PCs are discarded each year in China alone. In 2009, investigative reports[9] by United Kingdom (UK) media houses from dumping sites in Ghana and Nigeria tracked electronic devices that belonged to the UK's leading public institutions including councils, the police department and health services.

E-waste and human health

Modern electronics can contain up to 60 different elements. These devices are manufactured from human-made and natural materials. Many are valuable, some are hazardous and some are both. The most complex mix of substances is usually present in the printed wiring boards. When toxics are exposed, potential human impacts include – but are not limited to – lung cancer and damage to the heart, liver and spleen. Some could also lead to brain swelling and muscle weakness. Chromium VI and lead may also cause DNA damage. Substances like mercury can cause brain and liver damage if ingested or inhaled. The burning of e-waste is very common in developing countries and it can leave high levels of lead present in soils and the water.

Recycling as a way of avoiding resource depletion

A 2009 report from the United Nations Environment Programme (UNEP), *Recycling – From E-waste to Resources*, offers several considerations of the hidden environmental impact of electronic devices.

Besides the impact on people's lives, one important reason to encourage the proper recycling of technology is the impact that the production of ICTs from scratch has on the environment and on crucial resources. Mining plays the most important role in the supply of metals for electrical and electronic equipment, since supply from recycling is very limited and it cannot meet the industry's demand. Vast lands are used for extracting natural resources for ICTs, which also use up other precious resources such as water and energy in production, resulting in tonnes of CO_2 emissions. For example, to produce one tonne of gold, palladium or platinum, CO_2 emissions of about 10,000 tonnes on average are generated.

1 Adapted from Wikipedia's entry on e-waste: en.wikipedia.org/wiki/Electronic_waste

2 See Greenpeace's mapping of e-waste: www.greenpeace.org/international/en/campaigns/toxics/electronics/the-e-waste-problem/where-does-e-waste-end-up

3 Osborne, H. (2006) Rich nations accused of dumping e-waste on Africa, *The Guardian*, 27 November. www.guardian.co.uk/technology/2006/nov/27/news.waste

4 Sinha, S. (2010) *Sustainable E-waste Management*. www.toxicslink.org/artview.php?id=134

5 Ibid.

6 Husman, J. et al. (2008) *Review of Directive 2002/96 on Waste Electrical and Electronic Equipment (WEEE)*, UN University, Bonn.

7 www.computertakeback.com/Tools/Facts_and_Figures.pdf

8 Geyer, R. and Doctori Blass, V. (2010) The economics of cell phone reuse and recycling, *International Journal for Advanced Manufacturing Technology*, 47 (5-8), p. 515-525.

9 www.independent.co.uk/news/world/africa/dumped-in-africa-britain8217s-toxic-waste-1624869.html and www.bbc.co.uk/news/world-europe-10846395

Gold is used in computers to ensure rapid and accurate transmission of digital information through the computer. Gold meets these requirements better than any other metal. Therefore the annual demand for gold in electrical and electronic equipment is some 300 tonnes on average. This extraction alone produces 5.1 million tonnes of CO_2 (at the rate of 17,000 tonnes CO_2 per tonne of gold). Other metals like copper, cobalt, tin, indium, silver, palladium, platinum and ruthenium used in electrical and electronic equipment account for an annual CO_2 emission level of 23.4 million tonnes, almost 1/1000 of the world's CO_2 emissions. These 23.4 million tonnes do not include CO_2 emissions from metals used in electrical and electronic equipment like steel, nickel or aluminium, nor other CO_2 emissions associated with the manufacturing or use of electrical and electronic equipment.[10]

So what needs to happen? The challenge is to raise awareness among all actors – policy makers, producers, consumers and recyclers – in order to be aware of the environmental impact and realise the innovation potential that could lead to sustainable consumption.

Policy and regulatory mechanisms

E-waste is very much a subject dealt with by individual states, even though the movement (or dumping) of e-waste blurs state boundaries. In order to address the transborder issue, the United Nations (UN) introduced the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal. So far 134 countries have recognised this convention. Australia, Canada, New Zealand and the US are yet to ratify it. Nevertheless, ratification of the Basel Convention has not necessarily led to policy or legislative responses.

In some countries where legislation has been developed, the success has been mixed. For instance, despite all legislative efforts to establish sustainable e-waste recycling in many developed countries such as the UK – also party to 1994 European Community convention that bans the export of hazardous waste to anywhere outside the Organisation for Economic Co-operation and Development (OECD) – these laws often lack effective implementation or regulations. Good recycling calls for efficient collection points, appropriate recycling technologies, and integrating streams of waste in a country or region with appropriate recycling infrastructures in place.

With regard to e-waste policy and regulatory mechanisms in developing countries, the situation is potentially similar by analogy to how governments handled ICT policies in the early days of ICT policy making: treating it as part of postal and telegrams policies. A recent study by UNEP analysing policy and legislation mechanisms to assess barriers for sustainable e-waste in eleven countries (South Africa, Kenya, Uganda, Morocco, Senegal, Peru, Colombia, Mexico, Brazil, India and China) showed that no country – with the exception of China with a poor record of implementation – has dedicated policy and legislative mechanisms to deal with e-waste. As a result, the legal scope and definition to recognise e-waste is in danger of morphing with hazardous waste. Such policy generalisation makes e-waste recycling unaffordable and potentially undermines the market opportunities involved in it.

A dedicated policy and legislative mechanism should be in place and offer clear guidelines and steps for collection, dismantling, pre-processing and end-processing for final metal recovery. This is important as emerging (and developing) economies will continue to generate more e-waste in the next twenty years. For example, the growth rate of mobile phone uptake in India continues to be over 80% and UNEP estimates mobile waste will be multiplied by eighteen until 2020. Lastly, policy support should exist to improve the harmonisation of waste streams nationally and regionally, including integrating waste management approaches with other sectors.

All these point out that there is an immediate need to create dialogue and spaces to develop policy and legislative mechanisms through effective stakeholder engagement involving government, industry and civil society organisations.

From voluntarism to accountability

Producers of electronic devices transcend nation-state borders. This is especially the case with mobile phones and electronic gadgets for entertainment. In the past decade, major players in electronic devices have come up with voluntary codes of practices towards sustainable use and recycling of their products. A recent report from the GSM Association, which informs its stakeholders about how the telecommunications industry is working to address its environmental responsibilities for both new and used phones, is one useful example. Similarly, members of the Global e-Sustainability Initiative (GeSI) came up with a SMART 2020 strategy to fight against climate change, which could enable emissions reductions of seven gigatonnes of CO_2 by 2020.

In the absence of strong legislative practices, voluntary actions appear to guide waste management – both at global and national levels. Where a policy mechanism exists, such as in the European Union, the implementation is weaker. Despite the common WEEE Directive, the 27-member-state European Union has more than 100 collection systems and every system

10 United Nations Environment Programme (2009) *Recycling – From E-waste to Resources*. www.unep.org/PDF/PressReleases/E-Waste_publication_screen_FINALVERSION-sml.pdf

has another weak spot.[11] A major problem here is inconsistency amongst collection systems by producers that needs serious attention by implementing agencies. Collective efforts by producers to receive, dismantle and recycle waste need policy support. Producers also lack incentives (e.g. market opportunities for recycling systems and products) and therefore it is cheaper for them to dump (often illegal) waste in developing countries.

These initiatives are important good practices but corporate or individual voluntarism alone cannot provide solutions to e-waste. Policy and legislative mechanisms should actively hold producers to account, especially in creating infrastructures and systems to collect e-waste and ensure its proper delivery to approved dismantling units. Because of the impact on human health and the environment, e-waste cannot be left to voluntarism. It should be treated as a national priority and regarded as a key consumer awareness issue.

Raising awareness

Currently, the data on e-waste are poor and insufficient, limiting our understanding of the issues and therefore solutions. Analysts often depend on estimations to map data at a national, regional and global level. Given the very limited data available on amounts of e-waste collected and treated through "official" e-waste channels, it is clear that the recycling of significant proportions of e-waste currently goes unreported in different parts of the world.

Awareness is also important to sensitise the public on reusing and/or recycling electronic devices. A Nokia global consumer survey showed that the majority of old mobile phones are lying in drawers at home and not being recycled.[12] At the same time, the GSM Association estimates that more than 70% of a mobile phone can be recycled.

Media reports are often on illegal dumping and its potential dangers with very little space for what needs to happen to manage e-waste. For instance, there is very little information on the need for an e-waste management system and its impact on poor labourers.

The working class in the information society

Emphasis on accountability would also mean formalising labour forces in developing countries that deal with e-waste. International media reports, activists and civil society organisations have produced evidence that the poor, informal sector in developing countries is often responsible for processing toxic e-waste.

While the "digital divide" has dominated policy debates and scholarly analysis, the emergence of a "working class"[13] in the information society is hardly recognised. Mobile phones, the internet and computers are often seen as privileges of the few and wealthy. The labour side of the information society hardly features in any policy debate. Civil society organisations should raise awareness and build public pressure about the emergence of this information society working class, so that it gets the attention of policy makers. Government and producers should create infrastructures and sustainable safety systems for dismantlers, such as managed recycling hubs in select towns. Examples like the material recovery facility, a Hewlett-Packard pilot project in Cape Town, should be explored for scaling up.

Financing e-waste

The financing of e-waste management and allocation of economic responsibilities along the downstream chain has proven to be challenging in countries with existing take-back schemes and in countries discussing potential take-back system architectures. Many models exist in different countries.

From a general perspective, three main stakeholders could bear responsibilities for managing e-waste:

- *The producers:* This is based on the producer responsibility principle. This is possible by reducing sales margins, or increasing sales prices. The current producer responsibility principle across Europe has not always been an incentive to collect more, simply because stakeholders responsible for financing have no economic benefits.
- *Government:* As e-waste is a societal problem and it has long-term environmental impact, the management system could be effectively regulated by policy mechanisms. Government also can use civil society organisations and media as watchdogs and management systems could be judiciously financed by tax.
- *The consumers:* This is an extension of the "polluter pays" principle.

Conclusion

This overview of managing e-waste within the global and national context is very broad and I have only touched on key issues that need immediate consideration. The most urgent intervention is to raise awareness among all actors, and to create a dedicated policy and legislative mechanism through stakeholder engagement. Recognition of the working class in the information society in policy mechanisms is a crucial step to formalise dismantlers who deal with e-waste. ■

11 www.bbc.co.uk/news/world-europe-10846395

12 pressbulletinboard.nokia.com/2008/07

13 For more information, see Qiu, L. J. (2009) *Working-Class Network Society: Communication Technology and the Information Have-Less in Urban China*, MIT Press, Cambridge (USA).

Smart technologies

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The future of electricity: Diverse, connected, clever

In 2008, South Africans learnt a new term: "load shedding".

Unlike the 2003 "Northeast Blackout" which affected 50 million people in the United States and Canada (or even larger blackouts in Italy, also in 2003, Indonesia in 2005 and Brazil in 2009), load shedding is the planned and scheduled interruption of electricity supply to specific areas or industries in order to make up for a shortfall in generation capacity.

What South Africans experienced was not a "forced outage" or a large-scale blackout, but a "rolling blackout". It has become a common phenomenon in many developing nations. In South Africa, load shedding cost the economy billions and raised a red flag on the state of the country's energy security.

By 2010, South Africa was hosting the world's biggest sports event with power at least temporarily secured. Strides are being made at the policy level to introduce clean energy into the country, not only because of a proactive stance on climate change, but because of the economic security and savings provided by energy efficiency.

Looking forward

Now imagine it is June 2020 and the Olympic Games have come to Durban, South Africa. The sun is just going down as you get home from work. You plug your new "Made in South Africa" hybrid electric car into the garage charge point, keen to kick off your shoes and watch the opening ceremony on your 3D home theatre.

As the house switches on the lights, you cannot tell that there is load shedding going on. But this is not the load shedding of 2008: a smart meter in the house's electrical distribution box has responded to a request from the transmission system operator to save some electricity during the early-evening peak and has switched off the solar geyser's electric back-up system.

Because the car is set to "parked mode" the smart meter decides to only start charging it later in the evening when the price drops to ZAR 0.75 per unit.[1] In fact, at the present peak-time price of ZAR 2.00[2] per unit, it makes economic sense to sell some of the remaining charge in the car's battery back onto the grid, making already-cheap electric mobility even cheaper.

Just like the Football World Cup a decade ago and despite the noticeable impact of climate change, the Summer Olympics are being held during a chilly South African winter – that is to say, cold everywhere but in tropical Durban.

While you are watching the ceremony, you notice that the street lights have gone out. It seems that the load shedding has spread as it often does on energy-thirsty cold nights. Fortunately, your home power monitor tells you that the smart meter was able to divert some of the car's battery power from the grid to the house's LED lights and electronics, so even that goes unnoticed.

Grid computer

This futuristic scenario is but the tip of the iceberg when it comes to the capabilities of a smart grid, of which the smart meter is only one component.

The smart grid embodies the convergence of two types of networked infrastructure: electricity and information and communications technology (ICT). Mobile phones have come to integrate radios, music players, cameras, TVs, email and internet devices. Similarly, smart grids do much more – and do it much more efficiently – than today's grids, which simply pump electricity one way: from power stations to buildings and factories.

In a smart grid, the flow of energy and information is multi-directional: solar panels on rooftops can supply to the grid, while a smart meter monitors and reports on this supply to the system operator and the building's energy management system. If there is a fault on a line or a cable has been stolen or there is a high parasitic load on a specific feeder line, the grid's monitoring systems can notify maintenance teams before anyone has picked up a phone to report it.

With the flexibility that intelligence brings, smart grids are far more robust than today's grid. An intelligent grid can spot problems before they affect or spread through the entire system, and in many cases can self-repair the problem. This includes potential power outages and variations in the quality of supply that cost economies like the United States more than USD 100 billion a year,[3] with commerce and information-based industries suffering the greatest losses.

1 The average wholesale cost of electricity will be ZAR 0.70/kWh by 2013 according to the 2009 Multi-Year Price Determination by the South African energy regulator, NERSA. USD 1 = ZAR 8

2 The marginal cost of peaking electricity (from gas turbines) is around ZAR 3.50/kWh.

3 www.epri-intelligrid.com/intelligrid/docs/Cost_of_Power_Disturbances_to_Industrial_and_Digital_Technology_Companies.pdf

The future is electric

Grids that can predict and plan are also a key enabler for adding large amounts of variable renewable energy to the generation mix. Smart grid applications can predict, for example, the supply of wind power for the next day, the next hour or the next minute based on weather models and real-time data. Other applications can optimise dispatch schedules (how much power is required and when it is required) for different generators.

In addition to electricity supplied from coal, nuclear and renewable energy plants, such a dispatch schedule might include:

- "Dispatchable demand-side management", which reduces demand (as in the example above of an electric geyser that can be turned off on request);
- Drawing electricity into the grid from energy storage (batteries or hydro-pumped storage schemes), which bolsters supply; or, unless it can be avoided
- Bringing quick-but-expensive peaking generators (like gas turbines) online.

The combination of variable renewable energy supply, hybrid and electric vehicles and smart grids are a match made in heaven. By storing the energy from one large (1 MW) turbine in the batteries of 25 electric vehicles,[4] you can get a guarantee of (300 kW of) steady power, even when the wind comes and goes. The car owner, in turn, gets access to clean energy at a very low marginal cost. A smart grid brings all of this – distributed, renewable energy power and energy storage devices like vehicle traction batteries – together, where and when required.

Smart grids are set to revolutionise energy markets by providing real-time information across the grid. This is essential for the implementation of flexible pricing mechanisms like time-of-use tariffs, free basic electricity, escalating block tariffs and electricity quota systems (like that contemplated for the South African government's Power Conservation Programme). You cannot get real-time information from a monthly reading of a meter. You need intelligent systems that can record and transmit usage data in a structured way to multiple users of that data: the user of the electricity (via the building or process monitor), the utility supplying the electricity and the system/network operator who manages it.

Intelligent empowerment

Just as telecommunications networks have given rise to e-commerce, smart grids also support new markets: electricity "users" are empowered to become "participants" in the energy market – they can sell electricity they produced or stored or even electricity they *did not* use back to the system operator.

On top of this, smart grid participants (homes, businesses or factories) can choose to buy and sell electricity at the time when they would benefit most: buying off-peak and selling back excess power during peak times. The mechanics of supply and demand in an open and real-time energy market ensure that prices rise sufficiently when demand is high for additional supply to become available.

Because information on energy usage is also more visible – for example, it can be displayed in real time on an energy-use monitor – smart meters help change consumer behaviour to save more energy. Together, all of the energy-saving effects of smart grids are expected to reduce US consumption by as much as 4.3% by 2030.[5] The accompanying reduction in greenhouse gas emissions would be equivalent to converting 14 to 50 million cars to zero-emission vehicles every year.

A global movement

With all of these advantages, it is little wonder that smart grids are getting a lot of attention worldwide. In the United States, more than thirteen cities[6] have announced roll-out programmes for between one and five million smart meters each. In 2009, the federal government also earmarked USD 4.5 billion in stimulus funding to smart grid projects.

In the European Union, research on smart grids started in 2005 and smart grid policies are now being developed. South Korea plans to roll out a complete smart grid by 2030 and has started developing pilot programmes, Australia has committed USD 100 million to smart grids, and China is rolling out a smart grid focused on the transmission network.

4 A plug-in hybrid electric vehicle (PHEV) with a 100-km range can provide planning reserves of 1.5 kW and operational reserves of 5.8 kW (www.spinnovation.com/sn/Reports/A_Preliminary_Assessment_of_Plug-In_Hybrid_Electric_Vehicles_on_Wind_Energy_Markets.pdf). A wind turbine of 1 MW, at a 30% capacity factor and with a 15% capacity credit (corresponding to medium levels of penetration) requires 150 kW of operating reserve for 300 kW of "firm capacity" (lightbucket.wordpress.com/2009/03/12/the-capacity-credit-of-wind-power). Thus, 150kW/5.8kW=25 PHEVs.

5 www.smartgridnews.com/artman/uploads/1/SGNR_2009_EPRI_Green_Grid_June_2008.pdf

6 David J. Leeds, GTM Research (2009) *The Smart Grid In 2010: Market Segments, Applications and Industry Players*. www.gridwise.org/documents/090901The%20Smart%20Grid%20in%202010%20GTM%20Research(revisedSept09).pdf

Some of the world's leading businesses are developing and selling smart grid products. This includes established engineering companies like ABB, Siemens and General Electric, as well as ICT companies like IBM, HP, SAP, AT&T, Cisco and Google. Upstart "cleantech" companies are also getting a share, including Comverge, Echelon, EnerNOC, GridPoint and Itron.

Companies specialise in different aspects of the smart grid architecture, including the power layer, the information layer and the application layer. Products span the whole power system, from generators to homes or factories, with the entire electrical infrastructure in between.

While there are still some competing standards for home area networks, some smart grid communications are converging on the leading standards in use in the ICT industry. This includes wireless standards like 2G/3G, WiMax and Wi-Fi.

As energy security and climate change continue to bite, we will require an energy revolution. Such a revolution, like many others, must be accompanied by better information, more accurately communicated, and mediated by technology shaped to our needs.[7] ■

7 For comprehensive information on smart grids, see the resources section of the US GridWise Alliance at www.gridwise.org/resources_gwaresources.asp

Green grassroots technologies

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Welcome to Nguruman, the heart of Maasailand

Springs of fresh water flowing freely, fresh air, thousands of different bird species, lovely picnic and camping sites, breathtaking sceneries… These are the many unique features that greet you as you enter Nguruman, Entasopia. Nguruman is located in the heart of the Maasailand in Kenya, approximately 158 kilometres from Kenya's capital city Nairobi. The first 120 kilometres from Nairobi to Magadi is a tar road, while the remaining 38 kilometres to Nguruman is untarred. The drive to Nguruman is marvellous, with a view of the Ngong hills, the Rift Valley, Lake Magadi, and the beautiful Nguruman and Loita escarpments.

With about 4,000 inhabitants, Nguruman is at the end of a rough road, and beyond the reach of power lines and modern facilities associated with urban life. It has no bank, no post office, few cars and little infrastructure. Daily newspapers get to the area after 1:00 p.m. due to transport logistics. Public transport is provided by one bus, which leaves for the capital early in the morning, returning at 10:00 p.m. At night, most people light kerosene lamps and candles in their houses or fires in their huts and go to bed early, except for the agropastoralists guarding crops against elephants and buffalos.

Nguruman is the last place on earth one would expect to find an internet connection, yet it is here where you find a community-based access centre referred to as a Maarifa (Knowledge) Centre, courtesy of an international NGO, the Arid Lands Information Network (ALIN).[1] ALIN – an organisation I work for – is an information network that works with rural communities in the East Africa region to improve the delivery and utilisation of useful information through the application of modern technologies.

A typical Maarifa Centre is located in a remote setting, and includes five or more computers with internet connectivity (as well as print publications). All of ALIN's Maarifa Centres are linked via internet to a central server and run a content management system (eNRICH) which enables content to be created and classified under different themes in English and local languages. Each of the Maarifa Centres can exchange content through downloading and uploading, and is used by people to find quality information, and to document and share their own good information.

1 www.alin.net

Nguruman Maarifa Centre

The Nguruman Maarifa Centre is housed by World Corps Kenya, an international non-profit organisation working on poverty issues, particularly the lack of access to energy, information and economic opportunities in rural areas of developing countries. Since most of the communities living here are agropastoralists, there is a need for information on markets, agricultural practices and livestock management, among other things. The youth, who form the bulk of the population, search for information on educational institutions, job opportunities, HIV/AIDS, reproductive health and entertainment.

The centre is located in a front shop for easy access by the residents who throng the market for other services. The centre is opened daily from 8:00 a.m. to 6:00 p.m. with shorter working hours during weekends. On a market day, this is the only place one can go to charge a mobile phone. In addition, this is the only place where you can get computer lessons and internet services. It is equipped with three desktop computers, one laptop, a printer and two satellite radios, which are used by listening groups. In addition the centre has VSAT[2] and two solar panels with a capacity of 315 watts and four batteries with a combined 48 volts.

Using the sun to get access

Mobile phone services

In Kenya, mobile phone industry growth continues to be one of the best in the world with a combined subscription base of 19.4 million by December 2009, representing a penetration rate of nearly 50%. According to ICT sector statistics from the regulator, the Communications Commission of Kenya,[3] the mobile signal covers 85% of the population and 34% of the land mass. This trend can be explained by, among other factors, the reduction in the cost of mobile handsets as well as the low cost of prepaid calling cards which go for as low as KES 20 (USD 0.25).

With such growth and uptake of technology, power remains one of the major factors determining the continuous operation of the centre – yet the Nguruman Maarifa Centre has none except solar. The centre offers phone-charging service for the residents using the two solar panels that are also used to power the computers. "We charge between 15-25 mobile phones on a weekday and between 20-30 mobile phones on a weekend," says Steve Mwangi, the ALIN field officer based at the centre.

2 VSAT (very small aperture terminal) is a two-way satellite ground station that uses a small dish antenna. en.wikipedia.org/wiki/Very_small_aperture_terminal

3 cck.go.ke/resc/statistics/Sector_Statistics_Report_Q2_2009-2010.pdf

Internet and computer lessons

Nguruman Maarifa internet connectivity was initially made possible in November 2007, when three young engineers from the University of Michigan's IMAGINE Africa project helped ALIN install the VSAT, powered by a solar panel, to hook up the three computers in the Maarifa Centre and connect this rural community to the rest of the world.[4] Prior to this the centre was using a GSM modem to connect only one computer at a time. Due to the rapid data evolution in the Kenya ICT sector, this VSAT connectivity has been replaced with a more cost-effective GSM router that has higher speeds and costs much less.

Through the solar energy, the Maarifa Centre offers free access to information and knowledge in line with ALIN's mission of promoting information exchange among communities. Community members come for skills. On average the centre trains approximately twenty people per month on basic computer operations and basic packages.

Empowering through green information

Among the innovations being powered by solar are iPods.[5] ALIN uses iPods as a podcasting platform to distribute tailor-made information on best adaptation practices to communities. iPods come in handy due to the low literacy levels: community members can visit the centre to view a short video clip, as opposed to reading a book. In the past year, ALIN has compiled many video clips on best practices in climate change adaptation. They include a voice-over in local languages and are used to educate the people. iPods can be borrowed and returned to the Maarifa Centres by regular users, catering for those with time constraints, such as women.

Other training through the centre includes working with Web 2.0 tools, like blogs. This has enabled the youth to create blogs. One such blog aims at improving ecotourism and attracting tourists to Nguruman.[6]

Limitations of power

For technical sustainability, the Maarifa Centre turns to the local community. It is responsible for assisting community members in repairing their electrical gadgets such as radios, torches and mobile phones. It has also incorporated a few skilled technicians from the community who have experience in electronics to offer services to the community at a low price using the centre's solar power.

One of the main challenges at the centre is, however, the insufficient power provided by the two solar panels, given the many demands from the community. Because of this, the centre can only operate for a given number of hours, limiting the equipment it can support. This means that people have shorter working hours on the computers, and limited access to the use of their mobile phones. Despite the demand for training and internet usage from the community, only part of it can be met due to the use of solar power.

Pros of solar power

- It is a renewable source.
- It is easy and cheap to install.
- It has a low maintenance cost once installed.

Handicaps of solar power

- Most equipment has not been configured for solar and needs extra gadgets.
- It cannot support heavy equipment, and when it does, the cost is prohibitive.
- The power output is affected by climatic factors such as rain and clouds.

E-waste management: A downturn in refurbishment

In the last few years, the government of Kenya introduced a policy to manage electronic waste (e-waste) due to the large number of computers that were being imported. This implies a 25% tax on the refurbished computers coming into the country. This has limited the number of imported computers and, in effect, the dumping of low-cost computers. At the same time, the new measure has reduced the number of people who can access technology.

The Maarifa Centre started by using refurbished computers from ALIN's computer refurbishment programme, but newer computers have been added to meet the demands of multimedia outputs that the centre produces. The refurbished computers have been in service for over two years and they are useful for training.

To manage e-waste related to computers, another computer refurbishment programme, and one of the leading refurbishers, Computers for Schools Kenya, set up an e-Waste Management Centre in 2008, with a view to providing e-waste management services for decommissioned

4 www.nytimes.com/2009/02/02/technology/internet/02kenya.html?pagewanted=1&_r=3&ref=technology; crave.cnet.co.uk/gadgets/0,39029552,49303909,00.htm

5 www.alin.net/?news/alin_pilots_use_of_ipods_for_communities

6 www.loitasafaritrekks.blogspot.com

electrical and electronic equipment in Kenya and the neighbouring states. Decommissioned computers are disassembled by competent technical personnel, with due attention to best practice for such work. Metal parts such as the chassis and the casings are then sold to local metal recyclers for conversion into other products or for export. Soft plastic parts that are recyclable locally are also similarly sold to local manufacturers for conversion.

Reusable components from printed circuit boards (capacitors, transistors, etc.) are extracted and stored for the initiative's own maintenance work and occasional sale to micro-enterprises that repair and maintain consumer electronics. The rest of the printed circuit boards are safely stored in secured premises for re-export to recyclers overseas who have the technical capacity to safely extract the valuable materials from them. The centre has a capacity to receive 2,000 units per month, but has only been rolling about 300 units per month.

The challenge of cost

One of the key prohibiting factors in the acquisition of green energy is cost. The solar panels that can run for a reasonable period of time, say six hours, cost way above what most of the community members can afford. In addition, the solar technology has not penetrated much in the rural areas, making it a "foreign" technology. However, with the increased cost of energy in Kenya, most people will have to turn to green energy to support their ever-increasing energy requirements.

Green technology is a reality but more needs to be done, such as sensitisation to the issues, and tax incentives to increase its acquisition and penetration in the rural areas. The opportunity that refurbished computers offer (both in terms of cost and e-waste management) is also not helped by the government's attempts to prevent the import of second-hand PCs into the country. Engagement with all stakeholders, at every level – including those at the grassroots – is necessary to secure a sustainable green future. ■

Building advocacy networks

Pavel P. Antonov
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Could a lack of sensitivity spoil the love affair between the Pirates and the Greens?

What activists in Central and Eastern Europe have to say…

His long, brown hair, tiny glasses loosely fixed on the characteristic nose, and spicy jokes are well familiar to Sofia's environmental protection activists. They call him Cluster, but no one surely remembers whether this nickname originates from his fixation with ecosystems, or from his passion for computer equipment. As a matter of fact, for over two decades now he has been a true geek of both environmental protection and information and communications technologies (ICTs). But recently Cluster's two passions have become harder to combine. "I like computers less and less," he admits with a sigh, "for they now don't last long and are impossible to upgrade or repair."

In South Eastern Europe, as in most parts of the world, environmental activists and experts like Cluster have been among the first to take advantage of the internet and ICT resources.[1] More recently a new generation of green citizen movements and political parties in countries like Bulgaria and Hungary have used web-based social networks as their primary communication media.[2] Understanding the power brought to them by ICTs, many such groups have embraced internet rights and privacy issues as part of their campaigns and political platforms.

But the sky is not cloudless above the love affair between environmental and ICT activism. The realisation that keeping up with the newest software and user features requires constant upgrades and replacement of hardware – and therefore generates more and more waste – leaves a bitter taste in the mouth for environmentalists. More alarmingly, otherwise grateful for any support, ICT activists and newly evolving social movements around the internet and communication rights do not seem to be that willing to engage with environmental protection causes. Could a lack of sensitivity spoil yet another love affair – that between environmental and internet activists?

In an attempt to answer this question I approached representatives of both communities: ICT and environmental activists. Respondents were professionals employed by environmental protection and ICT organisations and think tanks; ICT specialists volunteering for environmental causes; citizen campaigners with greater understanding of ICT issues; as well as active members of their respective new political movements, the Pirates and the Greens.

Among major environmental issues two came clearly into focus, as they are most obviously connected to ICTs: climate change[3] and waste processing.[4] The computer industry seems to make a notable contribution to these two issues, although opinions on the scale of their contribution differ.

The proximity between active environmental and internet rights causes has been reflected in the processes of new political parties and movements emerging in Bulgaria and Hungary since 2008. The appearance of new activist-based Green Parties in both countries more or less coincided with the wave of political activity around piracy and the internet. The two types of movements seemed to share a common vision on many problems, and a common membership base. The Greens were the only party which sent representatives and congratulations to the launch of the Pirate Party in Bulgaria, remembers Boris Loukanov, one of Bulgaria's Pirate Party's board members. Another founder of the party, Veselin Petkov, wrote: "I am a 'pirate', but one interested in and trying to keep an eye on whatever happens in the world of 'green' causes." However, Petkov may be the exception. The similarities between Green and Pirate causes are that both are extraordinarily important for the common person – but the latter seldom realises it, he explained.

Viktor Bjelic, a web specialist based in Bosnia's Banja Luka, suggested that a certain group of ICT activists is more interested in the environment than others: the open source community. "They are much more aware of social and environmental issues," Bjelic concluded, based on his experience with e-networking for environmental activists since 2001. Elitsa Stoyanova, who works for a Bulgarian IT company, has noticed a higher level of fascination with environmental protection among programmers, database managers and system administrators. "I would not say they are too active, but are certainly moved by [environmental]

1 REC (2002) *Networks at Work: Status and Needs Assessment of Electronic Networking and Cooperation Among Environmental NGOs in South Eastern Europe*, Regional Environmental Center for Central and Eastern Europe, Budapest. archive.rec.org/REC/Programs/SEE_networking/NetworksAtWork.html

2 Antonov, P. (2009) Grassroot(er)s: Green activists of Eastern Europe enter politics, *APCNews*, 30 July. www.apc.org/en/news/grass-root-er-s-green-e-activists-eastern-europe-e

3 Leake, J. and Woods, R. (2009) Revealed: the environmental impact of Google searches, *The Times Online*, 11 January. technology.timesonline.co.uk/tol/news/tech_and_web/article5489134.ece

4 Walraven, K. (2007) E-waste: Impacts, challenges and the role of civil society, *APCNews*, 28 February. www.apc.org/en/news/e-waste-impacts-challenges-and-role-civil-society

problems," Stoyanova wrote. Stoyanova herself has been a voluntary web editor for Bulgaria's coalition of environmentally concerned citizens and NGOs for more than two years. "Most programmers in my experience are good people, highly concerned about things that surround them, including nature and society," she said.

But according to Todor Yalamov, a coordinator for the ARC Fund – an ICT think tank in Sofia – the environment is just one of many social causes that ICT specialists care about. "The IT community in Bulgaria struggles for principled causes like law enforcement and eradication of corruption, among which nature protection seems like just a tiny bit," Yalamov said. He then pointed at another reason: doubt. Climate change is a complex issue and its effects seem to be proved, but then the evidence is questioned again and the total ecological effect appears to be negated, Yalamov explained. "Environmentalism seems too ideological for the IT community," he finally added.

Thomas, an owner of an advertising agency in Sofia, is an active blogger and activist on citizen causes like smoking and urban environment. But he denied the existence of any connection between ICTs and the environment, particularly when it comes to climate change. Electronic waste (e-waste) seems like a small portion of all garbage, and contributes to general pollution, if anything, but certainly not to climate change, he stated. "Someone is trying to impose on us [the guilt for] greenhouse emissions from the power we use, but this is not very true, as no such problem exists with nuclear [energy]; it exists with coal or petrol, but seems negligible to me in comparison to what is burned as fuel in transport," Thomas wrote.

Zoltan Varady, a Budapest-based programmer, attributed the low level of engagement of ICT specialists with environmental issues to the generally low level of environmental awareness in society. Veny Markovski, the founder and president of Bulgaria's Internet Society, shared a similar opinion: "People have different interests; being active on internet rights does not mean you need to care about the environment as well." In the case of Bulgaria, Markovski spoke of a generally low level of civil society development in general, which results in the weaknesses of both the environmental and ICT movements.

In fact, both the environmental and internet rights movements in Bulgaria, Hungary, and elsewhere in the region have lived through significant victories over the past years,[5] sometimes effectively joining forces.[6] Varady, who has been a collaborator of Hungary's green NGO e-network Zöld Pók (Green Spider)[7] for over a decade, spelled out a deeper reason for the lack of environmental awareness among ICT specialists and activists: environmental thinking stands in the way of the philosophy of constant upgrade. As the ICT industry in principle is unwilling to "upgrade" their materials to be less toxic, more recyclable and less power hungry, ICT professionals employed by it feel that environmental protection "isn't worth the bother," Varady wrote. "Tech companies, computer factories, etc. are so involved in the race to be better, faster, and have more features, that they can only show a token effort for the environment," he explained. As examples of such "token" efforts, Varady listed www.apple.com/environment and lastyearsmodel.org.

Certain business decisions within the ICT industry seem to cause more and more frustration to environmental minds. Cluster's complaints – which referred to the Apple iPhone's maintenance policy – seemed to summarise the opinion of his green-minded fellows on the new proprietary trends with ICT equipment. Ivaylo Hlebarov from CEE Bankwatch, a prominent network of environmental pressure groups, suggested that there would be fewer problems should ICT companies respect some basic principles with regard to equipment: it should be modular, durable, possible to repair, and recyclable. Hlebarov, who has spent most of the past decade campaigning around waste, criticised the European Union for not applying strictly the proximity principle which requires all waste to be treated close to the place where it was generated. "Transportation, processing and disposal of waste – including e-waste – in distant areas is immoral and unethical," he said.

In conclusion, natural bonds seem to exist in the post-socialist societies of Central and Eastern Europe between environmentally minded people and those who care about internet freedom and other ICT-related issues. These bonds already have a solid record in the relations between the respective communities of campaigners, NGOs and their newly emerged political movements. However, for different reasons, ICT professionals seem less likely to embrace environmental protection causes: some find them too ideological, others simply question the reasoning behind issues like climate change. At the same time, the ICT industry is perceived to be committed to maximising profits through increasing equipment sales and limiting modularity and the possibilities of self-repair. These trends are watched by the environmental community with growing dissatisfaction.

5 Antonov (2009) op. cit.

6 BlueLink (2010) Bulgaria is not Big Brother, 2010 is not 1984, *BlueLink News*, 10 June. www.bluelink.net/en/index.shtml?x=42264

7 www.zpok.hu

While the environmental community seems well aware and supportive of internet rights issues and causes like open source, additional efforts are needed to raise the environmental awareness within the ICT community. Efforts are needed, and timely ones, to prevent further discord between the civil society voices on critical ICT and environment issues. Such efforts could possibly include detailed comparative analyses and mapping of the underlying principles and goals of the two communities, with special analytical attention on the areas where they match or differ substantially.

Further, it would be useful to promote the findings from such an analytical study in both communities, while emphasising the potential opportunities that could arise as a result of a "common voice" between them on crucial issues, and raising awareness of the threats posed by any eventual split or disharmony between the two. Selected goals and priorities of each community will need to be systematically integrated – including in their strategic and policy documents, projects, and real life activities. ■

Institutional overview

Institutional overview

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Introduction

The global interest and movement to address climate change is led by the Intergovernmental Panel on Climate Change (IPCC). The IPCC, established in 1989 by the World Meteorological Organization and United Nations Environment Programme (UNEP), has since led a number of deliberations and consultations to get a better understanding of the causes of climate change, its impacts, and mitigation and adaptation strategies.[1]

The UN has steered the Framework Convention on Climate Change (UNFCCC),[2] which enjoys near universal ratification by 194 parties (193 states and one regional economic integration organisation). It sets an overall framework for intergovernmental efforts to tackle the challenge posed by climate change. It recognises that the climate system is a shared resource whose stability can be affected by emissions of carbon dioxide and other greenhouse gases (GHGs). The UNFCCC came into force on 21 March 1994.

With a range of environmental and climate challenges facing the world, attention has turned to the positive and negative relationships between information and communications technologies (ICTs) and the environment. A number of international organisations and partnerships are involved in examining and proposing industry and policy actions for mitigating the adverse environmental outcomes of ICTs, but also focusing on the environmental benefits they can bring. This report provides a review of selected organisations and their goals in relation to ICTs and environmental sustainability.

Key institutions

The parties to the UNFCCC have been meeting annually since 1995 at what is called the Conference of the Parties (COP) to assess progress in dealing with climate change. In 1997, the Kyoto Protocol was concluded, with legally binding obligations for developed countries to reduce their GHG emissions.

The Kyoto Protocol, which came into force in 2005, is the current international commitment. It developed three innovative mechanisms to tackle the impact of climate change. These are emissions trading, joint implementation, and the clean development mechanism (CDM). In December 2009, the UN hosted the Climate Change Conference in Copenhagen (COP 15), which resulted in the Copenhagen Climate Accord. This is regarded as having no binding agreement on how to tackle climate change and its consequences. A side exhibition organised by the secretariat of the UNFCCC at COP 15 focused on how ICTs are helping to increase awareness and to support concrete action on climate change in both developing and developed countries.

Below, we provide a brief summary of the activities and respective goals of selected organisations in relation to ICTs and environmental sustainability.

- *European Commission*: The European Union (EU) has a number of ambitious targets for reducing GHG emissions by 2020. The focus of these targets in relation to ICTs include the use of more energy-efficient ICT products; ICT-enabled energy-efficient buildings, manufacturing, logistics and power grids; and new ICT-enabled business models, markets and lifestyles.[3]
- *International Telecommunication Union (ITU)*: The ITU says that "methodologies for evaluating CO_2 reductions through the use of ICTs should be standardized."[4] It is already very active in standardisation work and other studies that are relevant to climate change, in particular in the areas of energy efficiency (energy-efficient ICT equipment will reduce the emission of GHGs), mitigation of the effects of climatic change, and technologies for reducing carbon emissions. The ITU's work in recent years has been on next-generation networks (NGNs), which are expected to reduce energy consumption by 40% compared to today's PSTN (public switched telephone network).[5]
- *Intergovernmental Panel on Climate Change (IPCC)*: According to the IPCC, the capacity to mitigate and adapt to the effects of climate change is dependent on socioeconomic and environmental circumstances and the availability of information and technology. In this regard, the IPCC defined technology as "the practical application of knowledge to achieve particular tasks that employs both technical artefacts (hardware, equipment) and (social) information (software, know-how for production and use of artefacts)."[6]

1 Intergovernmental Panel on Climate Change (IPCC) www.ipcc.ch/organization/organization_history.htm

2 www.unfccc.int

3 European Commission (2008) European Policies for ICTs in a Low-Carbon Society, presentation made by Peter Johnston to the joint OECD/Danish National IT and Telecom Agency Workshop on ICTs and Environmental Challenges, Copenhagen, Denmark, 22-23 May 2008. www.oecd.org/dataoecd/42/28/40833630.pdf

4 Scholl, Reinhard (2009) ITU and Climate Change: Standardization Landscape, presentation to the ETSI Green Agenda Seminar, Cannes, France, 26 November 2009. docbox.etsi.org/Workshop/2009/200911_GREENAGENDA/03Scholl_ITUandClimateChange.pdf

5 International Telecommunication Union (2007) *ICTs and Climate Change: ITU-T Technology Watch Report #3*, ITU, Geneva.

6 Intergovernmental Panel on Climate Change (IPCC) (2007) *Climate Change 2007: Synthesis Report*, IPCC, Geneva. www.ipcc.ch/ipccreports/index.htm

- *Organisation for Economic Co-operation and Development (OECD)*: The OECD is developing policy, undertaking analysis, and facilitating international debate on the use of ICTs to tackle environmental challenges. Reaffirming the OECD's Ministerial Declaration in Seoul in June 2008 on the environmental impact of ICTs[7] and the necessary policy action, the OECD Council on 8 April 2010 made the ten-point recommendations on ICTs and the environment. These recommendations encouraged governments to increase the environmental benefits of ICT applications and attend to the negative environmental impacts of ICTs.[8]
- *Global Information Infrastructure Commission (GIIC)*: With its mission to provide private-sector leadership to bring about the conditions needed to foster investments in information infrastructure in both developed and developing countries, GIIC devoted its 2008 annual meeting held in Tokyo to a discussion entitled "The Power of Green: In the Future of ICT, Is it Part of the Problem or the Solution?" The report of this meeting led to the Tokyo Declaration, which contains two recommendations: "Lower the environmental impact of ICTs" and "Lower the environmental impact by using ICTs." It also says that to achieve these goals an exchange of information is necessary, as well as a roadmap, based on market analysis and recognising the need for early action.[9]
- *Global e-Sustainability Initiative (GeSI)*: GeSI is an international non-profit association that addresses sustainability (the triple bottom line: social, environmental and economic). GeSI is industry-led and open to ICT industry participants. It also partners with several international organisations, including UNEP, the ITU, European Telecom Network Operators (ETNO), the US Telecom Association and the Electronic Industry Citizenship Coalition which promotes the Electronic Industry Code of Conduct (EICC).[10] GeSI led a global study on the carbon impacts and opportunities of ICTs which presents the first comprehensive estimates and projections of the ICT sector footprint until 2020.[11]
- *International Institute for Sustainable Development (IISD)*: IISD has worked on the relationship between ICTs and sustainable development since 2003 by advancing policy recommendations on climate change and natural resources management. It contends that policy makers have underestimated the impact of ICT on sustainable development (and vice versa).[12]
- *United Nations*: Following the urging of the Secretary General to "lead by example," the UN System Chief Executives Board for Coordination (CEB) decided in October 2007 to move towards a climate-neutral UN. The UN, through its specialised agencies and regional commissions – mainly the United Nations Economic Commission for Africa (UNECA) – undertakes a number of activities in the ICT and environment field. These include supporting GeSI, developing a standard methodology to measure the impact of ICTs on climate change, e-environment scoping studies, and capacity building seminars/workshops in different regions to assist countries in implementing new standards aimed at the reduction of GHG emissions through the use of radio and ICT devices.[13]
- *World Wide Fund for Nature (WWF)*: WWF's mission is "to stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature." It started work on ICTs and the environment in 2000 and works with other organisations, including the World Economic Forum (WEF), which states that "ICT solutions have the potential to be an enabler to reduce a significant part of the remaining 98%" (a reference to the frequently cited statistic that ICT products are responsible for 2% of emissions).[14] An ETNO/WWF report notes that ICTs can be an important part of combating climate change, and should

7 Organisation for Economic Co-operation and Development (OECD) (2008) *Addressing Environmental Challenges: The Role of Information and Communication Technologies (ICTs) and the Internet*, OECD, Paris. www.oecd.org/dataoecd/25/55/42911620.pdf

8 Organisation for Economic Co-operation and Development (OECD) (2010) *Recommendation of the Council on Information and Communication Technologies and the Environment*, OECD, Geneva.

9 Global Information Infrastructure Commission (GIIC) (2008) *The GIIC Tokyo Declaration*, 25 April 2008. www.biac.org/members/iccp/mtg/2008-06-seoul-min/GIIC_Tokyo_Declaration.pdf

10 The Electronic Industry Code of Conduct was initially developed by a number of companies engaged in the manufacture of electronics products between June and October 2004. Participating companies included Celestica, Dell, Flextronics, HP, IBM, Jabil, Sanmina SCI and Solectron. For more information, see also www.juniper.net/us/en/local/pdf/investor/electronic-industry-code-conduct.pdf

11 Global e-Sustainability Initiative (GeSI) (2008) ICT key driver to a low-carbon society: The need for the right policy framework, presentation made by Luis Neves to the joint OECD/Danish National IT and Telecom Agency Workshop on ICTs and Environmental Challenges, Copenhagen, Denmark, 22-23 May 2008. www.oecd.org/dataoecd/42/27/40833651.pdf

12 International Institute for Sustainable Development (IISD) (2008) *ICTs, Adaptation to Climate Change, and Sustainable Development at the Edges: An IISD Commentary*, IISD, Winnipeg. www.iisd.org/pdf/2008/com_ict_climate.pdf

13 United Nations System Chief Executives Board for Coordination (2008) *Acting on Climate Change: The UN System Delivering as One*, United Nations, New York.

14 Organisation for Economic Co-operation and Development (OECD) (2009) *Measuring the Relationship between ICT and the Environment*, OECD, Geneva.

be engaged because it is a sector that is used to rapid changes and employs many creative people. The report outlines a roadmap for the ICT sector, and sets out targets for 2010 and 2020. The target for 2010 is to use ICT to reduce CO_2 emissions by 50 million tonnes.

Conclusion

It is now clearly recognised that ICTs can play a significant role for climate change mitigation, monitoring and adaptation efforts, becoming an enabler to reduce a significant part of the 98% of the GHG and other emissions from all sectors. Although this also includes mitigating the growth of the ICT industry footprint itself, a consensus has emerged that the role of ICTs in enabling energy savings and reducing negative environmental effects across all industry sectors is even more crucial. In this regard, institutions will have a key role to play in both the selection and implementation of ICT applications at the national, regional or international level.[15]

There is a need to streamline the role of the various institutions focusing on the key areas where the share of the impact of ICTs on climate change can be reduced and its benefits enhanced through research and development, innovation, capacity building, standards, awareness raising, policy and advocacy activities by the respective organisations. There is, however, a lot to be done in terms of the "lead by example" approach to promoting green growth through, for example, the climate-neutral initiative being implemented by the UN. As public sector institutions are the largest users of ICT products and applications, such initiatives could contribute to energy savings and reducing negative environmental effects. Therefore, an international multi-stakeholder approach would be of paramount importance.

The World Summit on the Information Society (WSIS) developed a specific multi-stakeholder approach ("WSIS-practice") that went beyond the approach of other UN summits. WSIS provided a global platform where key players – governments, UN agencies, the private sector and civil society – came together to develop a common vision and a common understanding of the information society, to adopt a declaration and a plan of action as well as an agenda to facilitate the effective growth of the information society. One of the WSIS action lines was e-environment. The WSIS Plan of Action states that "governments, in cooperation with other stakeholders, are encouraged to use and promote ICTs as an instrument for environmental protection and the sustainable use of natural resources." The World Meteorological Organization was the proposed e-environment moderator/facilitator. Co-facilitators include the World Health Organization, UNEP, UN-HABITAT, ITU and International Civil Aviation Organization. ■

15 Ospina, A. V. and Heeks, R. (2010) *Linking ICTs and Climate Change Adaptation: A Conceptual Framework for e-Resilience and e-Application*, University of Manchester, Manchester. www.niccd.org/ConceptualPaper.pdf

Indicators for measuring green ICTs

Indicators for measuring green ICTs

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Background

In the debate on sustainability, the role of information and communications technologies (ICTs) is becoming ever more prominent. On the one hand, ICT is a key technology to be used for achieving sustainability by making better use of resources and encouraging efficiency (greening using ICTs). On the other hand, the sustainability of the technology itself is important (green ICTs) in terms of, for example, energy use and the disposal of equipment (electronic waste or e-waste). In the process towards a greener society, creating awareness is an important step,[1] as is assembling reliable data to make decisions. One instrument that can be used for both is benchmarking countries on their achievements and actions in arriving at a more sustainable use of ICTs. Benchmarking can provide insight into the relative position of countries regarding their progress, but more importantly it can provide examples and best practices from countries that are ahead of the game. The scope of this chapter will be limited to green ICTs; however, greening ICTs is included in the benchmarking framework to some extent, as this is necessary to provide the right context for the first.

Thinking on green ICTs

There are examples available where sets of indicators are used to benchmark "greenness" in general, but quite often these do not focus on countries – for example, they may focus on companies (e.g. the Company Report Card by Greenpeace),[2] products (e.g. the European Ecolabel)[3] or cities (e.g. the European Smart Cities Ranking).[4] Benchmarks at a national level often include indicators for measuring sustainability in the broadest sense (e.g. the United Nations work on indicators of sustainable development)[5] and include indicators that are not directly relevant to green ICTs.

Examples of indicators aimed more specifically at (the role of) ICTs are the ICT Sustainability Index by the International Data Corporation (IDC),[6] which scores countries' efforts in using ICTs to meet their CO_2 emission targets, and the Green ICT Scorecard, which was developed in the United Kingdom (UK) to monitor the government's ICT strategy.[7] This scorecard uses a list of 301 green ICT-related questions in the categories of sustainable development, corporate social responsibility, technology optimisation, and green ICT policies.

International organisations such as the Organisation for Economic Co-operation and Development (OECD) and the UN's International Telecommunication Union (ITU) refer in their work to the important role for governments as well as companies in encouraging sustainable and green ICTs. There are examples of governments with policies in place aimed at green ICTs. The UK Cabinet Office's[8] Greening Government ICT strategy[9] sets out the first steps that can be taken to reduce the carbon footprint by, for example, extending the life cycle of ICT purchases and reducing the number of PCs and laptops used. The ITU recommends developing such strategic planning frameworks along with action plans as important steps in dealing with ICTs and sustainability.[10] More examples of such programmes and initiatives can be found in an OECD study assessing policies and programmes on ICTs and the environment of 92 government programmes and business initiatives across 22 OECD countries, plus the European Commission.[11] Many of these target energy consumption during ICT use and using ICTs to reduce energy consumption. Only a few initiatives focus on optimising ICT value chains.[12] For business programmes, objectives relate most to supporting (green ICT) innovation, design of resource-efficient ICTs and the promotion of green ICT standards and labels (including measurement and accounting tools). The OECD has also started to research the link

1 ITU (2008) *ICTs for e-Environment*, p. 100.

2 Greenpeace (2010) *Guide to Greener Electronics.* www.greenpeace.org/international/en/campaigns/toxics/electronics/how-the-companies-line-up

3 European Commission (2008) Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on the Sustainable Consumption and Production and Sustainable Industrial Policy Action Plan. ec.europa.eu/environment/ecolabel/about_ecolabel/what_is_ecolabel_en.htm

4 Giffinger, R. (2007) Smart Cities: Ranking of European medium-sized cities. www.smart-cities.eu/index2.html

5 United Nations (2007) Indicators of Sustainable Development. www.un.org/esa/dsd/dsd_aofw_ind/ind_index.shtml

6 IDC (2009) IDC Readies ICT Sustainability Index Ahead of United Nations' COP15 Climate Change Conference. www.idc.com/getdoc.jsp?sessionId=&containerId=prUS22091709&sessionId=672F9DED3A0A6EEEB840AD954C07AEE0

7 Cabinet Office (2008) Greening Government ICT. webarchive.nationalarchives.gov.uk/+/http://www.cabinetoffice.gov.uk/cio/greening_government_ict.aspx

8 The Cabinet Office supports the Prime Minister and the Cabinet, helping to ensure effective development, coordination and implementation of policy and operations across all government departments.

9 Cabinet Office (2008) Greening Government ICT. webarchive.nationalarchives.gov.uk/+/http://www.cabinetoffice.gov.uk/cio/greening_government_ict.aspx

10 ITU (2008) *ICTs for e-Environment*, p. 103.

11 OECD (2009) *Towards Green ICT Strategies: Assessing Policies and Programmes on ICTs and the Environment.*

12 Ibid, p. 23.

between ICTs and the environment[13] in which an extensive list of indicators on ICTs and the environment is suggested, including potential data sources. This list can be used to develop a set of indicators for a benchmark and already provides an assessment of availability of data.

Indicators for green ICTs

The first step in the development of indicators for benchmarking green ICTs is the establishment of the main areas on which the indicators will focus, rather than the development of specific indicators itself. For this it is necessary to identify the main factors or stakeholders that are important in striving for green ICTs. Based on research commissioned by Hivos and TNO, a number of important areas have been identified: ICT penetration,[14] green ICT government policies (aimed at government organisations as well as at markets and citizens) and green ICTs in other domains, such as industry or civil society. A short survey among this year's GISWatch authors identified government policy as a key area to be included in a framework for benchmarking. Regarding ICT penetration, a number of standard indicators should also be included to measure the level of ICT development. Including these helps to relate the level of green ICTs in a country to ICT penetration generally, and so ratios can be developed.

An example of how the benchmarking framework and a format to be used for collecting data might look like is depicted in Table 1. The case of the Netherlands has been used to test such a format.[15] This example illustrates that a number of international sources are available for collecting standardised data.[16] For a number of indicators, collecting data involves the use of national sources and national knowledge (such as indicators on national policy). The example also illustrates that collecting data for a number of relevant indicators will be quite a challenge.

Figure 1 and Figure 2 provide a summary of the survey among the GISWatch authors. The first describes the relevance of including a specific indicator in a framework for benchmarking green ICTs. The second refers to the extent to which the authors expect it to be possible to access data for the specific indicator.

The inclusion of data on green ICTs in an indicator is important. However, this area is underdeveloped in terms of the availability of reliable and standardised data that can be used for benchmarking. This refers to indicators regarding the impact of ICTs on the environment, for example, in terms of energy use and policies for disposal of unused or obsolete equipment.

Indicators for measuring the actions taken by important stakeholders should be included. These are governments and organisations. Governments have an important role in stimulating green ICTs, on the one hand through policies that are aimed at society as a whole (e.g. aimed at consumers or industry) and on the other hand as an important user of ICTs. Indicators could include the use of energy-efficient equipment and efficient use of the equipment via power management, aimed at consumers/businesses as well as government organisations. Industry is another important stakeholder through the policies they set for themselves, for example, those dealing with sustainable design in production, the handling of discarded products, and lowering energy use and CO_2 emissions.

The way forward

Many indicators can be relevant, but data will not always be available for a number of countries. For example, the OECD has already established that there is lack of reliable and standardised data regarding unused equipment and its disposal, and that national household surveys in general lack questions in this area. This lack of data makes it difficult to monitor developments regarding green ICTs and assess the impact of measures taken. A framework for benchmarking countries on green ICTs should take into account the limitations of availability of data and focus on a set of indicators for which data are generally available (for example, see the work done by the OECD on assessing data availability).[17]

As mentioned, actions taken by major stakeholders such as governments are a good starting point for mapping progress on green ICTs. This could be measured by establishing whether policies are available or by developing indicators that require more specific information such as a scale indicating the level of policies (e.g. from intentions for national policy to a fully implemented action plan, including monitoring instruments). Other stakeholders are not always included in current research. For example, the civil society sector in some countries can be substantial, and their role in green ICT projects, awareness raising, and policy advocacy should also be reflected in a benchmarking framework.

Further research should develop a solid set of indicators, based on the work and data of organisations such as the OECD and the ITU, and projects such as the Smart Cities Index and the ICT Sustainability Index. Moreover, further research is necessary on how to generate data that are still lacking. Finally, it may be that regional indicators in relatively synchronous and stable policy environments, such as the European Union, might be easier to develop than global benchmarks. ■

13 OECD (2009) *Measuring the Relationship between ICT and the Environment.* www.oecd.org/dataoecd/32/50/43539507.pdf

14 Such as the number of mobile phones, computers and internet users per 1000 inhabitants.

15 The data for the Netherlands only serve to illustrate the use of the format and are based on a short, non-exhaustive quick scan.

16 Although other (national) sources are available for some of the data, it is recommended that international sources are used to ensure the use of standardised, comparable data.

17 OECD (2009) *Measuring the Relationship between ICT and the Environment*, p. 26. www.oecd.org/dataoecd/32/50/43539507.pdf

Table 1. **Benchmarking format example: The Netherlands**		
	2008	Source
General indicators		
Population	16,445,593	World Bank
GDP (USD)	871,000,000,000	World Bank
GDP per capita (USD)	52,963	World Bank
ICT indicators		
Number of computers per 1000 inhabitants	880	OECD
Number of mobile phones per 1000 inhabitants	1210	OECD
Number of internet users per 1000 inhabitants	860	OECD
Number of broadband internet users per 1000 inhabitants	350	OECD
ICT expenditure (% of GDP)	6.30%	World Bank
ICT expenditure per capita (USD)	3337	Estimate
Government policy (aimed at other organisations)		
Policy on sustainability	Yes	VROM (NL)
Policy on green ICTs	Yes	Ministry of Economic Affairs (NL)
R&D investment in green ICTs	NA	
Government policy (aimed at government organisations)		
Policy on green ICTs	Yes	Ministry of Economic Affairs (NL)
Implementation of green ICT policy	Strategy and action plan	Ministry of Economic Affairs (NL)
Non-government organisations		
Industry		
Green ICT policy	NA	
Energy reduction	Yes	Commissie benchmarking (NL)
R&D in green ICTs	NA	
ICT industry		
Green ICT policy	Yes	ICT Office (NL)
Energy reduction	Yes	ICT Office (NL)
R&D in green ICTs	NA	
Energy indicators		
Carbon footprint		
Carbon dioxide emissions (thousand metric tonnes of CO_2)	173,244	UN statistics division
Ecological footprint (global hectares per capita)	4.6	Global Footprint Network
Energy use per capita (kilograms of oil equivalent [kgoe] per person)	4.909	World Bank
Energy use of ICT-producing sector	NA	
Energy use of ICTs, per capita	NA	
Amount of “clean” energy (% of total energy)	1.80%	World Bank
Amount of combustible renewables and waste	3.50%	World Bank
Amount of renewable energy used in ICT sector	NA	

Figure 1. **Relevance of indicators**

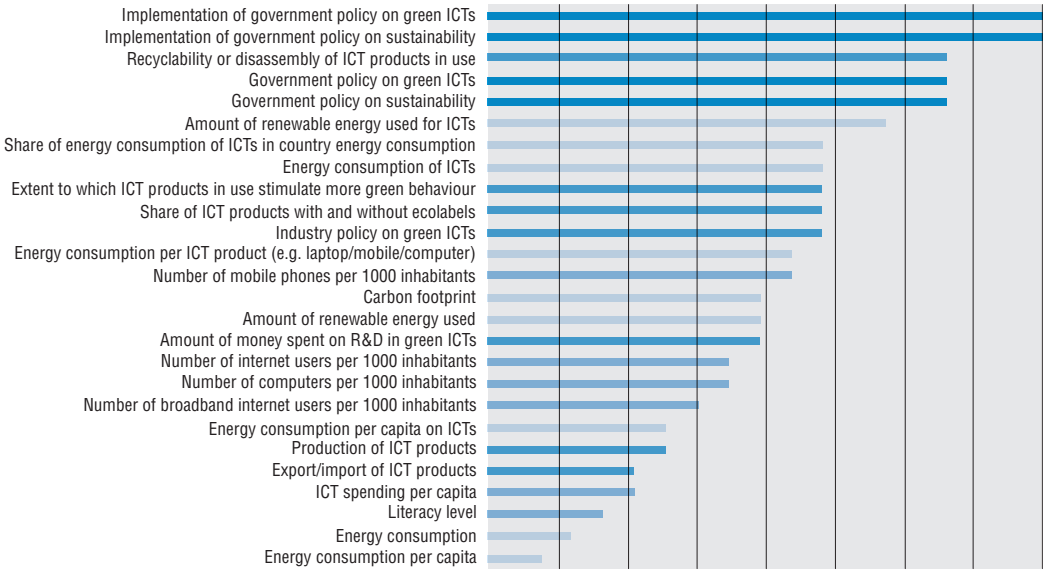
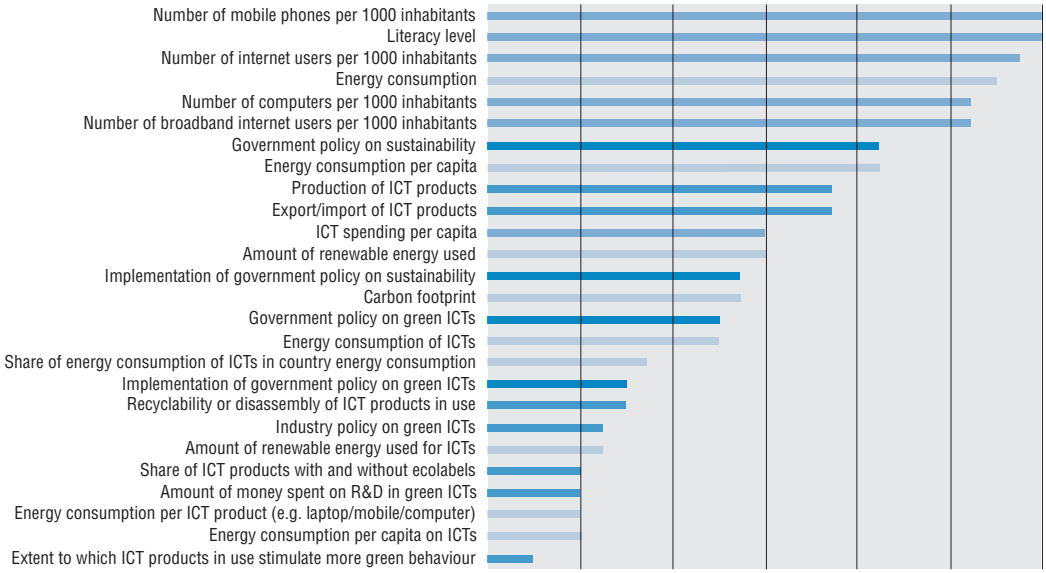


Figure 2. Feasibility of indicators (availability of data)



Green mapping

What kind of space is the "sustainable home"?
A comparative analysis of three media spheres on the web

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Introduction

In popular media as well as in the scientific literature, there exists widespread disagreement about the opportunities offered by the home as a site for environmental citizenship. The recent focus on domestic settings as a place for individuals to engage in "environmental action" is viewed critically by some, who point at the risk that public participation is here reduced to an individualistic, private, "calculative" or myopic activity.[1] From this perspective, the home presents a rather dangerous location for civic action, as engagement with complex public affairs like climate change here easily acquires an all-too-narrow focus, with attention turning to routine practices like washing and heating, and more or less obsessive attempts to reduce the amounts of energy and the other resources households use. Others, however, view the "environmental home" more favourably, as providing a space where people can explore alternative forms and practices of environmental politics. From this perspective, the home may offer a space, for instance, for developing affective and material forms of participation: engagement here can take the form not just of the voicing of opinions and arguments, as is more customary, but also of embodied practice. The sustainable home then may make possible more materially and physically sensitive forms of engagement, where getting involved with "things", "technology" and "stuff" becomes a way of developing one's moral and political sensibilities and experimenting with one's habits.[2]

In the analysis presented here, we turned to the web to explore this disagreement by empirical means. That is, rather than considering the differences between these two interpretations to be a conceptual matter – which depends on what theory of public participation one adheres to – we decided to translate the disagreement into a question of internet research. We asked whether and how the "environmental home" is currently being configured as a location of citizenship on the web: does it predominantly figure here as a site for private, calculative activity, or does it also feature as a space for public engagement with the environment? Furthermore, rather than treating online publicity around sustainable homes indiscriminately, as one singular media space, we decided to take a comparative approach. We delineated three different source sets, or "spheres",[3] in which "sustainable homes" figured on the web as sites of environmental engagement:

- Green home blogs: Active English-language blogs that feature the home as a place for adopting sustainable ways of life.
- Green commentary: Active English-language blogs that comment on wider issues of sustainability and the low-carbon economy (as reported in the news).
- Green issue network: A hyperlink network consisting of large US and UK governmental and non-governmental organisations.

In the small research exercise presented here, we then approached the web as a space for exploring how the phenomenon of the "sustainable home" is "multiply" constituted. To do so, we took up various web-based tools of social research: tools of network analysis, textual analysis and data visualisation. Such tools provide ways of examining how a given object or issue – in this case the "sustainable home" – is configured differently in different source sets or web spheres.[4] Which is also to say, using these tools of internet research, we are not obliged to treat the question of the normative possibilities that the "sustainable home" opens up for political or moral action as a question of either/or. Rather, we can explore whether and how it may be taking on multiple forms, and is ascribed multiple affordances for engagement, across the media spectrum going from the more informal and personal green home blogs to the organisational websites of governmental and non-governmental organisations. In this respect, we also wonder whether a comparative approach may provide a way of assessing the relative *instability, malleability,* or *open-endedness* of sustainable homes as a site of political and ethical engagement with the environment.[5] To what extent are its moral and political capacities currently being negotiated or contested on the web?

1 Slocum, R. (2004) Consumer citizens and the Cities for Climate Protection campaign, *Environment and Planning A*, 36, p. 763-782.

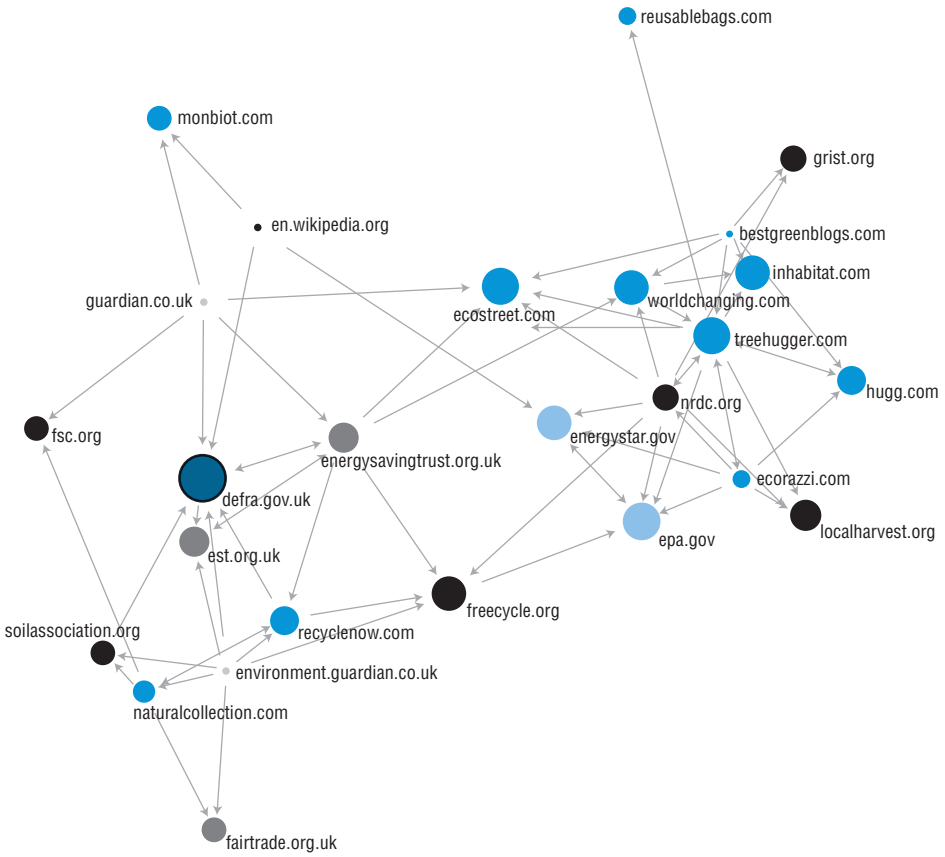
2 Hawkins, G. (2006) *The Ethics of Waste: How We Relate to Rubbish*, Rowman & Littlefield Publishers, Lanham.

3 Schneider, S. and Foot, K. (2005) Web Sphere Analysis: An Approach to Studying Online Action, in Hine, C. (ed.) *Virtual Methods: Issues in Social Research on the Internet*, Berg Publishers, Oxford, p. 157-170.

4 Rogers, R. (2010) Internet Research: The Question of Method – A Keynote Address from the YouTube and the 2008 Election Cycle in the United States Conference, *Journal of Information Technology & Politics*, 7, p. 241–260.

5 See Mol, A. (2002) *The Body Multiple*, Duke University Press, Durham.

Figure 1. **Issue network disclosed by green home blogs, Issuecrawler, March 2008**



Map details

Author:	Noortje Marres
Email:	marres@dds.nl
Crawl start:	4 Mar 2008 - 05:10
Crawl end:	4 Mar 2008 - 08:05
Privilege starting points:	off
Analysis mode:	site
Iteration:	2
Depth:	2
Node count:	26

Map generated from Issuecrawler.net by the Govcom.org Foundation, Amsterdam.

Legend

- (.com)
- (.gov.uk)
- (.org)
- (.org.uk)
- (.gov)
- (.co.uk)

Green home typology: What kind of object is it?

Question

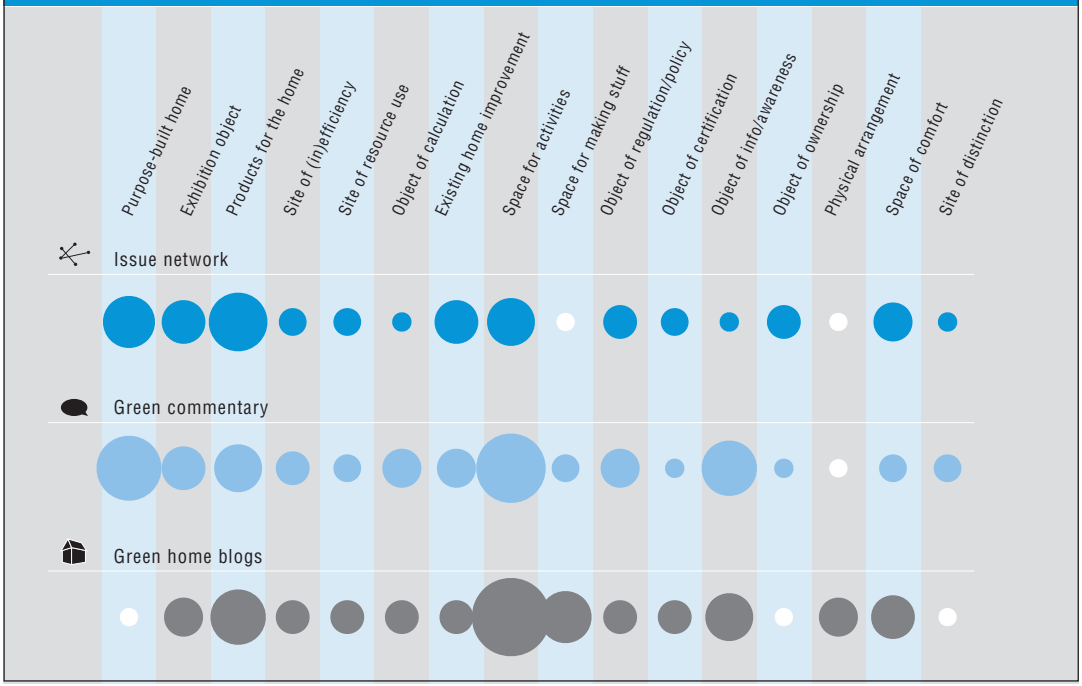
We begin with an exploratory question: What kind of object is "the home" according to the three green web spheres?

Method

We perform a simple textual analysis of the three source sets, querying each of them for the key word "home", using the Google Scraper.[6] We select the "key word in context" data returned by the scraper for all sources in each source set, and mark up the top three returns for each source, using categories that we have interactively defined on the basis of an initial survey of the data. We count the number of

6 The Google Scraper queries Google for a given source set and makes the results available for further analysis. This tool, like most of the tools used in this study, has been developed by the Amsterdam Digital Methods Initiative. They can be found online at wiki.digitalmethods.net/Dmi/ToolDatabase

Figure 2. **Home bubbleline, July 2008: What kind of object is "the home"?**



mentions per category, and visualise results with the aid of the Bubbleline visualiser.

Findings and further questions

Our initial typology of the green home brings into view a number of differences and similarities among the three source sets or spheres. For instance, the more "institutional" issue network focuses on new and purpose-built homes and products, while on the more informal blogs, the home figures especially prominently as an activity space. Secondly, we note that the home does figure as a space of calculation in all three spaces, both in the narrow sense (a focus on calculating the carbon output associated with individuals, activities and settings), as well as in the broader sense (a preoccupation with resource efficiency). In this respect, the significant divergence between the source sets does not centre on how "calculative" they are in their approach of sustainable housing, but rather on the kinds of homes and objects they foreground: new builds versus existing homes, and domestic products versus domestic activities. We speculate that different types of sustainable homes may instantiate different foci of environmental action: innovation versus renovation; buying versus doing. If so, this also raises particular questions about public engagement: is it oriented towards the future (new builds) or situated in current locations (existing homes)? Is it enacted through consumption or through the informal activities associated with the domestic sphere?

"What you can do": Green home blogs versus the green issue network

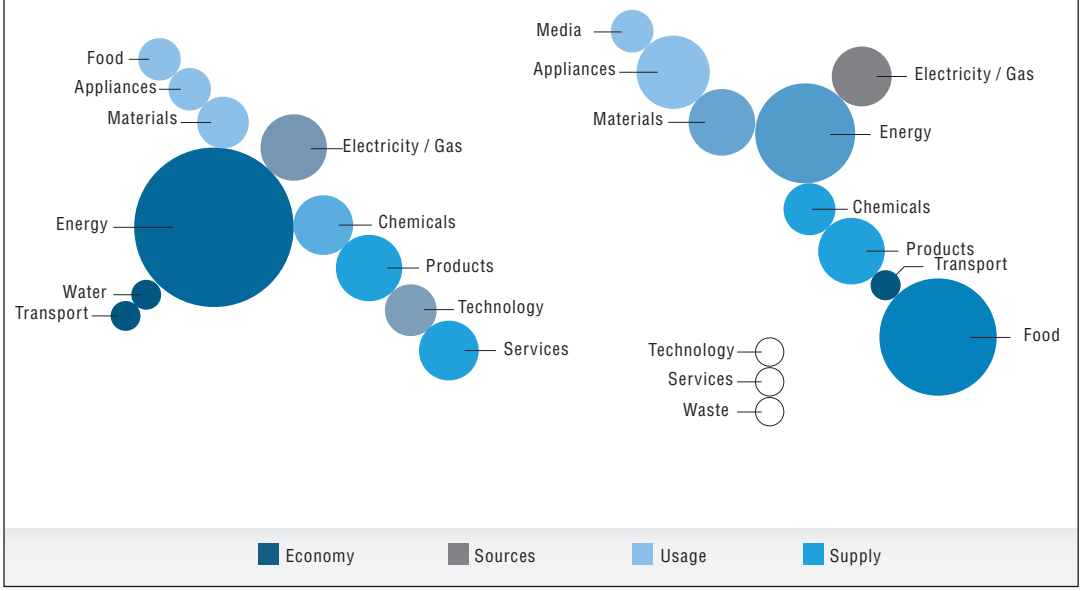
Question

In this second exercise, we seek to further "dis-aggregate" the sustainable home, and to consider more closely its various constituent parts. We ask: What kinds of objects and activities is the "sustainable home" made up of, in different media spaces? And: What can this tell us about the different forms of environmental engagement it may enable?

To address this question, we decided to focus on a particular "information template" that proliferates across green media sources on the web: action lists that specify "what you can do" "to help save the environment". Such tips for personal action on the environment abound both in the green issue network and on green home blogs, but not so much on green commentary sites, so we decided to consider only the former two. Considering our question of whether the sustainable home facilitates the reduction of environmental citizenship to a merely "calculative" activity, we are interested to find out how prominently the calculative category of "resource efficiency" figures on these pages.

We then further operationalise our initial question: Do tips for "what you can do" constitute environmental action mainly as a matter of resource efficiency – of "economising" on electricity, gas and water use – or do other modes of activity and things come into play?

Figure 3. **"What you can do": Green issue network vs green home blogs**



Method

For each source set, we manually select pages on "what you can do" from the issue network and green home blogs. From these pages, we extract key words with the aid of the textual analysis tool Open Calais. We manually categorise these terms, using categories provided by Open Calais (such as energy, materials), adding further ones on the basis of an initial survey of the data. We count mentions per category, and use the Dorling Visualizer to visualise the relative sizes of categories. Using an analyser tool, we determine unique terms per category per source set. We then manually mark up these unique terms according to four values: economy, supply, usage, service. We colour code the Dorling visualisation to show the distribution of categories across these values.

Findings

This exercise, too, brings into focus some significant divergences among green home blogs and the green issue network. The categories of "energy" and "services" are big in the green issue network, while "food" and things (products, appliances, materials) are more prominent on green home blogs. In the issue network, more objects and activities are coded in terms of efficiency (saving, efficient, cost) than on green home blogs, and this framing is especially predominant in relation to energy.[7] Green home blogs place much emphasis on home-made entities, from food to cleaning materials. Comparing this to the relative prominence of services in the issue network, one could interpret this as a difference in emphasis on domesticity versus infrastructure, and perhaps, in terms of private versus public. However, these different "ontologies" disclosed by the template of "what you can do" can also be taken to articulate divergent kinds of political economies: a service economy centred on energy, or a "craft" economy concentrating on food and "other stuff". While this is a question rather than a finding, it suggests to us that an analytical focus on the reductive power of the sustainable home (does it turn citizenship into a calculative activity?) might have its drawbacks. It might lead us to miss out on the more "expansive" work of articulation performed with the aid of green homes, namely the formulation of different possible "green" political economies.

Sustainable perspectives: How expansive are the space-times of green living?

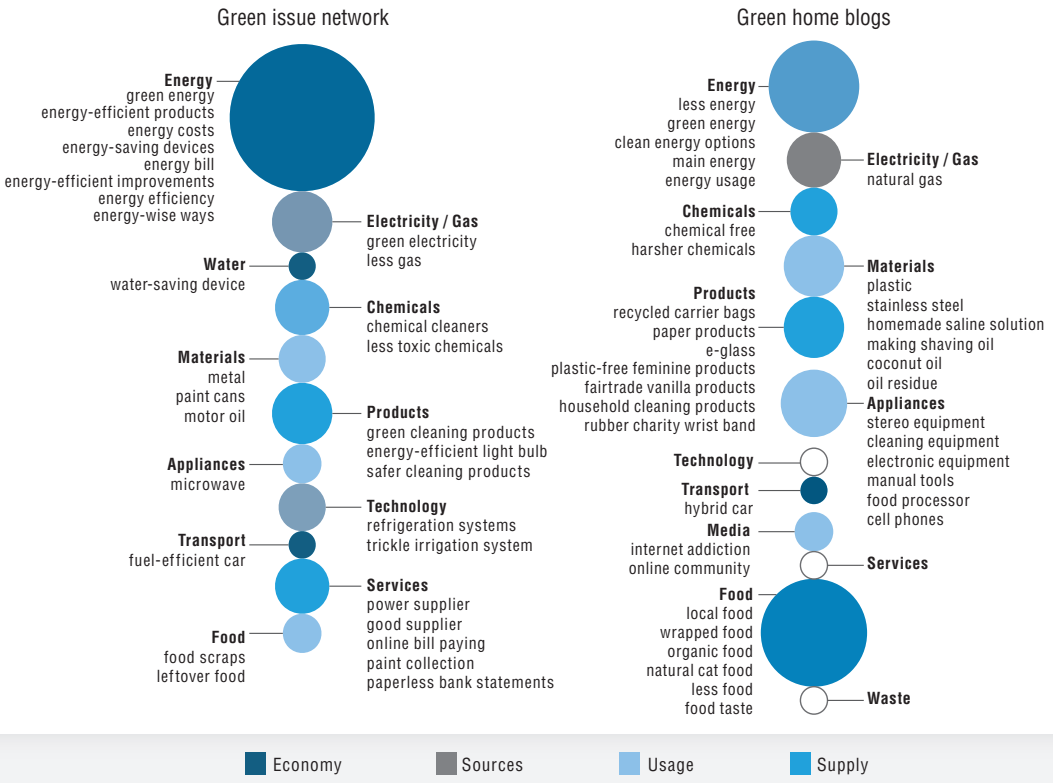
Question

In this last exercise, we further explore the issue of the relative "smallness" of the sustainable home as a space for action on the environment. That is, we are interested in the "scope" of sustainable homes,[8] the question of how expansive the range of issues they open up is. We would like to find out whether "sustainable living" is primarily oriented towards the immediate context of everyday living, or whether it also involves reference to, consideration of, or even intervention in, wider technological, social and political spaces that lie well beyond it.

7 These findings contrast with those of our initial green home typology, as there we found that green home blogs did deploy the calculative repertoire. In this respect, the findings presented here may also tell us something more specifically about the codification of "activities" on green home blogs, as here we are considering the genre of "what you can do".

8 Michael, M. and Gaver, B. (forthcoming) Home Beyond Home: Dwelling with Threshold Devices, in Domenech, M. and Schillmeier, M. (eds.) *Space and Culture*, special issue on Care and the Art of Dwelling: Bodies, Technologies and Home.

Figure 4. **"What you can do": Terms per category**

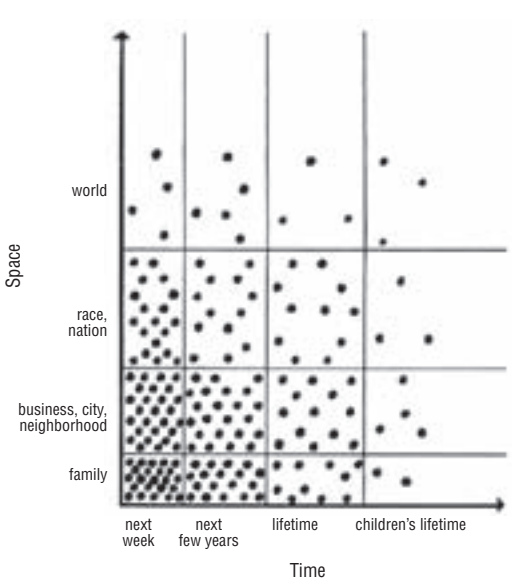


In taking up this question of the "spatio-temporal" coordinates of the green home, we find inspiration in a diagram that featured in the *Limits to Growth* (1972) report,[9] the famous global environmental assessment that brought the environmental crisis into public view around the world, now more than three decades ago.

This classic figure plots human concerns across time and space, moving from more immediate to distant times and spaces. It locates the majority of people's concerns in the here and now, and as such it passes a rather bleak verdict on the public's capacity for sustainability (i.e. its ability to take into consideration the consequences of present activities that are distant in time and space).

In analogy with this figure, we ask: What is the spatio-temporal distribution of the concerns expressed in our three green web spheres? Are the more informal and "homey" green home blogs mainly preoccupied with the here and now? Do the green organisations assembled in the green issue network represent more global concerns? Does it even make sense to apply this spatio-temporal grid to these "digital formations"?[10]

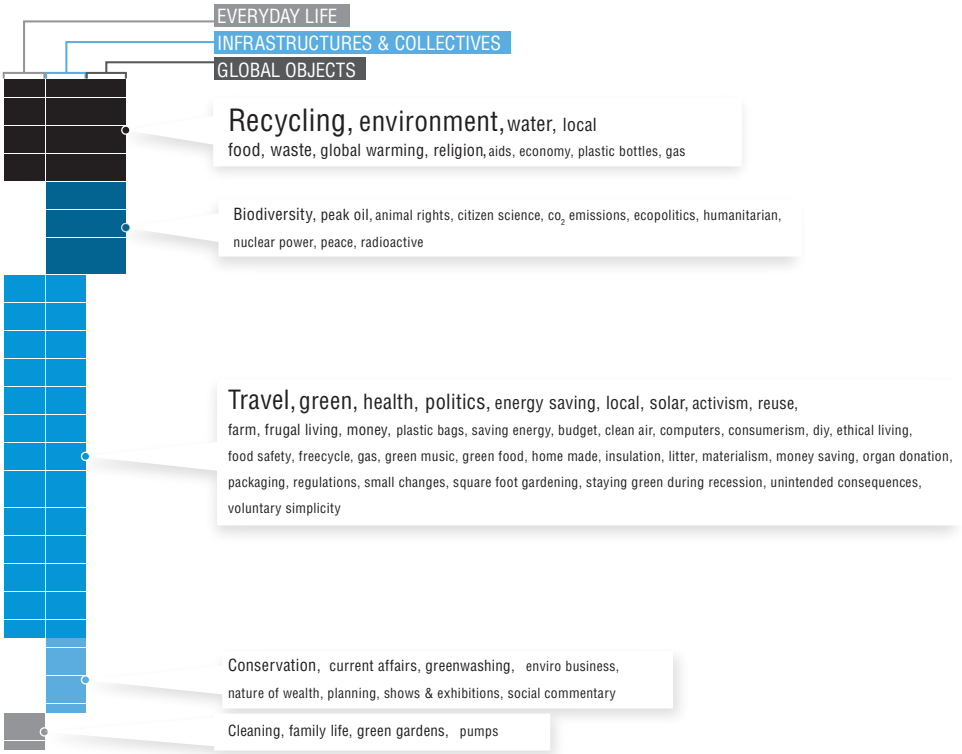
Figure 5. **Human perspectives (Limits to Growth, 1972)**



9 Meadows, D. H., Meadows, D. L., Randers, J. and Behrens, W. W. (1972) *Limits to Growth: A report for the Club of Rome's Project on the Predicament of Human Kind*, Universe Books, New York.

10 Latham, R. and Sassen, S. (eds.) (2005) *Digital Formations: IT and new architectures in the global realm*, Princeton University Press, Princeton.

Figure 6. **Green home blogs perspective: Distribution of blog categories from the everyday to the global**



Method

For this exercise, we focus on the tags and categories that our sources use to organise the information they make available (postings, reports, and so on). We aggregate the tags and categories for each source set, and visualise them using the Tag Cloud Generator. We then proceed to manually attribute spatio-temporal coordinates to these categories:

x: the everyday (1), infrastructures and collectives (2), elsewhere (3)

y: the present (a), the next decade or so (b), further into the future (c)

We then seek to visualise the tag clouds spatially, which turns out to be more complicated than anticipated. This is because many categories have more than one set of spatio-temporal coordinates attributed to them.

Findings

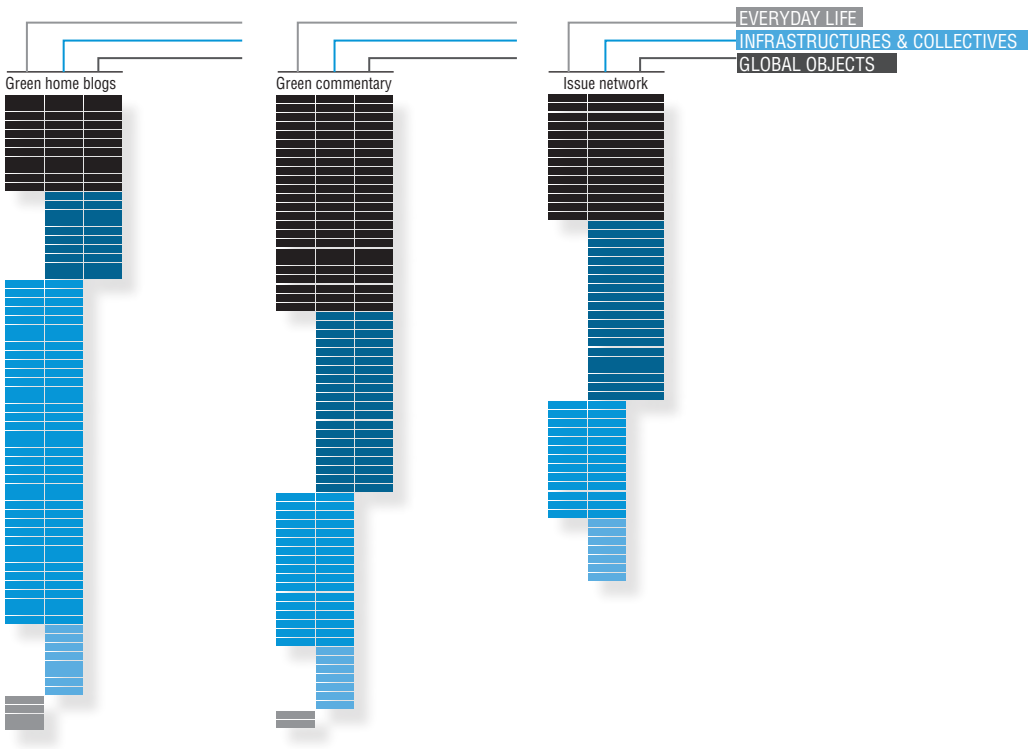
We draw two main conclusions from this exercise:

- The spatio-temporal framework of the "human perspectives" figure in the *Limits to Growth* report does not really apply to the three source sets.

One of the main "findings", or realisations of this exercise, is that it is next to impossible to locate the "concerns" of green blogs, commentary sites and the issue network in the linear "space-time" assumed by the *Limits to Growth* report. This is for two reasons. Firstly, it proved difficult to attribute straightforward temporal coordinates to the substantive categories, or "issues" treated in green media spaces: is peak oil, geo-engineering or renewable energy something of the future, present or past? To us, this is either uncertain or "all of the above".[11] A similar problem arose in relation to spatial coordinates: is an issue like waste, water or pharmaceuticals a concern of everyday life or a global issue? Again I would say all of the above. For this reason, we decided to drop the temporal coordinates, and to accept that spatial coordinates may be "non-exclusive". That is, in our classification, concerns or issues could be located on all spatial levels, or any combination thereof: everyday life, collectives and infrastructures, and global objects.

11 See on this point Nowotny, H. (2002) Vergangene Zukunft: Ein Blick zurück auf die ›Grenzen des Wachstums‹, in *Impulse geben – Wissen stiften. 40 Jahre VolkswagenStiftung*, VolkswagenStiftung, Göttingen, p. 655-694.

Figure 7. **Comparative perspective: Distribution of blog categories from the everyday to the global**



- Assuming non-exclusivity of the spatial coordinates, the exercise did yield a spatial distribution of concerns.

  Perhaps unsurprisingly, the more informal and "homey" green home blogs tend towards the everyday. However, possibly more surprisingly, it is *not* the more institutionally oriented green issue network that is most concerned with global issues, but rather critical commentary sites. And significantly, while the issue network is much concerned with consumption, it includes no issue terms that can be considered exclusive to everyday life.

  Perhaps most interesting, however, are the questions this exercise raises about the spatio-temporal assumptions implied by the concept of sustainability. Sustainable is often defined in terms of the attempt to render relevant in the here and now harmful effects which are distant in space and/or time (poverty, carbon emissions, future generations, and so on). However, the sustainable web spheres under study here unsettle the neat space-time geometry that such an understanding of sustainability seems to presuppose. Objects and practice cannot be located so straightforwardly in space and time: a preoccupation with proximate objects (home-made food, for example) does not necessarily exclude attention to distant ones (carbon emissions).

  So our next question would be: Do sustainability spaces on the web disclose alternative "topologies" of the environment, which problematise the equation of the everyday with the small-scale and the proximate? Could sustainable homes be locations where the space-times of public engagement with the environmental are re-imagined, or even, materially reconfigured? This may or may not be the case. But one thing cannot go unnoticed in this respect: while the concerns expressed on green home blogs may seem expansive in some respects, in other ways the "spaces of relevance" that they open up seem to be rather restricted. As mentioned, we located the green issue network in Figure 1 by following the aggregated hyperlinks of green home blogs. And this issue network presents not an inclusive global network, but rather a centralised, government-centred political geography, with US and UK government and consumer organisations taking centre stage. While it must remain an open question what exactly can be deduced from such a pattern, we are reminded that sustainable living, in these cases at least, seems to be configured as a specifically Northern undertaking. ■

Regional and country reports

Introduction
(Re)claiming the environment

Climate change is presented as a crisis: by the scientific community, global institutions, governments and the media. Its urgency provokes the need for mainstreaming environmental concerns in the information and communications technology for development (ICT4D) sector. While analysts argue that climate change magnifies development inequalities, it is also likely to magnify political disagreements and fault lines – already the case at global forums such as the recent negotiations in Copenhagen.

Many ICT activists have been active at the interstice of ICTs and environmental sustainability at least for the past three decades. The pioneering role organisations across the globe played in the early internet – such as GreenNet in the United Kingdom, Pegasus Networks in Australia, and SANGONeT in South Africa – meant that they served a critical historical function in linking up social and environmental groups as early as the 1980s. Similarly, BlueLink in Bulgaria, which was founded in 1997, was initiated by several environmental non-profit organisations, linking the internet with environmental activism in that country. Over the years, the fields of interest for ICT4D practitioners have extended to low-cost and sustainable technologies in environments where there is no infrastructure, and the outspoken promotion of refurbished computers and open source technology in areas such as education – the latter leading to early calls for multinational vendors to take responsibility for discarded technology in developing countries. The historical importance – and thematic significance – of environmental issues to the ICT4D sector is shown by the 2003 World Summit on the Information Society Plan of Action, where "e-environment" (C7, 20) is one of the action areas alongside e-government, e-learning and e-health, amongst others.

Fifty-three authors responded to a call for reports on ICTs and environmental sustainability – including GreenNet, BlueLink and EngageMedia (Andrew Garton being one of the people involved in setting up Pegasus Networks). The brief to the authors was broad. This was to give them the leeway to focus on issues that were directly relevant to their work, and with the recognition that the field may be new to a number of them. Within the general field of "ICTs and environmental sustainability" authors were encouraged – although not limited – to write on issues to do with electronic waste (e-waste) and climate change.

Many countries here are grappling with the tangible effects of climate change, such as the melting of the glaciers that make up the Venezuelan Sierra Nevada, the impact of higher temperatures on sensitive rainforest ecosystems and floods and droughts on agriculture, and the regional political consequences of access to the water security of the Nile. In many countries the negative consequences of e-waste have been felt for some time now, such as in India, where there are 52 million internet users, and 15 million regular mobile users, yet e-waste is processed largely by the informal sector, with few, if any, safety and health considerations. In other countries, which are still struggling to overcome the "digital divide", the challenge of e-waste is still being anticipated. At the other end of the product chain – production – the report on the Republic of Korea is a clear account of the quite frightening challenges facing factory workers who have to deal with the toxins that make e-waste a hazardous waste in the first place. While 47 cancer cases among Samsung workers have been reported, the company has refused responsibility. Min Kyung Jeong from the Korean Progressive Network Jinbonet writes:

> There was no transparent and verifiable process in the investigation [into the death of a Samsung semiconductor factory worker from leukaemia], which can lead some results to be distorted and left out. It is also difficult for the complainants to verify the results in the case when there are usually several years between exposure to the harmful materials and the onset of diseases.

Just under half of these reports deal with e-waste as their core discussion, the rest focusing on climate change, or a combination of climate change and e-waste. Taken together, these reports cover the full range of ICT implications for the environment: from production, to markets and procurement (read Sweden's account of challenges around eco-friendly government tenders, for instance), to use, reuse and disposal.

The tensions provoked by ICTs and their impact on the environment – as well as how they can benefit environmental sustainability – are not all resolved in the same way in these reports. Some see the practical opportunities in e-waste, such as upskilling and employment, or the potential for ICTs to help win the battle against a changing climate. Some engage with the issue at the level of political challenge – governments and powerful stakeholders such as multinational vendors need to be taken on. This whether it involves the disconnect between policy promises at the global level – such as being a signatory to the Basel Convention but having no practical instrument at the country level to honour this commitment – or being alert to the "greenwashing" of big business looking to exploit new markets with the veneer of an eco-conscious agenda:

> As "green" products are proving a successful model for marketing, ICT vendors stress the fact that their newest products are greener and that is why customers should buy them, even if their old equipment satisfies their

> needs. This is a business practice that eventually leads to a commodity-driven lifestyle that directly contradicts the logic of green ICTs: saving nature's resources. (Vera Staevska, BlueLink)

In one way or another authors in this GISWatch have shown that the information society has its working class too, and technology is not an escape from social conditions as it is sometimes marketed. The underbelly of the technology we use so freely is the impact it has on the environment, and the knock-on effect consumption has on the most vulnerable people: the life conditions of the waste pickers on the dumps all over the world, and the factory workers in Asia. Technology, and its hunger for natural resources, has real-life consequences on the ground, as in the global demand for coltan and its role in the civil war in the Democratic Republic of Congo.

As Sohrab Razzaghi and Hojatollah Modirain (Arseh Sevom) suggest in their report on Iran, "going green" – which is a *systemic* need – requires at least political stability:

> Without human rights, sustainable development cannot happen. It should be noted that human rights are not only confined to freedoms, such as freedom of speech and prohibiting torture, but also cover some basic rights such as water, health, food, eliminating poverty, education, as well as freedom of information and access to the internet. (…) The political uncertainty in the country and harsh suppression of civil society have resulted in less attention being given to environmental issues and climate change.

While most see the need to mainstream environmental concerns in ICT4D organisations, it is important to note that there are activists who do not feel that environmental issues should be part of their core mandate which, they feel, should continue to attend to more cross-cutting structural concerns, such as consumerism, or market ideologies. At least one regular GISWatch author did not contribute a report this year for this reason – and the rationale needs to be taken seriously. For many, the most comfortable fit for environmental causes in their advocacy agendas is still being worked out.

These reports capture something of the (re)emerging story of ICTs and environmental activism – and something of its messiness. As usual, the country reports are prefaced by regional reports which contextualise, and add nuance to, the specific considerations at the country level. Together they make a critical intervention from a civil society perspective. As positions are formed in institutions, businesses and governments around the role of ICTs and the environment – most readily felt right now on the issue of climate change – they suggest a need for civil society to enter the debate; to rupture too easily taken positions, some of which might play into the hands of powerful stakeholders. It is the job of the ICT activist to keep the debate open, the tensions apparent, and to surface those things that are kept hidden. ■

REGIONAL REPORT

South Asia

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Introduction

South Asia, home to more than one billion people, is also a region where information and communications technology (ICT) usage and adoption are growing exponentially. ICTs here do not mean a computer as a dedicated device only. Rather, "the miniaturization and embedding of microelectronics into non-ICT objects and wireless networking have made ICT ubiquitous."[1] India alone has 52 million internet users and 362.3 million mobile phone subscribers – 15.3 million new subscribers were added in June 2010.[2] Bangladesh has a total of 59.98 million mobile phone subscribers and sold about 230,000 PCs and 65,000 notebooks so far this year.[3] Another populous country in the region, Pakistan, has 18,500,000 internet users and was set to hit 100 million mobile phone subscribers by August 2010.[4]

The pace and the extent to which these products are penetrating society pose two types of problems. One is increasing cost, scarcity and consumption of energy through ICT tools or products that have an impact on the environment; and the other is the life cycle of ICT products and management of waste that has a considerable effect on health, safety and the environment. According to *info*Dev, ICTs contribute just over 2% of global greenhouse gas emissions, while they can play a significant role in reducing the remaining 98%, in particular by enabling smart energy efficiency and providing a substitute for the physical transport of goods and people.[5]

In South Asia more work is done in the context of ICTs being a part of the problem – for example, with regard to electronic waste (e-waste) – rather than technology being a solution to environmental challenges, such as climate change.

Climate change policy and legislative context

Policy or legislative discussion in the region has little to say about ICTs, although reference to the use of technologies is pretty clear. For example, ICTs are not directly included in the present National Environment Policy of India; but the use and application of new technology such as energy-efficiency technology, remote sensing, natural resource management, local information management and dissemination, and disaster management has been emphasised. The government of India has set up the National Natural Resources Management System (NNRMS) for optimally managing and mapping the natural resources and environment of the country using a mix of remote sensing and conventional techniques.[6] Similarly, the draft National Climate Change Policy of Nepal does not mention anything about ICTs, except using remote sensing technologies in climate change observatories for data collection.[7] A draft National Environment Policy of Sri Lanka[8] emphasises the introduction of cleaner energy production through the development and promotion of technology, and reducing the use of hazardous substances through the application of alternative technology or management practices. The Bangladesh Climate Change Strategy and Action Plan 2008 talks about technology transfer and a virtual technology bank on climate change adaptation and mitigation.[9] The Pakistan National Environment Policy 2005[10] explains the best use of available technologies as one of its guiding principles to achieve its objective of attaining sustainable development by protecting the resource base and environment of the country and ensuring the effective management of the environment.

It seems that many countries in the region have multiple policies or acts with regard to environmental issues, and there is a trend to bring those under one umbrella. India leads the way. For example, the National Environment Policy of India was announced on 18 May 2006 as an umbrella policy to accommodate other existing policies, including the Environment (Protection) Act, 1986; National Forest Policy, 1988; National Conservation Strategy and Policy – Statement on Environment and Development, 1992; the Policy Statement on Abatement of Pollution, 1992; National Agriculture Policy, 2000; National Population Policy, 2000; and National Water Policy, 2002. The National Environment Policy is likely to work as a guide to take action in several areas, such as regulatory reform, programmes and projects for environmental conservation, and the review and enactment of legislation by central, state and local governments.[11] In Bangladesh, the Climate Change Strategy and Action

1 Global e-Sustainability Initiative (GeSI) (2008) *The Contribution the ICT Industry Can Make to Sustainable Development: A Materiality Assessment.* www.gesi.org/LinkClick.aspx?fileticket=yUzW4/uE15E%3D&tabid=60

2 Telecom Regulatory Authority of India (TRAI) www.trai.gov.in

3 Bangladesh Telecom Regulatory Commission www.btrc.gov.bd

4 Pakistan Telecommunication Authority www.pta.gov.pk

5 *info*Dev (2009) *ICTs and Climate Change.* www.infodev.org/en/Document.658.pdf

6 Global Information Society Watch 2010, India country report.

7 Global Information Society Watch 2010, Nepal country report.

8 www.dailynews.lk/2001/pix/ministry-environment.pdf

9 www.indiaenvironmentportal.org.in/files/Sep08-Bangla-CC-moef.pdf

10 www.environment.gov.pk/nep/policy.pdf

11 Global Information Society Watch 2010, India country report.

Plan 2008[12] talks about establishing a dedicated web portal, which would track all national policies, rules and regulations, and news related to climate change debates. The country has nineteen different related policies or plans, including the Bangladesh National Adaptation Programme of Action, 2005; Bangladesh Environment Conservation Act, 1995; and the Environment Conservation Rules, 1997.

The Biodiversity Action Plan (BAP)[13] in Pakistan is the first comprehensive attempt in that country to compile all contemporary policies related to biodiversity, including the Pakistan National Conservation Strategy, 1992; Forestry Sector Master Plan, 1985; Biodiversity Action Plan, 1998; and Pakistan Environmental Policy, 2005.

Climate change issues have resulted in countries going in different policy, action plan and strategy directions. Bangladesh has developed the Climate Change Strategy and Action Plan (BCCSAP) 2008, formulated in the aftermath of COP 13 in Bali,[14] and the National Adaptation Programme of Action (NAPA). Its main purpose is to articulate a strategy that prioritises adaptation and disaster risk reduction, low-carbon development, mitigation, technology transfer and the provision of adequate finance.

India signed the UN Framework Convention on Climate Change (UNFCCC) in June 1992. It released its first National Action Plan on Climate Change (NAPCC)[15] on 30 June 2008, which identifies eight core national missions, including those dealing with solar energy, energy efficiency, sustainable habitats, water, and the Himalayan ecosystem. The National Adaptation Programme of Action (NAPA), both in Nepal and in Bhutan, were designed to address climate change issues and included points such as forest reforms, water conservation, and the health impacts of climate change.

E-waste policy and legislative context

Although climate change is a much talked-about issue, the waste generated by ICT equipment and the policies to support the management of this waste are equally important a discussion in the region. E-waste has a direct and visible impact on people's health, environment and livelihoods and is considered to be an unregulated domain. Computers, refrigerators, televisions and mobile phones contain more than 1,000 different toxic materials. Chemicals such as beryllium, found in computer motherboards, and cadmium in chip resistors and semiconductors are poisonous and can lead to cancer. Chromium in floppy disks, lead in batteries and computer monitors and mercury in alkaline batteries and fluorescent lamps also pose severe health risks.[16] A typical personal computer has three to five years of good use before it needs to be replaced or upgraded or completely discarded. The disposal of mobile phone waste is more rapid than computers, as new and cheaper models of mobile phones flood the market every month.[17]

Many countries do not have much longitudinal data on the extent of e-waste. Heavy use of ICT devices is one reason, but another important reason is that these countries are increasingly being used as a dumping ground for different electronic products. One study shows India generates around 300,000 tonnes of e-waste annually, which is estimated to grow to 1.6 million tonnes by 2012.[18] Apart from this, an additional 50,000 tonnes of e-waste are illegally imported into the country. The informal sector processes close to 100% of the total amount of e-waste in India by recycling and backyard scrap trading.[19]

A recent study in Dhaka, Bangladesh, shows that the city produced close to 16,000 tonnes of PC e-waste and 2,600 tonnes of mobile phone e-waste this year alone.[20] According to a *Dawn Newspaper* report, more than 500,000 used computers (or 50,000 tonnes of e-waste) are dumped in Pakistan every year.[21]

According to Amit Jain, hundreds of workers, including teenage children, earn their livelihoods by dismantling electronic scrap and extracting valuable components in South Asia. No fresh data is available, but Jain's study in Delhi shows that during 2002-2003 the recycling sector had a trade turnover of about USD 5 million with a yearly investment of close to one million person hours, where the profit ranges from 10% to 20%.[22]

In Sri Lanka, according to its scrap export association, the industry generates about LKR 1.5 billion (over USD 13 million) per annum – a part of which comes from e-waste.[23]

12 www.sdnbd.org/moef.pdf

13 www.iucn.org/about/union/secretariat/offices/asia/asia_where_work/pakistan/publications/pubs_2000/pubs_bap.cfm

14 unfcccbali.org/unfccc/event/climate-change/cop-13-and-cop/mop-3.html

15 pmindia.nic.in/Pg01-52.pdf

16 Beary, H. (2005) Bangalore faces e-waste hazards, *BBC News*, 31 January. news.bbc.co.uk/2/hi/south_asia/4222521.stm

17 Global Information Society Watch 2010, Nepal country report.

18 Puducherry Pollution Control Committee (2008) e-Waste, *Quarterly News Letter of the ENVIS Centre*, January-March. dste.puducherry.gov.in/envisnew/tenthnewsjan-mar-2008.pdf

19 Energy and Resources Institute (2008) Climate Change Mitigation Measures in India, International Brief. www.pewclimate.org/docUploads/India-FactSheet-09-08.pdf

20 Sarwar Uddin Ahmed (2010) *e-Waste: A Growing Concern for ICT-based Growth and Development: A First Cut Analysis*, D.Net, Dhaka.

21 www.dawn.com/wps/wcm/connect/dawn-content-library/dawn/news/sci-tech/12-pakistan+a+dumping+ground+for+e-waste--bi-14

22 Amit Jain (2006) *e-Waste in South Asia*, IRG Systems South Asia Pvt. Ltd., New Delhi. www.irgssa.com

23 Ibid.

In Dhaka, Bangladesh 120,000 urban poor from the informal sector are involved in the recycling chain. Most of the recyclers work with their bare hands and extract precious metals such as gold and silver using crude chemical processes.[24] Metal extraction processes using acid, open burning and glass recovery from breaking cathode ray tubes (CRTs) are also practised.

Countries in South Asia do not have comprehensive policies to handle e-waste challenges. All South Asian countries including India, Pakistan, Bangladesh, Nepal, Bhutan, Sri Lanka and Maldives are signatories to the Basel Convention prohibiting transboundary movement of hazardous waste. India has drafted e-waste (management and handling) rules, which are in public consultation right now and are likely to be gazetted soon. Prior to this, India enacted its Hazardous Waste Management and Handling Rules (1989)[25] where electrical and electronic assemblies are covered under category B-1110 of Schedule 3 of the rules. The rules state that electrical and electronic assemblies are not valid for direct reuse, and may only be recycled. The import of second-hand electronic items for disposal and recycling is also banned in India. Nepal formulated a Solid Waste Management Bill (2008)[26] that provides directives for managing, categorising and collecting information on solid waste types. Surprisingly it does not say much about e-waste. In Bangladesh, the National Environment Policy (1992) and Environment Conservation Act (1995) tried to highlight that the government can take action to stop activities that destroy or pollute the environment. Medical Waste Management Rules (2008)[27] in the same country address waste management issues for the medical sector, including e-waste.[28] The government of Bangladesh is now preparing a solid waste management policy which will cover e-waste issues as well. Section 13 of the Pakistan Environmental Protection Act (1997)[29] prohibits the import of hazardous waste and Section 14 disallows handling of hazardous elements. The country also has solid waste management rules and draft hazardous waste management rules. The government of Pakistan has also imposed a 25% tax on computer screens.[30]

Conclusions

- Although the countries of South Asia are not on the list of high carbon emission countries, their governments should formulate policies and encourage and develop awareness among their citizens to adopt more energy-efficient ICT devices, applications and networks, so that the emission of carbon due to ICT usage is limited. Different ICT companies could be encouraged to use alternative sources of energy (such as solar, biogas or wind) to run their computer networks and devices and more fiscal support or tax breaks could be offered. A McKinsey report shows that boosting the use of intelligent devices and applications could reduce global CO_2 emissions by as much as 15% by 2020.[31]
- More serious and in-depth study needs to be done to identify the nature, extent and impact of e-waste on human health, the environment and livelihoods. The impact is felt, but most of the countries in South Asia do not have any baseline data on this.
- ICT penetration is increasing in the countries of South Asia, but these countries do not have much information on e-waste management systems and recycling processes. Civil society organisations should work more to raise awareness and to translate best practices from other countries to suit the local contexts.
- Countries in the region are being used as dumping grounds for used computers, monitors, mobile phones and other electronic items. The entire trade route of this e-waste import needs to be investigated for proper action.
- Countries need to formulate dedicated policies and legislation focused on e-waste challenges. Policies or acts relevant to e-waste management need to be brought under one umbrella. Often multiple plans or policies work without any interconnection. ■

24 news.bbc.co.uk/2/hi/south_asia/4222521.stm

25 www.envfor.nic.in/divisions/hsmd/notif.html

26 www.ngoforum.net/index.php?option=com_content&task=view&id=2252&Itemid=6

27 gec.jp/gec/jp/Activities/ietc/fy2010/e-waste/ew_1-9.pdf

28 Fazle Rabbi Sadeque Ahmed (n.d.) *e-Waste Management Scenario in Bangladesh*, Department of Environment, Dhaka.

29 www.environment.gov.pk/act-rules/envprotact1997.pdf

30 Zaigham Abbas (2010) *E-Waste Management in Pakistan*, Ministry of Environment, Islamabad.

31 www.euractiv.com/en/climate-change/ict-and-climate-change-problem-or-solution-linksdossier-188492

REGIONAL REPORT

East Africa

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Introduction

The landing of three fibre optic cables in East Africa heralds an era of exponential growth of access to and use of information and communications technologies (ICTs). With this growth, it is expected that the region will produce more electronic waste (e-waste) as East Africans discard obsolete computers, television sets, mobile phones and other ICT equipment. Further donations of second-hand equipment, the transition to digital broadcasting and the rapid turnover in technology are likely to compound the problem.

In the past ten years, East African governments have been preoccupied with universal affordable access to ICTs without paying equal attention to the environmental impact of access. Most of East Africa's e-waste is dealt with by the informal sector with little or no regulation and no existing strategy for e-waste management and recycling systems. Some countries like Uganda and Kenya have just begun to deal with and develop basic waste management systems, but still lack the capacity, skills, resources and infrastructure to address the challenge effectively.

Regional trends in e-waste policy and legislation

None of the East African countries has a specific policy on e-waste in place. However, there is recognition of international conventions regulating hazardous waste, among them the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, and the Bamako Convention, which aims at introducing preventive measures and guaranteeing appropriate disposal of hazardous waste in Africa. A proposal to amend the Basel Convention banning all transfers of hazardous wastes from developed to developing countries has been hindered by lack of support since it was introduced in 1995. Similarly, the Bamako Convention aims to criminalise the import of hazardous waste into Africa from outside the region and from non-contracting parties and also prohibits dumping hazardous waste at sea as well as incinerating it.

Although East African countries do not have specific e-waste legislation there are provisions found in other laws governing the environment, air, water, public health, waste and hazardous substances. For example, in Tanzania, the main environmental governance legislation is the Environmental Management Act (2004), which addresses the management of hazardous waste. It is largely aimed at regulating movement of this waste and placing responsibility for its disposal on those who generate it. Uganda applies the non-specific National Environment Act (1999) to e-waste; however, in 2010 the government released a draft Electronic Waste Management Policy for comments from stakeholders. The draft policy aims at enforcing several strategies for e-waste management. Kenya, on the other hand, has a mix of laws and regulations addressing waste, and some recent references to e-waste, but there is no coordinating framework. Two important pieces of legislation under which e-waste can be considered in Kenya are the Environmental Management Co-ordination Act, and the Public Health Act, which places responsibility for waste management at the local authority level. There is also provision for e-waste management contained in the National ICT Policy (2006), which calls for appropriate recycling and disposal facilities as requirements for the renewal of communications licences.

The Rwanda National Environment Policy sets principles for management of the environment as well as institutional legal reforms and established the Rwanda Environment Management Authority. Nevertheless, the application of these legal instruments is typically unspecific to e-waste, and the practical implementation of environmentally progressive waste regulations when it comes to discarded technology is virtually impossible in countries where basic waste management is still a priority.

Challenges and the roles of stakeholders

Although awareness and readiness for improving the management of e-waste in the region are increasing rapidly, major obstacles still exist. Lack of reliable data poses a major challenge to the development of e-waste management strategies, policy and regulation. The reliance on the informal sector, without appropriate infrastructure and regulations, where e-waste is commonly burnt in open air or dumped into landfills and bodies of water where it releases toxic substances, continues to contribute to environmental degradation and serious health challenges.

An East African Community Secretariat report of the 13th Meeting of Permanent Secretaries Responsible for Environment and Natural Resources noted that there is increased dumping of second-hand equipment in the region in the form of donations. The report recommends fast-tracking the establishment of electronic and hazardous waste management frameworks, and building capacity for handling electronic and hazardous waste.

The current waste management experience in the region demonstrates that informal organisations and the few formal ones cannot deal adequately with the increasing volumes, diversity and complexity of e-waste. It needs to be addressed through a multi-stakeholder partnership approach within a

relevant and appropriate framework, at both the national and regional levels. Clear responsibilities must be placed on each stakeholder group to ensure that each is playing its role effectively and efficiently. However, the role of governments in ensuring that the appropriate legislation and new frameworks are drafted is paramount.

Studies conducted in the East Africa region identify the main stakeholders in e-waste generation and management as the government/policy makers, private sector (manufacturers, distributors/importers), and civil society (refurbishment centres, consumers, collectors, recyclers).

Governments/policy makers

While governments seem to be taking e-waste seriously, they are still struggling with the issue of used ICT equipment being promoted as access solutions and the dumping of e-waste. Their reaction has tended to be severe: placing bans or levying taxes on the importation of second-hand computers. Kenya recently imposed a 25% tax on refurbished computers, while Uganda established a total ban. Rwanda, Burundi and Tanzania are still accepting refurbished computers for rural communities, schools and other development initiatives. However, these sorts of reactions may not be constructive. A United Nations Environment Programme (UNEP) study published in February 2010 revealed that reusing a computer is twenty times more effective at saving life cycle energy use than recycling.

Civil society and industry are now urging governments to reconsider the ban and taxes and instead place an emphasis on the better management of e-waste. East African governments should focus on developing policy, legislative and regulatory frameworks at a national and regional level. These policy interventions must begin by clearly defining e-waste for effective regulation and provide an integrated policy with both regulatory and operational components. They must also encourage an effective import and export regulatory regime, and ensure that the provisions of international conventions – Basel and Bamako – are implemented and followed. This needs to be done through strengthening cross-border cooperation in the East African region. This is also where governments could aim at harmonising regulations on aspects like approval of equipment types as well as providing support for the growth of a regional recycling industry from their universal access strategy funds or the creation of an e-waste support fund.

Governments should also ensure that there are adequate capacity and skills, including institutional capacity building, and formalise the informal recycling sectors so that there is a protective protocol for workers dealing with e-waste disposal.

Industry/private sector

A study funded by Hewlett-Packard, the Global Digital Solidarity Fund (DSF) and the Swiss Federal Laboratories for Materials Testing and Research (Empa) in 2007 indicates that the private sector has the largest computer stocks and generates two thirds of the related waste flow in Africa. The private sector cites lack of infrastructure and policy as some of the obstacles to contributing to e-waste management.

The lack of an e-waste management system and limited processing capacity has led to e-waste being stockpiled in homes, offices and repair shops. However, some companies, such as Hewlett-Packard and Nokia, among others, have launched or expanded recycling programmes in recent years. Some already provide incentives to their customers for product return through a “buy-back” approach.

Manufacturing companies need to assume their responsibilities and obligations in setting up appropriate solutions and mechanisms to recycle their products. Policies for the return of goods at the end of their useful life and plans for safe and clean disposal of equipment and e-waste should be adopted. Some solutions that industry could adopt include, but are not limited to, adapting precautionary principles by employing sustainable product designs, for example through the use of renewable, biodegradable components and material and waste minimisation techniques, among others. Industry could also work with governments to implement extended producer responsibility as an appropriate framework that combines major principles of environmental justice. This approach would shift responsibility for safe disposal to manufacturers.

Civil society

East African civil society organisations have tended to lead in optimising the life cycle of electric and electronic equipment through various community projects attempting to increase access to affordable technologies by reusing equipment. They are also often at the forefront in searching for and implementing solutions for e-waste management and recycling; for example, by participation in the creation of National Cleaner Production Centres in Uganda, Kenya and Tanzania as part of initiatives led by UNEP and United Nations Industrial Development Organization (UNIDO). Civil society initiatives include the Second Life recycling initiative in Uganda and Computers for Schools in Kenya, among others.

Civil society is also very active in increasing public, scientific and business knowledge on e-waste and continues to play a very important role of awareness creation through

research and advocacy activities, such as those undertaken by I-Network Uganda and the Kenya ICT Action Network (KICTANet). This seems to have encouraged East African governments to take the issue seriously and to begin to act. As mentioned, in Uganda, the Ministry of ICT recently released an e-waste policy for stakeholder comments, while in Kenya, the Communications Commission of Kenya has held several workshops with various stakeholders to begin considering the form of new regulations. Civil society organisations also continue to increase consumers' knowledge of e-waste by placing the issue on the public agenda through collaboration with the media.

Consumers

There is a general lack of awareness among consumers and collectors of the potential hazards of e-waste to the environment and their health. Consumers in the region tend to use equipment until the end of its useful life and then store it in their offices or homes, or sell or donate it as second-hand equipment that can be repaired and used by others. Consumers need to be informed of their role in e-waste management and encouraged to adopt responsible consumerism. For example, while buying electronic products, they could opt for those made with recycled content and few toxic components, or those that are energy efficient, with minimal packaging and that offer take-back options. Furthermore, donating electronics for reuse could extend the life of valuable products and keep them out of the waste management system for longer.

Conclusion

All stakeholders in East Africa, including but not limited to policy makers, manufacturers, civil society and consumers, must be involved in any e-waste management system in order for it to be effective and efficient. Regional cooperation amongst technology-poor countries is also critical, both for sustainability of recycling initiatives and to ensure that e-waste is treated properly. Any strategy must take into account issues of sustainability and approach the matter through technical and policy-level interventions that would also convert this challenge into an opportunity. Policy-level interventions should also look into the import and export of e-waste between regions, and a better understanding of the appropriate interventions at this level are necessary. ■

References

Computers for Schools Kenya www.cfsk.org/index.php?pageid=9

East African Community Secretariat (2009) Report of the 13th Meeting of Permanent Secretaries Responsible for Environment and Natural Resources, Section 2.3.4 Status of Waste Management in Partner States.

Government of Kenya (2006) National ICT Policy.

Government of Tanzania (2004) Environmental Management Act.

Government of Uganda (1999) National Environment Act.

Government of Uganda (2010) Electronic Waste Management Policy (Draft).

Kenya ICT Action Network (2008) *E-waste management in Kenya.*

Schluep, M. (2007) *E-waste Management in Africa.* ewasteguide.info/e-waste-management-in-africa

Schluep, M. et al. (2009) *Recycling – From E-waste to Resources.* www.unep.org/pdf/Recycling_From_e-waste_to_resources.pdf

Tedre, M., Chachage, B. and Faida, J. (2009) *Integrating Environmental Issues in IT Education in Tanzania.* fie-conference.org/fie2009/papers/1238.pdf

UNEP (2007) *E-waste Volume I: Inventory Assessment Manual.* www.unep.or.jp/ietc/Publications/spc/EWasteManual_Vol1.pdf

UNEP (2007) *E-waste Volume II: E-waste Management Manual.* www.unep.or.jp/ietc/Publications/spc/EWasteManual_Vol2.pdf

Yu, J., Williams, E., Ju, M. and Yang, Y. (2010) Forecasting Global Generation of Obsolete Personal Computers, *Environmental Science & Technology*, 44 (9). ewasteguide.info/biblio/forecasting

REGIONAL REPORT

Middle East and North Africa

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Introduction

The Arab States region, spanning most of the Middle East and North Africa (MENA), is a relative newcomer to information and communications technology (ICT) waste. Nevertheless, in the last decade the take-up of mobile phones and computers has accelerated sharply, especially in high-income countries like the Gulf nations, Saudi Arabia and Iraq before the invasion. Countries with a large population, like Egypt, have also seen a sharp spike in mobile use.

The proper disposal of electronic waste (e-waste) is costly, and many developed countries have brokered deals with developing nations to dispose of their e-waste in foreign landfills or export old PCs and notebooks for reuse in developing countries.[1] Due to the short consumption-disposal cycle, ICT e-waste is one of the most rapidly growing hazardous waste categories.[2]

The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal is an international treaty to control and minimise the transfer of hazardous waste from the developed to the developing countries. E-waste is a sub-category of hazardous waste. The Convention has 172 parties and aims to protect human health and the environment against the adverse effects resulting from the generation, management, transboundary movements and disposal of hazardous and other wastes. The Basel Convention came into force in 1992. Most MENA countries are signatories to the convention.

Regional context

To be more attuned to regional needs and circumstances and to facilitate the Basel Convention's implementation, the secretariat created fourteen regional centres, the Basel Convention Regional and Coordinating Centres (BCRCs).[3] These regional centres were the focal point of implementing the Basel Convention's Strategic Plan and policy priorities. The BCRCs allowed the Basel Convention to tailor its strategies and objectives according to the different regional differences globally. That makes technology transfer, training for the reduction of hazardous, industrial and electronic wastes, and mechanisms for their environmentally sound management, disposal and recycling more effective. It also allows for a closer monitoring and communication process.

The BCRC for the Arab States has been located in Cairo, Egypt, since 1998. Since its establishment it has provided training in environmentally sound management of e-waste,[4] disseminated information, and encouraged technology transfer for e-waste management. The BCRC further supports public-private initiatives to deal with e-waste and other hazardous waste and the development of regional strategies that assist in the implementation of the Basel Convention in the Arab States. The BCRC is especially important for the MENA because at present there is no regional policy and legislation for e-waste in the region.

A number of initiatives, but little regional cohesion

The establishment of national and sub-national ICT e-waste management initiatives is becoming an issue of national policy concern in the MENA region. Many governments are aware of the necessity of implementing e-waste strategies due to the increasing amount of e-waste in recent years and the expected acceleration of e-waste in the decades to come. Governments and the private sector have shown successful collaborative initiatives and are expected to continue along this path. In some countries, like Morocco, civil society has had some effect on demanding e-waste solutions, although overall in the MENA region the primary push factor comes from the private sector, with cooperation from the national and local governments.

Besides the Basel Convention, the Centre for Environment and Development for the Arab Region and Europe (CEDARE) has begun to look at e-waste, as well as climate change concerns.

The need for a recycling and "take-back" programme for end-of-life products is being addressed by national governments with the assistance of the private sector, mostly multinational companies like Nokia, Motorola, Vodafone, Dell, Hewlett-Packard (HP), Canon, Cisco, and others. What the region lacks is proper e-waste recycling technology that separates and offers proper disposal of e-waste with the recovery of raw materials to use in a new production cycle.[5]

1 en.wikipedia.org/wiki/Electronic_waste

2 Mueller, E., Schluep, M., Widmer, R., Gottschalk, F. and Böni, H. (2009) *Assessment of e-waste flows: A probabilistic approach to quantify e-waste based on world ICT and development indicators.* ewasteguide.info/Mueller_2009_R09

3 www.basel.int/pub/BCRC-brochure.pdf

4 Among other hazardous and toxic waste; we are concentrating on ICT e-waste in this article.

5 Dyes, R. A. (2009) *Middle East braces to meet the challenge of e-waste.* ewasteguide.info/middle-east-braces-m

As far as the local private sector's involvement goes, the United Arab Emirates (UAE)-based EnviroServe[6] is the only regional company that collaborates with MENA governments for e-waste management and recycling.

Yet there is an alarming lack of national legislation regarding e-waste, let alone ICT e-waste. A major legislative initiative was the passing of a law governing the recycling of mobile phones in the UAE in late 2008. Qatar's Ministry of Environment is presently drafting a law governing the safe management of its e-waste. The law should be made operational by the end of 2010.[7]

Morocco has been looking into embarking on a national e-waste management strategy, although the present legal and recycling infrastructure is not yet adequate for it. The Moroccan government is well aware of the present imbalance between the spike in use of mobile phones, TVs and computers, and the lack of proper disposal systems.[8]

Bahrain has, together with Saudi Arabia, the most advanced bylaws regulating e-waste policies and regulations in the region.[9] The country's private sector, government and personal ICT equipment ownership is one of the highest in the region due to its strong per capita income. Bahrain has also adopted e-commerce and e-government policies. This is coupled with scarce land resources, making the management of e-waste a necessity as landfills are very limited.

Qatar's telecom operator, Qtel, is in the process of drafting a law on e-waste management, which is supposed to be completed by the end of 2010. This would be the first full law in MENA to deal with e-waste specifically. Qatari e-waste is expected to be collected by EnviroServe and then shipped to Singapore for recycling.[10] In Egypt and the UAE e-waste is being collected and recycled manually, generating some income for small recyclers. This also means that it is a selective process and is mainly focused on recyclable (and valuable) elements of ICT e-waste, without proper disposal of the non-recyclable parts.[11]

During the Cairo ICT 2010 conference in February, the Ministry of Communication and Information Technology (MCIT) and the Ministry of State for Environmental Affairs signed the first memorandum of understanding (MOU) on e-waste management. The MOU is the first environmental policy involving ICTs in Egypt.[12] To regulate the influx of outdated ICT equipment, Egypt's Ministry of Industry and Trade put up a ban in 2007 on the import of computers that are older than five years.

HP, the Swiss Federal Laboratories for Materials Testing and Research (Empa), and the Global Digital Solidarity Fund (DSF) are collaborating with the Moroccan and Tunisian governments to assess e-waste management measures.[13]

As is evident from the above, there are growing national initiatives for ICT e-waste management that are driven by global concerns, national awareness of an increasing and hard to manage problem, and the eagerness of multinational ICT companies to be part of the "greening of ICTs" that has risen with the concern of climate change.

Still there is a marked lack of a comprehensive regional e-waste strategy and much to be done at the national level. The country initiatives cited above are a mere start. A more comprehensive and process-oriented e-waste management policy, strategy and implementation plan is needed at the national level than the individual initiatives offer. E-waste recycling is a high technology industry and will need more investment and management processes than are presently available. An international convention with regional presence like the Basel Convention could offer the needed regional technology hub for e-waste management. E-waste management is a complex and costly process. At present most of MENA's recycling is done outside the region. The collected e-waste, which is a fraction of what exists, is being exported to recycling facilities mostly in Asia and in Europe. To establish a collective recycling facility for MENA could be a possibility, if backed by a regional agency.

6 www.enviroserve.ae

7 Kanady, S. (2010) Qatar: E-waste law soon; draft in the works, *The Peninsula*, 15 June. www.zawya.com/story.cfm/sidZAWYA20100615050542/Qatar%3A%20E-waste%20law%20soon%3B%20draft%20in%20the%20works

8 Laissaoui, S.E. and Rochat, D. (2008) Morocco: E-waste country assessment, paper presented at the 19th Waste Management Conference of the IWMSA, Durban, South Africa, 6-10 October. ewasteguide.info/files/Laissaoui_2008_WasteCon.pdf

9 Bushehri, F. (2009) UNEP Role in Promoting Environmental Sound Management of E-Waste, paper presented at the Kuwait Waste Management Conference and Exhibition, Safat, Kuwait, 14-16 April. www.kuwaitwaste.com/papers/03.pdf

10 Toumi, H. (2010) Qatar drafts law on electronic waste, *Gulfnews.com*, 16 June. gulfnews.com/news/gulf/qatar/qatar-drafts-law-on-electronic-waste-1.641398

11 Allam, H. (2009) E-waste Management in the Arab Region: Status and Opportunities, presentation at the E-Waste Management Forum, Cairo, Egypt, 9-10 February. www.euromediti.com/presentations/Allam.pdf

12 www.cairoict.com

13 www.dsf-fsn.org/cms/documents/en/pdf/EWasteGB51.pdf; Amorim, C. (2007) Hewlett Packard to aid Africa's e-waste battle, *SciDev.Net*, 20 September. www.scidev.net/en/news/hewlett-packard-to-aid-africas-ewaste-battle.html

Finally, the MENA region lacks the public demand for ICT e-waste management due to the suppression of civil voices. Although this weakens the e-waste management movement, public involvement in the recycling process can still be part of the equation. The private sector has started several of its recycling initiatives in the region by offering incentives to consumers to bring back old batteries and equipment. A more educated public will be more cooperative and eager to do the same without the incentives.

Conclusion

Regional and national coordination and proper enforcement of e-waste management strategies will be at the forefront of successfully handling the increasing threat of ICT e-waste in MENA. The Basel Convention, with its regional office, could offer an effective site for assessment, reporting and overseeing the e-waste management systems in the region. The Basel Convention's emphasis on technology transfer could also provide an important input into national governments' plans for ICT e-waste management.

The BCRC is also a forum where communication, cooperation and best practices can be shared and reinforced, and where support can be sought by the individual countries of the region. For example, the BCRC has a regional landfill project. Although it is a general e-waste landfill and not specifically focused on ICT e-waste, it sets an important precedent that could be used and modified in the future for the specific needs of ICT waste in the region. Establishing a regional landfill is also cost and technology effective. It could also become the starting point for a regional e-waste recycling trade hub.

E-waste management in the MENA region is shaping up to be a multi-stakeholder partnership. At present a more active pubic awareness campaign would also be beneficial to give more impetus to the quicker establishment of an ICT e-waste management system that is backed by consumer support and potentially involves consumer recycling at source. ■

Europe

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Introduction

A new issue is gaining space at international and European forums, as a response to a growing concern about the environment: the relationship between information technology, innovation and climate change.[1] Information and communications technologies (ICTs) have a high priority on the European Union (EU) policy-making agenda, as the Digital Competitiveness Report explains: "Europe remains a global force in advanced information and communication technologies. The World Wide Web, the mobile GSM standard, the MPEG standard for digital content and ADSL technology were all invented in Europe. Maintaining this leadership position and turning it into a competitive advantage is an important policy goal."[2]

The EU, as a supranational organisation, is a leading force in setting policy standards for the 27 member states, as well as non-member European countries. The EU policy framework for the information society and media – i2010 – has promoted the positive contribution that ICTs can make to the economy, society and personal quality of life. Since 2008 a more environmentally aware ICT policy direction[3] has taken off in the region. The green turn is a response both to climate change concerns and to the economic recession. The new ICT policy of the EU, launched in 2010 and called the Digital Agenda, rethinks ICTs as key tools of an environmentally sustainable, innovative Europe. At the same time, environmental policy is a key regulation area for the EU: nature has no political borders and clean technologies would impact on the quality of life of future generations. A tight climate change policy and strict electronic waste (e-waste) regulations set the framework for a clean ICT policy in Europe.

The focus of this report is the relationship between ICTs, climate change and innovation in Europe, as promoted by EU officials and backed up by ICT business stakeholders.

Regional trends in policy and legislation

The EU's ICT policy between 2005 and 2010 (i2010) highlighted e-inclusion, infrastructural development, interoperability and accessibility issues as top priorities. Between 2005 and 2010, European ICT policy highlights have been infrastructural development for high-speed and broadband internet, e-inclusion measures aimed at bridging the social and geographical digital divide, and interoperability in order to achieve media convergence goals. The Digital Agenda (2010-2015) has approached ICTs as tools for mitigation of and adaptation to climate change.[4]

The EU has committed to cutting its greenhouse gas (GHG) emissions by at least 20% by 2020 compared to 1990 levels and to improving energy efficiency by 20%. The ICT sector has a key role to play in this challenge:[5]

- ICTs offer potential for a structural shift to less resource-intensive products and services, for energy savings in buildings and electricity networks, as well as for more efficient and less energy-consuming intelligent transport systems.
- The ICT sector should lead the way by reporting its own environmental performance and by adopting a common measurement framework as a basis for setting targets to reduce energy use and GHG emissions of all processes involved in production, distribution, use and disposal of ICT products and delivery of ICT services.

Innovation and ICTs are the driving forces of the new economic strategy proposed by the EU called "Europe 2020". It sets ambitious targets in key economic, social, cultural and environmental areas:[6] 75% of the population aged 20-64 should be employed; 3% of the EU's gross domestic product (GDP) should be invested in research and development; the "20/20/20"[7] climate/energy targets should be met; the share of early school leavers should be under 10% and at least 40% of the younger generation should have a degree or diploma; and 20 million less people should be at risk of poverty. In order to meet these targets, the European Commission proposes joint action in several areas: rethinking innovation policy; enhancing the quality and international attractiveness of Europe's higher education system by promoting student and young professional mobility; promoting a digital market agenda for Europe – a digital single market

1 Maclean, D. and St. Arnaud, B. (2008) *ICTs, Innovation and the Challenge of Climate Change*, International Institute for Sustainable Development, p. 3. www.iisd.org/pdf/2008/ict_innovation_climate.pdf

2 Commission of the European Communities (EC) (2009) *Europe's Digital Competitiveness Report: Main achievements of the i2010 strategy 2005-2009*. eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2009:0390:FIN:EN:HTML

3 Commission of the European Communities (EC) (2008) *Addressing the challenge of energy efficiency through information and communication technology*. ec.europa.eu/information_society/activities/sustainable_growth/docs/com_2008_241_1_en.pdf

4 Ibid., p. 4.

5 Commission of the European Communities (EC) (2010) *A Digital Agenda for Europe*. eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:0245:FIN:EN:HTML

6 Commission of the European Communities (EC) (2010) *Commission proposes new economic strategy in Europe*. europa.eu/rapid/pressReleasesAction.do?reference=IP/10/225&format=HTML&aged=0&language=EN&guiLanguage=en

7 A 20% cut in emissions of greenhouse gases by 2020, compared with 1990 levels; a 20% increase in the share of renewables in the energy mix; and a 20% cut in energy consumption. BBC (2010) EU climate package explained, *BBC*, 9 April. news.bbc.co.uk/2/hi/europe/7765094.stm

based on ultra-fast internet; and supporting the shift towards a resource-efficient and low-carbon economy.[8]

Climate change and ICTs: Regulations and good practices

As a proof of its proactive attitude to tackling climate change, the EU has made a unilateral commitment to cut its emissions in 2020 to at least 20% below 1990 levels, and is offering to scale up this reduction to 30% provided other major emitters in the developed and developing worlds take on their fair share of the mitigation effort under a global agreement.[9]

European countries are at different stages of adaptation to climate change:[10] while many of them have developed complex and well-documented projects and programmes (Denmark, Finland, France, Germany, Hungary, Ireland, Netherlands, Norway, Portugal, Spain, Sweden and the UK), others are still working on their coping strategies (Austria, Bulgaria, Czech Republic, Estonia, Italy, Latvia, Lithuania and Switzerland). Some countries provided scarce or no information to the European Environment Agency concerning their climate change adaptation strategies: Cyprus, Greece, Luxemburg, Poland, Romania, Slovak Republic and Slovenia.

In order to meet their emissions targets, the role of ICTs as enablers of energy efficiency across the European economy needs to be fully explored and exploited.[11] Firstly, it is necessary to foster research into novel ICT-based solutions, in order to reduce the energy intensity of the economy by using smart technologies. Secondly, ICTs should lead by example and manufacturers should reduce their energy consumption, resulting in substantial energy savings. Thirdly, it is crucial to encourage structural changes aimed at realising the enabling role of ICTs in substituting physical products through online services ("dematerialisation") and in moving business to the internet (e-banking, teleworking).

Estonia and the UK are leading the way globally when it comes to smart ICT use for the benefit of urban communities: since 2007 they have ranked among the Top Seven Intelligent Communities of the Year, serving as role models for best practices in developing competitive local economies and connecting citizens.[12]

A policy study commissioned by the Swedish government under its EU presidency addressed environmental issues as key components of a broad ICT policy agenda for a green knowledge society.[13] Green ICTs should support an eco-efficient economy by achieving three main policy goals by 2015: to create a green ICT products and services market; to understand and exploit substitution mechanisms; and to harness ICT in non-ICT sectors. The report recommends that EU member states explore financial incentives to extend and use government procurement mechanisms, to research household and business behaviour, and to offer research and development support for ICT innovation.

The energy consumption of ICTs rose from 123 billion kilowatt hours (kWh) in 2005 to 246 billion kWh globally in 2010, according to a British Computer Society report.[14] Meanwhile, research by the US think tank Gartner has estimated that the ICT industry accounts for 2% of global CO_2 emissions.[15] Gartner has recommended organisations address the negative effects of using ICTs and should:

- Start measuring power consumption
- Buy fewer servers and printers by increasing their usefulness (e.g. using virtual servers)
- Improve capacity and provision planning
- Improve the efficiency of cooling
- Turn power management on, use a low power state or turn equipment off after hours
- Extend the life of assets by reusing within the enterprise and externally
- Use all electronic equipment correctly
- Analyse all waste produced in order to minimise waste, and dispose of it efficiently and environmentally soundly.

For its part, the British Computer Society recommends that since governments account for massive energy consumption through ICTs, they should put pressure on all suppliers to use and provide greener ICT assets and services, along with extending the life cycles of these devices and enabling active power management (switch-off, low-power standby modes).

8 europa.eu/rapid/pressReleasesAction.do?reference=IP/10/225&format=HTML&aged=0&language=EN&guiLanguage=en

9 Commission of the European Communities (EC) (2010) *Building a post-2012 global climate regime: The EU's contribution.* ec.europa.eu/environment/climat/future_action.htm

10 European Environment Agency (EEA) (2010) *National Adaptation Strategies.* www.eea.europa.eu/themes/climate/national-adaptation-strategies

11 Commission of the European Communities (EC) (2008) op. cit., p. 4.

12 Intelligent Community Forum (2010) Top Seven By Year: Community-based approach to the broadband economy. www.intelligentcommunity.org/index.php?src=gendocs&ref=Top7_by_Year&category=Events

13 Forge, S. et al. (2009) *A Green Knowledge Society: An ICT policy agenda to 2015 for Europe's future knowledge society*, SCF Associates Ltd., p. 7. ec.europa.eu/information_society/eeurope/i2010/docs/i2010_high_level_group/green_knowledge_society.pdf

14 Crooks, B. and Ross, M. (2009) *Greening your IT Work Space*, British Computer Society, p. 5. www.bcs.org/upload/pdf/green-it-mross.pdf

15 Gartner (2007) Gartner Estimates ICT Industry Accounts for 2 Percent of Global CO2 Emissions. www.gartner.com/it/page.jsp?id=503867

A European Commission report[16] identified the dual contribution ICTs have to make for a low-carbon economy. On the one hand, they can enable energy efficiency improvements by monitoring and directly managing energy consumption. They do this by providing the tools for more energy-efficient business models, working practices and lifestyles, such as e-commerce, teleworking and e-government applications, and by delivering innovative technologies in order to reduce wasteful consumption of energy. On the other hand, ICTs can provide the quantitative basis on which energy-efficient strategies can be implemented and evaluated, by providing energy consumption information to consumers, and by measuring energy performance at a system level: software tools can provide information on how to design a system in order to optimise its overall energy performance in a cost-effective manner.

The British Computer Society[17] summarised the EU clean tech approach: firstly, the ICT sector will be invited to set targets and reach a collective agreement on measurement methods. Secondly, partnerships between the ICT sector and other major energy-using sectors will be encouraged to improve energy efficiency and reduce emissions by using ICTs. Thirdly, EU member states will be called upon to enable smart and clean ICT solutions.

Euractiv estimated[18] that the ICT industry will lead by example and reduce the energy it uses. "In times of recession, reducing [the energy consumption of ICTs goes] hand in hand with environmental initiatives for a low carbon economy."[19] A number of ICT organisations in developed European countries have launched green ICT marketing campaigns. As an example of good practice, British Telecom "has been recognised as the world number one telecommunications company in the Dow Jones Sustainability Index for the seventh consecutive year and has achieved a 60% reduction in its UK carbon emissions from a 1996 baseline. The company has set a further target to reduce emissions by 80% from the 1996 baseline by 2016."[20]

There are multiple benefits of greening ICTs at the workplace, the British Computer Society report shows. These include enhanced reputation, reduced energy bills, and a decrease of travel costs, due to ICT-facilitated teleworking and remote meetings.[21] The report suggests companies take simple actions first, such as "hot rooming" (reducing heating and lighting to a limited area), and improving security so staff feel able to work earlier or later, thereby reducing the office space required if everyone worked at peak time. Good printing practices also contribute to greening ICTs at the workplace: using recycled paper, printing less, setting printers for double-sided or side-by-side printing by default, adopting high-density texts (more text on paper) and maximising print areas.

In a white paper[22] the German company T-Systems recommends the extensive use of ICT-enabled telecommunications solutions in order to decrease business travel: "In 2008, the average duration of business travel remained stable at 2.3 days. Trips without an overnight stay in particular were more frequent – short trips especially offer significant potential for savings when eliminated by telecommunications solutions that enable remote collaboration." Clean-tech solutions apply both to major corporations and to small and medium-sized companies, which account for about 80% of all business travel. Video-conferencing systems enable realistic virtual meetings, independently of the participants' geographical locations.

According to a global green ICT policy evaluation,[23] under the EU codes of conduct for broadband equipment, signatory companies commit to reducing energy consumption of broadband equipment. At the same time, the EU codes of conduct for data centres set energy efficiency goals and measures standards for data centre providers. The relatively small number of signatory companies to the EU codes of conduct for broadband equipment suggests that the codes of conduct have not yet been widely accepted. However, they are still useful for non-signatory companies as they include best practices and standards.

Conclusion

This report focused on the relationship between ICTs, climate change and innovation in Europe, as reflected in EU policies and good practices at governmental and business level. Replacing "dirty ICTs" with "green ICTs"[24] is a high priority for all stakeholders: supranational regulatory bodies, national governments and subnational structures and organisations. At the same time, using ICTs as smart tools for an environmentally sustainable Europe is being mainstreamed by governments and businesses equally. ■

16 Commission of the European Communities (EC) (2009) *Mobilising Information and Communication Technologies to facilitate the transition to an energy-efficient, low-carbon economy*, p. 3. ec.europa.eu/information_society/activities/sustainable_growth/docs/com_2009_111/com2009-111-en.pdf

17 Ibid., p. 9.

18 EurActiv (2009) *Brussels to launch new 'green ICT' plan.* www.euractiv.com/en/infosociety/brussels-launch-new-green-ict-plan/article-178747

19 Crooks, B. et al. (2009) *Raising Awareness of GreenIT – the BCS Way*, British Computer Society, p. 1. www.bcs.org/upload/pdf/sqm2009-raisingawareness.pdf

20 Commission of the European Communities (EC) (2008) op. cit., p. 3.

21 Crooks and Ross (2009) op. cit., p. 15.

22 T-Systems (2009) *Green ICT: The Greening of Business*, T-Systems White Paper, Bonn, p. 10. www.ictliteracy.info/rf.pdf/T-SystemsWhitePaper_Green-ICT.pdf

23 Reimsbach-Kounatze, C. (2009) *Towards Green ICT Strategies: Assessing Policies and Programmes on ICT and the Environment*, OECD Digital Economy Papers, No. 155, p. 14. www.oecd-ilibrary.org/docserver/download/fulltext/5ksdxhlh5bf2.pdf?expires=1280802562&id=0000&accname=guest&checksum=17C7F3DD959055C9BA33CF4A366A53ED

24 Organisation for Economic Co-operation and Development (OECD) (2009) *ICTs for Development: Improving Policy Coherence*, p. 24. www.oecd.org/document/12/0,3343,en_2649_18532957_44585164_1_1_1_1,00.html

REGIONAL REPORT

North America

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Introduction

Though not typically included under the "green-collar jobs" label, jobs in the information and communications technology (ICT) industry have significant backward and forward linkages with other industries, and can allow increased environmental sustainability in these industries through the use of teleconferencing, telework, and many forms of electronic transactions. Some authors[1] believe that "greening using ICTs" can reduce global greenhouse gas emissions by up to 17% by 2020. This does not, however, overshadow the real environmental justice issues at play. From becoming a larger CO_2 emitter than the aviation industry in the UK by 2012,[2] to triggering a doubling of the consumption of world office paper between 1980 and 1997,[3] fostering the exploitation of coltan in the war-torn Democratic Republic of Congo,[4] and causing a massive increase of electronic waste (e-waste),[5] the widespread deployment of ICTs externalises its share of environmental costs.

This report looks at the trends in North America in policy and legislation on ICTs and environmental sustainability, as well as the e-waste and climate change questions as they relate to corporate social responsibility (CSR). Emphasis will be placed on the need for mandatory regulations for the ICT industry in North America, as what they do will have a significant impact on other regions of the world, given the globalised nature of the industry.

Regional trends in policy and legislation

Regulation of the ICT industry is at its beginnings in North America. Forge describes four such initiatives in the US: the State of California Electronic Waste Recycling Act and Universal Waste Rules, the Federal Electronics Challenge, and the Electronic Product Environmental Assessment Tool.[6] An Electronics Industry Code of Conduct was also agreed on by 45 companies in 2004, but it has been sharply critiqued by Schipper and de Haan for its lack of clarity and lack of internationally accepted standards.[7]

Voluntary programmes are more prominent in North America than formal regulations. One example is the Climate Savers Computing Initiative, which led the industry to commit to a 50% reduction in power consumption in computers by 2010.[8] Groups such as the Mobile Phone Partnership Initiative[9] internationally and the GreenStar Network in Canada[10] are also important players in the organisational landscape.

One notable observation on the regulatory system is that North America is lagging far behind Europe. The European Telecommunications Network Operators' Association Sustainability Charter, the Restriction of Hazardous Substances (RoHS) Directive on toxic chemicals, the Waste Electrical and Electronic Equipment (WEEE) Directive, the Energy-using Products (EuP) Directive, and the Registration, Evaluation and Authorisation of Chemicals (REACH) legislation[11] are only some examples of the type of initiatives North America should consider. These regulations have a ripple effect on CSR innovations within the industry; in fact, a study on best practices in ICTs and sustainability by Two Tomorrows rates only two Asian companies and one US company in their Top 10.[12]

The need for corporate social responsibility

CSR and regulations are complementary; both are necessary to reconcile the sustainability budget of the ICT industry, which will contribute 2.8% of the global carbon footprint by 2020.[13] For example, while many of the most important

1 E.g. Casal, R.C., Van Wunnik, C., Delgado Sancho, L., Burgelman, J.C. and Desruelle, P. (2005) How will ICTs affect our environment in 2020?, *Foresight*, 7 (1), p. 77-87.

2 Global Action Plan (2007) *An Inefficient Truth: Executive Summary*. www.globalactionplan.org.uk/sites/gap/files/An%20Inefficient%20Truth%20-%20Executive%20Summary.pdf; UNESCAP (2010) *Creating Business and Social Value: The Asian Way to Integrate CSR into Business Strategies*. www.unescap.org/tid/publication/indpub2565.pdf

3 Global Action Plan (2007) op. cit.

4 Schipper, I. and de Haan, E. (2005) *CSR Issues in the ICT Hardware Manufacturing Sector: SOMO ICT Sector Report*. www.genderchangers.org/docs/ICT_Sector_Report.pdf

5 Forge, S. (2007) Powering down: Remedies for unsustainable ICT, *Foresight*, 9 (4), p. 3-21; Widmer, R., Oswald-Krapf, H., Sinha-Khetriwal, D., Schnellmann, M. and Böni, H. (2005). Global perspectives on e-waste, *Environmental Impact Assessment Review*, 25, p. 436-458; Herat, S. (2007) Sustainable Management of Electronic Waste, *CLEAN – Soil, Air, Water,* 35 (4), p. 305-310.

6 Forge (2007) op. cit.

7 Schipper and de Haan (2005) op. cit.

8 American Council for an Energy-Efficient Economy (2008) *Information and Communication Technologies: The Power of Productivity*. aceee.org/pubs/e081.htm

9 The Mobile Phone Partnership Initiative was launched during the sixth meeting of the Conference of the Parties to the Basel Convention to promote the environmentally sound management of end-of-life mobile phones. For more information: www.basel.int/industry/mppi.html

10 The GreenStar Network Project is initiating a Canadian consortium of industry, universities and government agencies with the common goal of reducing greenhouse gas (GHG) emissions arising from ICT services. For more information: www.greenstarnetwork.com

11 Schipper and de Haan (2005) op. cit.

12 Two Tomorrows (2010a) Tomorrow's Value Rating: Information and Communications Technology (ICT) www.tomorrowsvaluerating.com/Page/InformationandcommunicationstechnologyICT

13 Global e-Sustainability Initiative (2010) Climate Change Initiative. www.gesi.org/Initiatives/ClimateChange/tabid/71/Default.aspx

issues relating to greening ICTs identified by Forge[14] can be tackled domestically, the pressing problem of e-waste and other socioeconomic conditions such as labour rights, unionisation and occupational health in hardware factories[15] cannot be easily taken up by the ICT industry because they are deeply embedded in growth in production and consumption of electronic products in the global market. One ought to be reminded that CSR, which remains a voluntary form of self-regulation, while holding tremendous potential for innovation, is susceptible to the vagaries of the market.[16] On the upside, consumers can exert their purchasing power in the marketplace to entice companies to provide more socially and environmentally responsible goods.[17]

E-waste, however, cannot remain subject to supply and demand forces. ICT waste is a tremendous threat to environmental sustainability. It largely consists of incineration residues or discarded fraction placed in landfill sites, which result in exposure, for millions of recyclers, primarily located in China and India and other developing countries, to unhealthy solids and gases such as brominated flame retardants, phthalates, organotonins, ammonia, mercury, lead, cadmium and antimony.[18] There have been international efforts to tackle this problem, namely through the four following conventions: the Basel Convention (1989, with amendments in 1995) on transboundary movements of hazardous waste, the London Convention Protocol (1996) on ocean dumping, the Rotterdam Convention (1998) on exporting dangerous chemicals, and the Stockholm Convention (2001) on persistent organic pollutants.[19]

These conventions have done little to improve the management of e-waste in North America, as Canada did not ratify the Basel Convention and the US did not ratify any of the four conventions. In fact, it is estimated that 50% to 80% of the e-waste collected for recycling is being exported illegally by the US.[20] With over two billion mobile phones now in use worldwide, some 130 million PCs being produced annually, and over 150 million currently in landfills,[21] there is no sign of this situation changing, despite the best efforts of citizen lobby groups such as the Basel Action Network, the Silicon Valley Toxics Coalition, the Greenpeace Toxic Campaign and Toxic Links India.

E-waste goes hand in hand with planned obsolescence. One striking example of this is that the "average lifespan of a new model computer has decreased from 4.5 years in 1992 to an estimated 2 years in 2005."[22] This destructive cycle needs to be tackled for ICTs to become more sustainable.[23] The concept of extended producer responsibility for end-of-life management of electronic and electric equipment has been explored by Sinha-Khetriwal, Kraeuchi and Widmer[24] as one branch of CSR that can make a difference in reducing the e-waste stream, alongside design for environmentally cleaner production, standards and labelling, recycling and remanufacturing.[25]

One area in which CSR has been relatively effective in terms of greening ICTs is around climate change. Hewlett-Packard (HP) is the company that stands out in this area. HP has been awarded the best carbon disclosure award for its 2008 Global Citizenship Report,[26] and ranks No. 1 in Two Tomorrows' study of sustainability in the Silicon Valley[27] and third worldwide.[28] HP's Power to Change campaign encourages PC users to make behavioural changes to save energy by downloading a new desktop widget that tracks the cumulative energy savings associated with participants turning off idle PCs when not in use. Through its Social and Environmental Responsibility Supplier Code of Conduct, HP is also recognised as a leader in full supply chain analysis, which measures emissions produced at each stage of the product's life, and holds its suppliers accountable for meeting the same stringent environmental standards as itself.[29] The company also uses a carbon footprint calculator to assess printer energy and paper use and accepts all computers for

14 Forge (2007) op. cit.

15 Schipper and de Haan (2005) op. cit.

16 Doane, D. (2005) Beyond corporate social responsibility: Minnows, mammoths and markets, *Futures*, 47, p. 215-229.

17 Calveras, A., Ganuza, J.-J. and Llobet, G. (2007) Regulation, Corporate Social Responsibility and Activism, *Journal of Economics & Management Strategy*, 16 (3), p. 719-740.

18 Forge (2007) op. cit.; Herat (2007) op. cit.

19 Schipper and de Haan (2005) op. cit.

20 Forge (2007) op. cit.

21 Greenpeace International (2009) Where does e-waste end up? www.greenpeace.org/international/en/campaigns/toxics/electronics/the-e-waste-problem/where-does-e-waste-end-up/

22 Herat (2007) op. cit., p. 305.

23 Calder, J. (2010) Electronic Waste: How Waste Leads to Design Challenges, *In Compliance Magazine*, April. www.incompliancemag.com/index.php?option=com_content&view=article&id=274:electronic-waste-how-waste-leads-to-design-challenges&catid=24:current-issue&Itemid=126

24 Sinha-Khetriwal, D., Kraeuchi, P. and Widmer, R. (2009) Producer responsibility for e-waste management: Key issues for consideration – Learning from the Swiss experience, *Journal of Environmental Management*, 90 (1), p. 153-165.

25 Herat (2007) op. cit.

26 Corporate Register (2010) CR Reporting Awards '10: Global Winners & Reporting Trends. www.corporateregister.com/pdf/CRRA10.pdf

27 Two Tomorrows (2010b) Corporate responsibility rating: Silicon Valley. www.tomorrowsvaluerating.com/Page/SiliconValley

28 Two Tomorrows (2010a) op. cit.

29 Network for Business Sustainability (2010) *The New Normal: Sustainable Practices Your Future Employees Will Demand*. www.impactyouthsustainability.ca/en/wp-content/uploads/ImpactReport_Feb_10_ENG.pdf

recycling, while offering consumers cash for reusable technology equipment through its Expanded Trade Program. In addition, HP leads the way in terms of sustainability targets: the company set a goal to reduce water use to 5% below 2007 levels by 2010 and reduced its own carbon emissions by 4% in 2008 through teleconferencing, reduced travel, increased use of technology, reduced office space and sustainable building design.[30]

Telus is North America's Vodafone in the mobile phone industry. Telus has been tracking their environmental performance and setting targets since 2006, and showing improvement in most areas. It has new offices with LEED certification[31] and a goal of complying with the International Organization for Standardization (ISO) 14001:2005 Environmental Management Systems Guidelines by 2013.[32] As part of the Caring Company Program, which recognises companies that donate more than 1% of their tax profits to charitable organisations every year, encouraging employee volunteerism and implementing matching programmes to encourage employees to donate, Telus also contributes to the social and economic pillars of sustainability.

Electrical power to run servers is another area in which CSR leadership has been demonstrated. Google, which rates No. 6 in Two Tomorrows' study of sustainability among Silicon Valley companies,[33] has been paying extra for DC power supply, which has 90% efficiency as opposed to the typical 70%, a scheme which pays back in energy costs in only a few years.[34] Google has also been a pioneer in using renewable energy to power its data centres by setting up zero-carbon data centres powered by windmills, hydroelectric or geothermal sources.[35] In addition, Google has partnered with General Electric to develop a "smart grid" for network servers that reduces energy consumption through the more intelligent use of electricity.[36]

Despite these success stories, much remains to be done in terms of the impact of ICTs on the environment. It is the prerogative of the government to promote CSR, and this is an area in which North America lags behind its European counterparts. Canada is showing initiative by investing in the Green IT Program,[37] and the US houses some innovative ICT sustainability legislation. However, it remains that both Canada and the US have missed out on the opportunities to provide leadership in using ICTs as a tool for climate change adaptation at the COP 15 Summit in Copenhagen.

Conclusion

This article briefly highlighted e-waste policy and CSR as a solution to the greening using ICTs and greening ICTs puzzle, while maintaining the importance of increased regulations to tackle issues of planned obsolescence and climate change as they relate to design components such as energy efficiency. There need to be enforceable legislation, tax incentives and other reward systems to support more sustainable ICT practices in North America. With the atmosphere as a public good, the mantra "increased profit from more energy efficiency" just does not cut it. Standardisations, symbols and ratings such as those put forward by the Global Reporting Initiative, the Global Compact Index, the Dow Jones Sustainability Index and Energy Star can contribute to industry behavioural change and should be encouraged.

In addition to third-party analysis to maintain accountability and transparency, ICT companies and companies using ICTs ought to consider promoting staff to the role of sustainability coordinator to save costs and incentivise departments to take action around the life cycle of their products and utility bills. This should happen together with a decentralised, self-regulated approach in which individuals are provided with the necessary information to make responsible choices, for example by using their iPhone barcode app to gain information on retail products.

This article also pointed to happenings in the CSR realm, using HP, Google and Telus as examples. It is worth noting, however, that those innovations remain essentially piecemeal and that there is a high risk of "greenwashing" coming from an overall unsustainable industry that really needs to focus on cleaning up its act as opposed to flaunting its achievements through a marketing machine.

There are plenty of opportunities for ICTs and sustainability, but a new design paradigm of cradle-to-grave care and extended producer responsibility is imperative. ■

30 Ibid.

31 LEED certification stands for Leadership in Energy and Environmental Design. It is an internationally recognised green-building certification system, providing third-party verification that a building or community was designed and built using strategies intended to improve performance in metrics such as energy savings, water efficiency, CO_2 emissions reduction, improved indoor environmental quality, and stewardship of resources and sensitivity to their impacts.

32 The ISO 14001:2005 Environmental Management Systems Guidelines specify requirements for an environmental management system to enable an organisation to develop and implement a policy and objectives which take into account legal and other requirements and environmental aspects to which the organisation subscribes.

33 Two Tomorrows (2010b) op. cit.

34 Forge (2007) op. cit.

35 Williamson, A. (2008) Zero-carbon data centers for green computing, *International Science Grid This Week*, 19 November. www.isgtw.org/?pid=1001498

36 googleblog.blogspot.com/2008/09/partnering-with-ge-on-clean-energy.html

37 www.canarie.ca/en/green-program/pilot/about

Latin America and the Caribbean

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In combating climate change, monitoring and early warning systems, information and communications technologies (ICTs) are an essential factor, and several governments in the Latin American and Caribbean (LAC) region have been implementing programmes that use ICTs for these purposes. There is a tendency in the region to emphasise the potential of ICTs to mitigate and adapt to the "new" conditions resulting from climate change.

ICTs were seen as an essential element for reducing greenhouse gases (GHGs) globally during the 2007 Climate Change Conference in Bali, Indonesia. They have been considered an important support tool in adaptation to and mitigation of climate change.[1] Some governments, academic institutions, civil society organisations and businesses in the LAC region have provided continuity to that conference by responding to the International Telecommunication Union's (ITU's) call for the Symposium on ICTs and Climate Change held in 2009 in Ecuador. This was perhaps the most outstanding official event in the region because of the attempt to bring together contributions from a multi-sectoral perspective focused on providing analysis and opinions, and to stimulate actions aimed at confronting the effects of climate change.

Nevertheless, for their part, various civil society groups in Latin America are increasingly calling attention to the particular conditions generated by climate change, and focusing the analysis of the causes that provoke it on the patterns of consumption and production developed by modern societies. Numerous civil society forums have been held in Latin American countries to reflect on climate change and its human-made causes, which are considered to result from forms of consumption and production and market structures that entail excessive use of resources, directly resulting in high GHG levels.

Without a doubt, the most highly publicised event in this regard was the World People's Conference on Climate Change and the Rights of Mother Earth, which was held in Cochabamba, Bolivia in April of this year and drew together more than 20,000 participants from 130 countries around the world. The People's Agreement adopted at the conference stresses: "The 'shared vision for long-term cooperative action' in climate change negotiations should not be reduced to defining the limit on temperature increases and the concentration of greenhouse gases in the atmosphere, but must also incorporate in a balanced and integral manner measures regarding capacity building, production and consumption patterns, and other essential factors such as the acknowledging of the Rights of Mother Earth to establish harmony with nature."[2]

With regard to technology in particular, the conference participants resolved that the development of knowledge and technology should be seen as an integral part of a broader effort to deal with the fundamental, structural and root causes of climate change. They further stated that in order to reduce emissions over the next decade, and to deal with the growing damage caused by climate change, it is essential to implement socially and environmentally sound technologies in every country, sector and place, to help us live well and in harmony with one another and with "Mother Earth".

Several conclusions of the People's Conference were incorporated in a United Nations document on climate change used as a negotiation text for the 192 countries that gathered in Bonn, Germany in August of 2010.[3] Some points that were incorporated for consideration in the negotiations are:

- A 50% reduction of greenhouse gas emissions by developed countries for the second period of commitments under the Kyoto Protocol, covering the years 2013 to 2017.
- To guarantee an equitable distribution of atmospheric space, taking into account the developed countries' climate debt to the developing countries, based on their historic responsibility for greenhouse gas emissions.
- Promotion of measures that change the consumption patterns of the developed countries.
- The adoption of necessary measures in all relevant forums that will give access to intellectual property rights to technologies that can be used for climate change adaptation and mitigation.

This is particularly relevant, given that the LAC region's population faces constant danger as a result of climate change-related events such as droughts, hurricanes, floods, a rise in sea levels, overflowing rivers, changes in rainfall levels, degradation of the Amazon basin,[4] and Andean glacial melting, added to the already imbalanced natural resource management system (deforestation, extraction of raw

1 www.tendencias21.net/Las-TIC-son-esenciales-para-resolver-el-cambio-climatico_a3544.html

2 pwccc.wordpress.com/support

3 pwccc.wordpress.com/2010/08/16/the-proposals-of-%E2%80%9Cpeoples-agreement%E2%80%9D-in-the-texts-for/#more-2380

4 rainforests.mongabay.com/amazon/amazon_climate_change.html

materials and monocultures). According to observations by the Intergovernmental Panel on Climate Change (IPCC), they expect, among other consequences for the LAC region, corn yields to diminish in temperate zones, production in tropical and subtropical regions to be reduced to a third of current levels, and a possible increase in salinisation and desertification in dry zones. Climate change threatens to destroy many rural communities in the region because a rise in sea levels may force those in low-lying coastal areas and deltas to move to higher land.[5]

The LAC region produces between 4% and 12%[6] of total GHGs worldwide, but its population, which accounts for 8.6% of the world's population with its great biological and cultural diversity is constantly in an emergency situation due to GHG emissions from other regions in the world.

The LAC region's average per capita carbon emissions are 2.6 tonnes annually, low when compared to 7.9 tonnes for Europe, and 19.9 for the United States. Compared to the rest of the planet, a lower proportion of these emissions in LAC come from energy consumption, while a higher proportion come from changes in land use. It is important to note, however, that the region's share of global GHG emissions has declined percentage-wise in recent decades, although in absolute terms, total emissions have continued to rise.

For example, in 1990 the LAC region contributed 15% of total GHGs in contrast to 36% from Organisation for Economic Co-operation and Development (OECD) countries (excluding Chile and Mexico, which belong to the OECD group) and 49% from the rest of the world. Even though in absolute terms the total number of GHG tonnes emitted increased over the next decade, in 2000 the relative percentage of emissions contributed by the LAC region declined to 11%, while that of the OECD countries (again excluding Chile and Mexico) increased to 38%, and that of the rest of the world increased to 51%.

Although it has also been recognised that ICTs could assist other productive sectors in lowering their GHG emissions by optimising and dematerialising products and services, technology cannot solve the problems that we human beings have created or worsened in the environment. According to a recent study, a more effective use of ICTs could help to reduce total global emissions by 15% by 2020 (through video conferences, e-commerce, e-government services, smart buildings, smart devices in cities, etc.), representing carbon savings five times greater than the emissions estimated for the entire ICT sector.[7] [8] However, it seems unlikely that the sustainability crisis caused by the unjust exploitation of nature, stripping of natural resources from their original peoples, unequal markets, and high consumption models –all factors reflected in climate change — will be modified simply with an increased use of ICTs and its smart networks and devices.

It seems important to observe a change in the means of energy production and consumption to truly lower GHGs. That implies changes in the consumption of technology and products including ICTs. The challenge, therefore, is how to consume less and at the same time obtain the maximum benefits of ICTs. Quite a challenge!

Particularly harmful to the sustainability of the planet is the waste from the ICT industry, which results not only from the disposal of tech products, but also their production. Electronic waste (e-waste) is one the fastest growing waste streams.[9] Its potential hazard to human health must be acknowledged. It is known that electronic industry workers as well as those who disassemble ICT products suffer health effects from exposure to toxic compounds such as chromium, cadmium, mercury, lead and brominated flame retardants.[10] We know that 70% of the lead and mercury waste in landfills comes from electronic refuse.[11] Some Latin American countries are gradually including e-waste management in their political agendas, including Costa Rica, Argentina, Brazil, Colombia, Peru[12] and Mexico. Nevertheless, in most LAC countries, the actual amount and destination of outdated electronic equipment is unknown. There are also reportedly only a handful of e-waste recycling centres.

E-waste is reaching critical mass in Latin America.[13] Despite this fact, there are few studies that address this complex panorama. Only a few figures help to sketch the problem of e-waste in the region. Prince indicates, for example, that in the LAC region approximately 8-10% of all computers in service lie in disuse, which for the year 2008 meant some 84.5 million computers.[14]

5 FAO (2010) *Climate change and its impact in agricultural, forestry, and fisheries production in Latin America and the Caribbean*, Thirty-First FAO Regional Conference for Latin America and the Caribbean, Panama, 26-30 April.

6 Statistics from the UN and ECLAC, respectively.

7 The Climate Group (2008) *SMART 2020: Enabling the low carbon economy in the information age*. www.smart2020.org/_assets/files/02_Smart2020Report.pdf

8 www.itu.int/newsroom/press_releases/2009/NP09-es.html#1

9 Silva, U. (ed.) (2009) *Gestión de residuos electrónicos en América Latina*, Plataforma RELAC SUR/IDRC, Santiago, Chile.

10 For examples see lib.bioinfo.pl/auid:4058337

11 greenti.wordpress.com/category/tendencias/page/2

12 Silva (2009) op.cit.

13 Ibid.

14 Prince, A. (2006) *Recupero y reciclado de PC's en LAC*, Plataforma RELAC SUR/IDRC, Santiago, Chile.

Nevertheless, it is difficult to judge these statistics accurately, given that in the LAC region it is common to find high amounts of rebuilt computers sold without control or registration. This also makes it very difficult to achieve a measure currently being proposed in Europe – extended producer responsibility (EPR) – since there are no clearly identified producers. EPR is a policy tool that extends manufacturers' responsibilities beyond their current accountabilities (for worker health and safety, consumer safety and production costs) to also include responsibility for life-cycle costs of their products and associated packaging. Essential to EPR is its mandate for producers to "take back" their end-of-life products and create closed-loop systems that prevent pollution and the inefficient use of resources.[15]

Peripheral products should also be measured. For example, during a period of three years (2009-2012), it was estimated that there could be 17 million printers in disuse in the region.[16] Accessories like printer cartridges should be taken into account as well.

Meetings have been held and declarations signed in the effort to search for solutions to the problem of e-waste. The following stand out:

- The Organization of American States (OAS) stated in the Declaration of Santo Domingo: Good Governance and Development in the Knowledge-Based Society,[17] adopted in 2006, the readiness to cooperate and establish appropriate measures to prevent and mitigate the environmental impact of ICT-related products throughout their life cycle and at the stage of recycling and disposal, consistent with international law.

- The Mercosur Policy Agreement signed in 2006 mandated its member states (Argentina, Brazil, Paraguay and Uruguay) to take national measures to ensure that producers and importers take responsibility for their products after sale and use.

- In Trinidad and Tobago a meeting took place to discuss the e-waste problem in the Caribbean sub-region, also in 2006. There was a proposal to form an e-Waste Association of the Caribbean. The Trinidad and Tobago Solid Waste Management Company Limited (SWMCOL) was tasked with coming up with some guiding principles for e-waste management.

- A working group on technological waste was approved during and since the eLAC2010 Ministerial Conference in San Salvador,[18] in pursuit of its goal number 82, which proposes to promote the design of national strategies and regulation of technological waste management to deal with the environmental impact of this waste and take advantage of its potential in recycling and rehabilitation programmes, as well as to create a working group to address this subject.

Conclusions

It is crucial for the region to develop public policies, both national and regional, which promote more sustainable models of ICT production and consumption, based on clean manufacturing models which include reuse and recycling. Production models must be more nature-friendly, respecting the rights of Mother Earth.

Reliable data on ICT-related emissions, obtained using standardised methodologies, are essential to the region. A joint effort by the academic, public, business and civil society sectors to obtain reports and evaluate the impact of ICTs on emissions would be necessary.

To use ICTs as a model for climate change mitigation, broadband internet access must be guaranteed at affordable prices, accompanied by awareness-raising programmes for consumers on the implications of energy consumption and GHG production from the use of ICTs. Through this, citizens would be invited to use them in a more sustainable way.

We must give special attention to the production of e-waste in the region. Due to the increase in the use of ICTs, considerable rises in the levels of electronic refuse are expected. It is especially important to track toxic waste, assuring safe final disposal. Also important is to promote the right to information of the general population, and more specifically, workers, about the risks of e-waste. Actions towards implementing EPR would be positive.

Women are even more affected by the adverse conditions caused by the environmental sustainability crisis. That is why it is especially important to raise funds for educational, health, production support and other programmes using ICTs, which deal with the devastating consequences of climate change from a gender perspective with a special focus on women and children. ■

15 www.eprworkinggroup.org/epr_principles_aug-2003.pdf

16 Prince (2006) op. cit.

17 www.iin.oea.org/2006/Res_36_AG_OAS/AGDEC_46_ingles.htm

18 www.eclac.org/cgi-bin/getprod.asp?xml=/socinfo/noticias/paginas/6/32566/P32566.xml&xsl=/socinfo/tpl/p18f-st.xsl&base=/socinfo/tpl/top-bottom.xsl

ARGENTINA

Nodo TAU
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Introduction

In keeping with the global trend, electronic waste (e-waste) in Argentina is a growing problem that is keeping pace with an increase in consumption of technology. In turn, and following the regional trend, the treatment of e-waste hardly appears in public policy and legislation.

In Argentina, 2.5 kg of e-waste per inhabitant is generated per year. When multiplied by the country's 40 million inhabitants, this represents 100,000 tonnes of e-waste annually. Of this, 35% comes from computers and telecommunications.[1] In 2009 a major increase was felt in mobile phone volumes:[2] almost 10 million mobile phones were discarded annually over the last two years. This figure quadrupled between 2005 and 2009.[3]

In this context, the following can be said about the recycling and recovery of e-waste:

- One of the few private operators processes between 1,700 and 1,900 tonnes annually, less than 2% of the total amount generated in the country and between 4% and 6% of the e-waste from information and communications technologies (ICTs) alone.[4]
- Participation by the state is rare: less than 5% of the total e-waste processed comes from collection in municipalities or public e-waste disposal companies.[5]
- Social marginalisation and unemployment have created the so-called "waste culture" in which informal recyclers are an important part of the recycling system.
- In their efforts to promote social inclusion, some social organisations have initiated recycling and reuse of technology projects.

Policy and legislative context

Legislation

The constitution establishes in Article 41 that "all inhabitants have the right to a healthy, balanced environment, suitable for human development" and that "the authorities will provide protection of this right and of environmental information and education." That same article resolves that "the entry of actual or potentially hazardous waste into the country" is prohibited.

Argentina does not have a specific law that regulates e-waste. The current legal framework for this is Law 24.051 on Hazardous Wastes,[6] regulating the creation, handling, transport, treatment and final disposal of the hazardous wastes listed in Appendix I of the Law. The appendix is identical to Appendix I of the Basel Convention on Transboundary Movements of Hazardous Wastes and their Disposal, ratified by Argentina through Law 23.922,[7] and applied when waste undergoes cross-border movements for disposal or recovery.

These regulations present a paradox: while keeping Argentina from becoming a depository of electronic scrap, they also hinder the possibility of expanding local enterprises, and include regulations that prevent the disposal of e-waste, for instance, out of state institution storerooms. Two e-waste bills pending in the legislature lost parliamentary status.[8] Recently a bill that specifically deals with treatment of e-waste was presented in the Senate and awaits consideration.

Public policies

Argentina has signed international and regional commitments regarding the treatment of waste, under which e-waste falls. These are the Basel Convention and a Mercosur (Southern Common Market) agreement.[9] However, concrete initiatives of the federal government are very specific:

- *Campaigns and seminars:* The Department of Hazardous Wastes carried out campaigns to collect obsolete electronic devices in 2008 and 2009 in the nation's capital. It also organised two seminars in 2008, which drew broad institutional participation.[10]

1 Etchenique Gabrielli, M. B. (2010) Basura electrónica, *Eco Site*, February. www.eco2site.com/informes/raee.asp

2 Greenpeace Argentina (2010) *Basura Electrónica: El lado tóxico de la Telefonía Móvil*. www.greenpeace.org/raw/content/argentina/contaminaci-n/basta-de-basura/un-nuevo-flujo-de-residuos-pel/basura-electronica-el-lado-toxico-de-la-telefonia-movil.pdf

3 Cámara Argentina de Máquinas de Oficinas, Comerciales y Afines (CAMOCA) www.camoca.com.ar

4 Greenpeace Argentina (2010) op. cit.

5 Ibid.

6 infoleg.mecon.gov.ar/infolegInternet/anexos/0-4999/450/texact.htm

7 infoleg.mecon.gov.ar/infolegInternet/verNorma.do?id=322

8 www.rezagos.com/descargas/Proyecto-Ley-RAEE.pdf and www.rezagos.com/descargas/ProyectoLeyRAEE-UTN.pdf

9 Mercosur (2006) Agreement on an environmental management policy for universally generated special wastes and post-consumption responsibility, First Extraordinary Meeting of Environmental Ministers, 29 March, Curitiba, Brazil. www.ambiente.gov.ar/archivos/web/MERCOSUR/File/I%20Reunion%20Extraordinaria%20de%20Ministros%20-POSTA/ANEXO_4_POST_CONSUMO.pdf

10 Seminars on WEEE: www.ambiente.gov.ar/default.asp?IdArticulo=5267 and www.ambiente.gov.ar/default.asp?IdArticulo=5330

- *Classroom Recycling Project:*[11] This is the Ministry of Education's computer recycling programme to benefit public schools. The project has a training workshop for repair and recycling in order to create job opportunities.
- *National Electric and Electronic Waste Management Programme:* Designed by the National Institute of Industrial Technology (INTI), this is the most comprehensive initiative within the public realm. The programme involves local and national governments working with grassroots organisations to create an e-waste plant managed by a cooperative.

Responsibilities: Government, private sector and civil society

One important aspect in analysing the recycling of e-waste in Argentina is the interrelation between actors, and the definition of responsibilities in the e-waste chain (including storage in businesses or homes, reuse and commercial recovery, social recovery, recycling and treatment).

In the private sector we find the technology industry (equipment vendors and generators of their own e-waste/scrap) and the recycling industry (repair, recycling and final disposal). There are also organisations advocating for the recovery and social appropriation of these technologies (based on environmental rights, social inclusion, and educational and digital inclusion). Here civil society also takes on an important role, with millions of citizens/consumers that need to take responsibility for their electronic refuse. Finally, there is the government as provider of norms and regulations.

The following e-waste landscape emerges in Argentina:

Private sector

Technology industry: Companies can employ policies such as clean-up and eco-design policies to reduce the toxicity of the components and/or facilitate recycling. As a country that imports or assembles most of its ICTs, industrial policies such as the restriction of contaminants do not have a significant environmental impact in Argentina. Of greater significance is the impact on final disposal of the e-waste. Along these lines, the concept of extended producer responsibility (EPR) linked to individual producer responsibility (IPR), where the producer is responsible for its product, is important.[12]

Recycling industry: There are enterprises that take on this task as a business, and are committed to sustainable development and protection of the environment. Some of them are:

- E-scrap: A network of operators working in the refuse market. It advises businesses, governments, organisations and private individuals on reducing final disposal quantities in landfills.
- EcoGestionar: A company formed by specialists in environmental policy and management. They provide consultancy, management and treatment of wastes.
- Scrap y Rezagos: A company engaged in recycling, reuse and final disposal of e-waste. They offer collection and purchase of discarded technology, and even exchange it for other items the owner might need.
- Silkers: A company that provides e-waste collection, separation, assessment and recycling services.
- Ecotech: A company that certifies final disposal of e-waste, trains people, donates recovered equipment and disposes of the rest in an ecologically sound way.

We must underline that current management of e-waste is carried out in a setting that lacks sufficient information, despite the data that do exist. This prevents producers from making appropriate decisions for their companies, from both an economic as well as environmental standpoint, because they are unaware of the possibilities for reuse and disposal of their e-waste, the available operators, and the market transaction prices for each type of waste material.

Informal economy

"Informal recycling of material found in computer equipment by cardboard and scrap collectors is much more significant from the quantitative perspective than that carried out by private or government refuse collection companies," one report indicates.[13]

In this arena, some groups have organised into cooperatives, which allows them greater sustainability and better working conditions.[14] However, the above-mentioned report points out that treatment of hazardous wastes in the informal economy is rare or non-existent. "The risk exists that processes such as open-air burning of wires containing PVC and acid baths to recover gold and other metals are propagated, causing environmental risks and endangering the health of people in the sector and neighbouring communities."

Citizens

Much of the electronic scrap remains in Argentine homes and little information circulates advising what to do with it. A few collection campaigns have been held, but with minimal effect. In addition, the country's largest municipalities, such as Buenos Aires and Rosario, have committed to the Zero Garbage initiatives but have made little progress in recovering e-waste.

11 portal.educ.ar/reciclado

12 Lindhqvist, T., Manomaivibool, P. and Tojo, N. (2008) *La responsabilidad extendida del productor en el contexto latinoamericano. La gestión de residuos de aparatos eléctricos y electrónicos en Argentina,* Lund University, Sweden. www.greenpeace.org/raw/content/argentina/contaminaci-n/basta-de-basura/la-responsabilidad-extendida-d.pdf

13 Prince, A. (2006) Recupero y reciclado de PC's en LAC, paper presented at the Third International Workshop: From PC refurbishing to PC recycling, an opportunity for Latin America and the Caribbean, San José, Costa Rica, 13-15 November. www.residuoselectronicos.net/archivos/plataforma/tall_III_cr_1106/ppt/021_aprince_pincecooke_1106RESUMENMERCADO.PRINCE.pdf

14 Cooperativa Toma del Sur cooplatomadelsur.com.ar

Civil society organisations

Although social recovery through donations is minimal (0.1% by businesses, close to 0% by homes),[15] there are organisations in Argentina that have been able to create enterprises that reuse and recycle e-waste, incorporating labour and educational inclusion objectives and philosophies that promote care for the environment. According to experts,[16] the significance of these initiatives is mainly due to the absence of government actors. Some of them are:

- Equity Foundation:[17] Engaged in refurbishing computers donated by businesses, which are then given to schools and civil society organisations.
- Environment and Society Foundation:[18] Promotes training programmes for urban recyclers to improve management quality and specialisation.
- Federal Investment Council:[19] The Computers for Schools Programme involves the creation of Computer Refurbishment Centres in order to strengthen job skills for youth in vulnerable situations. They hold dissemination drives with the goal of sensitising communities.
- E-waste: Recycling for Social Benefit project:[20] University extension initiative of the New Computer Technologies Research Lab (LINTI) at the National University of La Plata.
- María de las Cárceles Second Chance:[21] Offers rehabilitation opportunities for those who are serving a prison sentence by recycling computers received from companies for donation to schools.
- Nodo TAU:[22] Works for digital inclusion of social organisations. Has a Machine Bank which has recovered over 100 computers that were used to equip ten Community Computer Telecentres. Provides technical assistance and training in the use and maintenance of the machines. Holds a workshop on computer recycling and refurbishing in the Santa Mónica Special School for differently abled children in the city of San Lorenzo.[23]

Organisations like these are demanding a national plan to promote growth in the recycling industry. Doing so would require measures such as declassifying technology as a hazardous waste, which restricts new business opportunities, and funding for the sustainability of the projects that take on all the phases of e-waste management.

Environmental organisations act as spokespersons on the dangers associated with e-waste. Greenpeace Argentina is implementing strategies for disseminating information, including reports on different technologies, giving visibility to best practices in refuse management,[24] as well as informational videos[25] and social pressure campaigns.[26]

Government

Public policies are in short supply and disorganised. Legislation is scant and not specific. As a result, there is no national system in Argentina that assures appropriate environmental handling of e-waste. At the same time, the lack of regulatory frameworks limits the potential and reduces the impact of efforts by other actors due to the absence of institutional spaces that can serve as clear points of reference for their management.

A shining example, however, is an entity such as the INTI, which has solid initiatives, as well as the National Electric and Electronic Waste Management Programme, an organisational experiment with municipalities that have the obligation to collect e-waste, and with civil society organisations that have successful experiences in the field.

The first phase of the programme will take place in the city of Rosario in mid-2010. INTI, in conjunction with the relevant undersecretary and Nodo TAU, has designed a project to create a recycling and refurbishing plant for e-waste which will be managed by a cooperative. Nodo TAU will be in charge of the training and technical supervision of the plant.

Also participating in the project is the Ecology Workshop, representing Greenpeace, which will be developing social awareness policies within the community and supervising the environmental aspects of the plant. The Ministry of Labour is contributing funds to implement the project (for job posts, internships and professional capacity building). The Institute to Mobilise Cooperative Funds will provide training in running cooperatives, and the Ministry of Education of the Province of Santa Fe will purchase the refurbished computers.

The project narrative underscores that in order to have an impact, a project must have, as central elements, citizen awareness raising, support by private and public institutions, and adequate collection logistics. In order to ensure that the initiative is economically viable, it envisions charging a disposal tax to e-waste generators (commercial or institutional), selling dismantled raw materials, and eventually, selling recovered equipment and spare parts, amongst other sources of financing.

15 Prince (2006) op. cit.

16 Fascendini, F. (2009) Basura electrónica: ¿debajo de la alfombra? *Boletín enREDando*, October. www.enredando.org.ar/noticias_desarrollo.shtml?x=52811

17 www.equidad.org

18 www.ambienteysociedad.org

19 www.cfired.org.ar

20 e-basura.linti.unlp.edu.ar/index.php/Proyecto_E-Basura

21 www.mariadelascarceles.org.ar/suenios.html

22 www.tau.org.ar

23 www.enredando.org.ar/noticias_desarrollo.shtml?x=52817

24 Ranking verde (Green Ranking) www.greenpeace.org/argentina/contaminaci-n/basta-de-basura/un-nuevo-flujo-de-residuos-pel/ranking-verde-de-electrnicos3/ranking-electronicos-dic-2009

25 Greenpeace Argentina video on e-waste www.greenpeace.org.ar/blog/nuevo-video-de-greenpeace-sobre-el-problema-de-la-basura-electronica/377

26 Greenpeace Argentina blog Call the Senators Campaign www.greenpeace.org.ar/blog/llama-a-los-senadores-y-exigiles-que-traten-la-ley-de-gestion-de-residuos-electricos-y-electronicos-antes-de-fin-de-ano/375

New trends

In April 2010 a new draft Law for Electrical and Electronic Waste Management was presented for the second time in Congress by Senator Daniel Filmus.[27] The law is based on the concept of EPR, encompassing production, use and final disposal, for products such as batteries, mobile phones, computers, low-energy light bulbs and televisions. It also establishes a prohibition on contaminating substances, develops eco-design and recovery goals, and promotes the reuse of materials such as gold, copper and platinum, which today are buried in landfills or thrown in open-air garbage dumps.

Highlighted in the body of the law are the declassification of e-waste as hazardous waste and the creation of a National Management Organisation, whose governing board is to be made up of producers, the Federal Council on the Environment, and the INTI. It also proposes the creation of a national fund for the management of e-waste, composed of mandatory contributions by manufacturers and importers to finance the handling of the waste.

After the bill was first presented in 2008, the Senate Committee on Environment and Sustainable Development called on social organisations and private enterprises to contribute to the draft. This effort not only allowed legislators to learn of the organisations' perspective but also for these organisations to come together and establish relationships and collaborative actions. This was how they jointly designed a document with proposals for implementation of the law. Among the changes proposed, they are requesting that the law prioritise the social and educational reuse of old equipment.

Action steps

The management of e-waste in our country presents two challenges: linking the different actors involved and extending and broadening the impact of e-waste initiatives.

- *Public policy:* The national government should organise a comprehensive system for e-waste management, which strengthens the various initiatives and makes funding available for the less profitable efforts.
- *Legislation:* Legislative measures should be adopted which establish the responsibility of manufacturers of electronic devices for their products until the end of their useful life. While this is a voluntary decision by the companies, the existence of regulations would boost this policy.
- *Information:* Both the private sector as well as citizens/consumers lack accurate information for making environmentally sound decisions regarding e-waste. In the case of companies, this information should emphasise the profitability of environmentally sustainable decisions.
- *Regional policy:* The extension of these policies into the region would be very beneficial. Some initiatives in this regard are the virtual Regional Platform on Electronic Waste for Latin America and the Caribbean (RELAC Platform)[28] and the proposal for the creation of the Latin American WEEE (Waste Electrical and Electronic Equipment) Market.[29] ■

27 www.rezagos.com/descargas/Ley-RAEE-Filmus.pdf

28 www.residuoselectronicos.net

29 Protomastro, G. (2007) *Study on formal and informal circuits for management of Waste Electrical and Electronic Equipment in South America.* www.basel.int/centers/proj_activ/tctf_projects/001-2.pdf

AUSTRALIA

EngageMedia
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Introduction

With the Australian government wavering on its response to climate change, a national household energy reduction scheme in tatters, and illegal shipments of electronic waste (e-waste) still said to be en route to China,[1] the July 2010 launch of a National Waste Policy Implementation Plan could not have come soon enough.

The pressure on Australians to upgrade domestic information and communications technologies (ICTs) is set to spike. With the 2012 change over to digital broadcasting, new wide-screen high-definition televisions are in demand. So much so that current trends suggest that the number of televisions are "fast outnumbering people in the average Australian household."[2]

An anticipated 40 million analogue radio receivers in Australia are also due to be discarded by 2012. This, together with LCD prices plummeting and 3D screens set to impact on the market, means that the volume of e-waste that will pour out of businesses and homes will be unprecedented. Kerbside e-waste, recognised by the Australian Bureau of Statistics as one of the fastest growing types of waste[3] in the country, will undoubtedly increase.

In an environment that has seen a government renege on its major environmental promises, it may well require a stronger commitment from industry, in cooperation with civil society, to ensure sufficient incentives and measures are in place to increase the uptake of e-waste management initiatives and the opportunities they afford. In fact, the past decade has seen the private sector – and many in the civil society sector – do just that.

Will Australia seek to influence ICT manufacturers to reduce e-waste to zero sums, or will it further the need to advocate for a programme of toxic waste management? The increasing concerns around the radioactive waste site mooted for Muckaty cattle station in the Northern Territory suggests Australia has yet to find the leadership and commitment towards the establishment of a uniform and consistent approach to outright minimisation of environmental harm across all sectors.

Still, the National Waste Policy is a much sought-for step in very much the right direction.

Policy and legislative context

In the face of increased ICT consumption and civil society concerns, the government announced in July 2010 that, under the new stewardship legislative framework, it will implement an industry-led life-cycle scheme to collect and recycle end-of-life televisions and computers.[4]

Due to be implemented in 2011, the National Waste Policy aims to reduce the amount of hazardous waste for disposal. For instance, it is targeting up to 80% of all televisions and computers for recycling by 2021. Additionally, and in spite of the failure to get a climate change policy in place, the National Waste Policy is clear on its aim to reduce greenhouse gas emissions.

The scheme was developed on the work of civil society and the private sector, which had both established community awareness and e-waste collection programmes for close on two decades. Industry alliances such as Product Stewardship Australia and the Australian Information Industry Association, as well as green groups formed under the Boomerang Alliance had had significant impact in their calls for a national policy, which has lagged behind local imperatives and international initiatives.

Yet despite their innovations and entrepreneurship, industry-driven recycling initiatives are said to be operating well below their capacities. The Australian Bureau of Statistics refers to e-waste as the "exception" when it comes to recycling.[5] Between 2007 and 2008 only one in ten computers was recycled. In 2009, 99% of Australian households participated in some form of recycling. However, nearly a quarter (23%) of electronic equipment disposed of in the twelve months prior to March 2009 was placed with non-recycled garbage for kerbside collection, and chucked into landfills across the country.[6] Currently the Australian Capital Territory is the only state to regulate the disposal of e-waste, placing "a levy on the disposal of televisions and computers at landfill sites."[7]

The National Waste Policy's flagship is the National Television and Computer Product Stewardship Scheme (NCPSS).[8] Although the National Waste Policy is not due to

1 Cubby, B. (2009) Toxic Australian e-waste dumped on China, *The Sydney Morning Herald*, 22 May. www.smh.com.au/environment/toxic-australian-ewaste-dumped-on-china-20090521-bh6f.html

2 Singer, M. (2010) TVs outnumber people, *The Age,* 19 July. www.theage.com.au/national/tvs-outnumber-people-20100718-10g4n.html

3 Australian Bureau of Statistics (2006) www.abs.gov.au

4 Department of the Environment, Water, Heritage and the Arts (2010) *National Waste Policy: Less Waste, More Resources.* www.ephc.gov.au/sites/default/files/WasteMgt__National_Waste_Policy_Implementation_Plan_Final_201007.pdf

5 Australian Bureau of Statistics (2009) www.abs.gov.au

6 Australian Bureau of Statistics (2009) www.abs.gov.au

7 Department of the Environment, Water, Heritage and the Arts (2009) *Draft National Waste Policy Framework: Less Waste, More Resources – Discussion Paper.*

8 Department of the Environment, Water, Heritage and the Arts (2010) *National Television and Computer Product Stewardship Scheme.* www.environment.gov.au/settlements/waste/ewaste/index.html

come into effect until 2011, the NCPSS will require importers or manufacturers of computers and televisions to join a producer responsibility organisation to arrange for collection and recycling of these products.

Product stewardship in Australia

While the private sector has invested in the means to retrieve and recycle e-waste, and community groups recirculate outdated computers, the national government lagged in its uptake of a national approach until 2010. The NCPSS is a welcome development, building on business-led voluntary product stewardship schemes for at least a decade.

The 2001-2002 product stewardship case study, "Beyond the Dead TV: Managing End-of-Life Consumer Electronics in Victoria", clearly identified the benefits of life-cycle thinking. In a 2003 report to government, the researchers recommended a framework "towards determining what operating, funding and institutional arrangements may need to be put in place to support a recovery and processing scheme for consumer electronics."[9] Additionally, industry participants in the pilot that was part of the study emphasised the need for opportunities that enhanced "the viability and profitability of the waste recovery and processing sector."

Going back even further, product stewardship was embedded in the principles of the Victorian Environment Protection Act (1970), but it would take three decades before businesses adopted the practice, and another before it would become a national programme. The NCPSS states:

> The proposed co-regulatory framework aims to achieve a nationally consistent approach to product stewardship for targeted products – ensuring that the whole Australian community enjoys the same standard of environmental protection, while minimising the compliance burden for industry.

It is unclear what standard of environmental protection is being referred to. Australians are being subjected to a pandemic of irresponsibility that can be traced through climate, mining, power and forestry. With no clear national approach to climate change and a government talking up the need for more coal-fuelled power stations in the midst of a mining boom,[10] we may take small comfort in the knowledge that a beleaguered environment will soon be spared a glut of ICT waste, even though it will have to suffer the consequences of business as usual elsewhere.

Although well behind the action plan set out in the Basel Convention on hazardous wastes, the NCPSS is a necessary addition to a plethora of initiatives already underway in Australia. Australia is yet to have a uniform approach to duty-of-care for both the environment and its citizenry, but it does have a healthy, innovative and eager civil society and private sector that have taken up the challenge to both reduce e-waste and address the need for redesign from concept to consumer.

Civil society and privately led initiatives

Whether recycle or reuse, Australian companies and organisations are reducing the impact of e-waste on landfills and are educating the public in responsible use and disposal.

Reverse Garbage Cooperative[11]

Reverse Garbage is a not-for-profit that encourages and practices reuse, refurbishment and repurposing of discarded electronic goods. Collecting up to 1,000 computers, monitors, scanners and printers every month, Reverse Garbage does not see itself as a recycler. For example, refurbished computers for resale and/or donation, and jewellery and other fashion items made from damaged motherboards and glass from old television screens, are part of Reverse Garbage's philosophy, employing environmentally benign processes and educating consumers in the process.

However, this does not come without its challenges. Accepting e-waste freely, Reverse Garbage is said to be overwhelmed by the sharp increase in volume they are now expected to manage. For some seven years Reverse Garbage has taken the burden of e-waste disposal off hospitals, schools, and small and large businesses, including some of the country's major financial institutions. Reaching capacity and with no government support in sight, come 2011 their e-waste programme may be halted to avert financial collapse of the entire cooperative.

Scrapyard Challenge Workshops[12]

Although the concept had not been initiated on a permanent basis in Australia, the Australian Network for Art and Technology participated in this series of international workshops, hosting its own Scrapyard Challenge at its touring New Media Lab in Melbourne, 2005.[13]

Scrapyard Challenge Workshops do not require any prior technical skills. Discarded "junk" including toys, computers and sound equipment are reassembled into new, innovative electronic devices for myriad purposes. Workshops are often theme-based. The MIDI[14] Scrapyard Challenge sought to create robots that draw. At the conclusion of every workshop participants are encouraged to "perform" or demonstrate the result of their efforts.

9 Consumer Electronics Suppliers Association (2003) *Beyond the Dead TV: Managing End-of-Life Consumer Electronics in Victoria*, p. 69. www.ecorecycle.sustainability.vic.gov.au/resources/documents/BeyondTV_v3.pdf

10 Morton, A. (2010) Critics blast Gillard's power-station policy, *The Age*, 23 July. www.theage.com.au/federal-election/critics-blast-gillards-powerstation-policy-20100723-10nxp.html

11 www.reversegarbage.org.au

12 www.scrapyardchallenge.com

13 Australian Network for Art and Technology, New Media Lab, Scrapyard Challenge Workshop (2005) www.scrapyardchallenge.com/?p=48

14 Music Instrument Digital Interface

Miss Despoinas Hackspace Hobart[15]

An artists' collective based in Tasmania, Miss Despoinas Hackspace Hobart provides hands-on, do-it-yourself workshops that both reduce the mysteries of computer hardware and educate on its reuse. Participants get in "under the hood" and convert all manner of parts into wearable art, from jewellery to clothing modifications.

The collective also aims to use entirely refurbished computers and open source software in the creation of artworks, from performance to installations.

Sims Recycling Solutions[16]

The largest e-waste recycler in Australia, Sims Recycling Solutions handles up to 10,000 tonnes of discarded electrical products a year and is said to be running at 50% capacity. That aside, in the past three years it has managed to divert an astonishing 1.3 million units of redundant computers and parts, televisions, mobile phones and other electrical products from landfill sites.

Sims Recycling Solutions are a vocal opponent of landfills as a dumping ground for e-waste. With no outright national ban on such practices they may never see their Australian operations run at full capacity.

Sims Recycling Solutions can be found in India, Singapore and South Africa, with partners emerging in China, Japan, Korea, Taiwan and Thailand.

Mobile Muster[17]

Established by the Australian Mobile Telecommunications Association in 1999, Mobile Muster is an industry-led national programme aimed at preventing all mobile phones from being disposed in landfills.

A network of drop-off points across the country, located at local councils, government agencies and small businesses, provides the public with the means to dispose of mobiles, batteries and accessories for recycling.

Mobile Muster is a free service, voluntarily supported by handset manufacturers (Nokia, Motorola, Samsung, Sony Ericsson, HTC, LG Electronics, i-mate, NEC, Panasonic, Sharp); network carriers (Telstra, Optus, Vodafone, 3 Mobile); telecommunications service providers (AAPT and Virgin Mobile); and distributors (Force Technology).

With such a significant uptake from the telecommunications industry, it is no wonder that the programme had, by 31 December 2009, collected 667 tonnes – some 4.48 million handsets and batteries.[18]

Green PC[19]

Created as part of InfoXchange Australia's digital divide strategy, Green PC refurbishes second-hand computers and makes them internet ready for low-income people across the country. What makes Green PC unique is that it has been established as a social enterprise initiative with support from the Victoria government's Community Jobs Programme. As such, Green PC provides employment for the long-term unemployed with opportunities for advancement within the information technology sector.

Green PC has set a benchmark for those computers it can effectively redeploy within the community. Anything lower than a Pentium IV is not acceptable to the programme, with consumers left to find other means of disposal, generally by way of information available from local councils.

Planet Ark

Planet Ark has created a website called RecyclingNearYou.[20] The site provides the public with information about recycling options nearest to them. Four out of the five most requested enquiries relate to e-waste – a trend over the past two years running.

Planet Ark has also created services specifically for businesses, including a hotline that assists in dealing with general office waste and electronics.[21]

These initiatives have been shown to be extremely popular, with some 1,830,829 visits to the RecyclingNearYou site alone from 1 May 2009 to 30 April 2010. With enquiries increasing, it has become evident to Planet Ark that without a concerted national programme, significant areas of the country will remain without access to recycling services and/or drop-off points. In their 2010 report, Planet Ark identified the fact that there were no disposal options whatsoever in rural locations.[22]

Action steps

The following recommendations, addressing shortcomings of Australia's National Waste Policy, are drawn from civil society concerns and the various organisations and businesses engaged in either recycling or reuse.

Though not exhaustive, they would not only bring the aims of policy in line with international conventions, but would provide significant leadership to other countries struggling with their own e-waste crisis.

- Make product stewardship a mandatory requirement for all electronics/ICT manufacturers who wish to do business in Australia.

15 www.sistero.org/mdhhh/index.php?/project/e-waste-hardware---opening-up-the-hood

16 apac.simsrecycling.com

17 www.mobilemuster.com.au

18 Australian Mobile Telecommunications Association - Mobile Muster www.mobilemuster.com.au/what_is_mobilemuster

19 www.greenpc.com.au

20 www.recyclingnearyou.com.au

21 businessrecycling.com.au

22 Planet Ark (2010) *Taking the Byte Out of Waste II*. recyclingnearyou.com.au/education

- Declare an outright national ban on all e-waste disposal in landfill sites.
- Provide grants and/or tax incentives for organisations tackling e-waste head on with reuse, refurbishment and repurposing programmes.
- Increase opportunities for e-waste refurbishment schemes within the social enterprise model across the entire country, addressing the shortfall of both e-waste solutions in rural areas and the increasing need for alternative forms of employment there.
- Establish recycling and/or e-waste drop-off points and the means for their collection in rural Australia.
- Implement consumer education programmes that encourage the use of reusable electronic goods and increase access to information, online and offline, about e-waste disposal options.
- Implement a vigorous research programme and increase research funding to both the private and civil society sectors to encourage the rapid redesign of the way we create, manufacture, distribute and employ ICTs in all facets of human life.
- Out the companies that have yet to apply environmentally benign methods in manufacturing processes and product design.
- Update the Australian Green Office Guide[23] to include reuse philosophies and current information on e-waste schemes countrywide. It appears not to have been updated since it was launched in 2001. ■

Additional references

ABC (2003) E-waste, *ABC*, 6 November. www.abc.net.au/science/features/ewaste/default.htm

ABC (2009) National policy targets e-waste, *ABC News*, 5 November. www.abc.net.au/news/stories/2009/11/05/2734429.htm

Department of Environment, Climate Change and Water: Waste avoidance and resource recovery in NSW. www.environment.nsw.gov.au/warr/index.htm/data/RecycleIT_Summary.pdf

Greensense (2009) The e-Waste Issue in Australia, *Greensense Blog*, 29 May. www.greensense.com.au/the-e-waste-issue-in-australia

Griffith University, Engineering and IT, E-waste Research Group: Resources. www.griffith.edu.au/engineering-information-technology/e-waste-research-group/resources

Hendry, A. (2007) Australia stuck in e-waste dark ages, *ARN*, 5 November. www.arnnet.com.au/article/198419/australia_stuck_e-waste_dark_ages

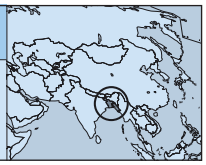
Salleh, A. (2009) New call for e-waste controls, *ABC*, 16 September. www.abc.net.au/science/articles/2009/09/16/2687670.htm.

Serpo, A. (2008) Australia's giant e-waste recycling centre: Photos, *ZDNet*, 20 November. www.zdnet.com.au/australia-s-giant-e-waste-recycling-centre-photos-339293389.htm

23 National Appliance and Equipment Energy Efficiency Committee (2001) *Green Office Guide*. www.environment.gov.au/settlements/publications/government/purchasing/green-office-guide

BANGLADESH

Bytes for All
Partha Sarker and Munir Hasan
www.bytesforall.net



Introduction

Like other countries in the region, Bangladesh has adopted information and communications technologies (ICTs) as tools for development. The ruling party currently has a declaration on building a "Digital Bangladesh" by 2021, which shows the government's commitment. Although Bangladesh got its first mainframe computer in 1963, mobile phones and PCs only started to penetrate the market in large quantities after 1997. Two things happened in that year: Bangladesh liberalised its telecom policy by allowing multiple private telecom operators to operate, and withdrew all import duties from computers and their peripherals. At the same time, operators, especially internet service providers (ISPs) were also allowed to use VSAT (very small aperture terminal) satellite systems for overseas communication, resulting in internet connectivity being opened up in the country.

In recent years the use of mobile phones, PCs, laptops, printers, scanners, etc. have witnessed tremendous growth. Recent data show that Bangladesh now has 59.98 million mobile subscribers (as of June 2010), and 1.02 million fixed-phone subscribers (as of May 2010).[1]

There is a tendency among mobile phone users to change their handsets quite frequently. Every month Bangladesh imports 0.75 million mobile phone handsets (according to the country's mobile phone importers association). While the reuse of technology is also high, nobody knows what happens to used mobile phones when they are abandoned and thrown away. At the same time, the sale of PCs and laptops in the country is rising at a constant rate with an estimated sale of 230,000 PCs and 65,000 laptops in 2009.

It is generally considered that computer dismantling and recycling is a growing business in the informal sector of Bangladesh, but no baseline data is available to show how these computers and mobile phones are being dismantled and recycled or left to be mixed up with other trash. General statistics show that 120,000 urban poor from the informal sector are involved in the recycling trade chain of Dhaka city, and 15% of the total generated waste in Dhaka, which is mainly inorganic, is recycled daily.[2]

Different chemical elements within mobile phones and computers are very harmful both for the environment and for human health. For example, mobile phone coatings are often made of lead, and mobile phone batteries were originally composed of nickel and cadmium (Ni-Cd batteries). Cadmium is listed as a human carcinogen that causes lung and liver damage. Alternatives contain potentially explosive lithium or toxic lead. Lead is present in cathode ray tube (CRT) computer monitors. Mercury is also found in computer circuit boards, along with lead and cadmium. Circuit boards can also include batteries made of mercury, as well as mercury switches.[3]

E-waste policy and legislative context

There is no comprehensive electronic waste (e-waste) policy, although it is briefly mentioned just as an action item in the country's ICT policy. The government established the Department of Environment (DoE) in 1977 under the Environment Pollution Control (EPC) Ordinance, 1977. Then in 1989, as pollution and environment got more attention, the Ministry of Environment and Forest[4] was established as the apex body. The National Environmental Policy, highlighting the regulation of all activities that pollute and destroy the environment, came into effect in 1992. The subsequent Environment Conservation Act (ECA), 1995, authorised the DoE to undertake any activity necessary to conserve and enhance the quality of the environment and to control, prevent and mitigate pollution. The DoE was also mandated to give clearance on environmental issues for any new project.

The subsequent rules under the ECA, the Environment Conservation Rules of 1997, divided industries and projects into different categories depending upon the pollution load and likely impact on the environment. There are some provisions and mandatory rules to build a waste management system within the industry sectors. However, e-waste does not require any compliance under the Act or Rules.

The government is now preparing a solid waste management policy which may cover e-waste. At the same time, the Medical Waste Management Rules, 2008, address waste management issues for the medical sector, including e-waste.

Bangladesh is a signatory to the Basel Convention prohibiting transboundary movement of hazardous waste. Import of any kind of waste requires government permission. The existing import policy allows importation of old computers higher than Pentium III, but importation of old computer parts is not allowed.

1 www.btrc.gov.bd

2 gec.jp/gec/jp/Activities/ietc/fy2010/e-waste/ew_1-9.pdf

3 earth911.com/recycling/electronics/e-waste-harmful-materials

4 www.moef.gov.bd

Lack of awareness

Two things are very important for Bangladesh regarding e-waste: lack of awareness among the citizens and policy makers, and a resulting lack of a proper policy framework exclusively related to e-waste. No social movement or civil society activities are visible. PCs have been a familiar part of society from the early 1980s, and so a good number of PCs have already been discarded in the country. It was also found that due to the absence of e-waste policy and management, most of them were discarded in an environmentally unsound way. In general, there is a tendency in the country to reuse electronic gadgets. A good number of repairing and maintenance shops for electronic devices are now available in the country. People try to use mobile phones and computers to their maximum life span. But once the use is over, people have a tendency not to care about the disposal of these devices and discard them randomly in the general waste stream. The lack of awareness on e-waste is mainly due to a general lack of environmental consciousness – and would include a lack of awareness of issues such as climate change, rising sea levels, and the illegal acquisition of river land.

E-waste, nevertheless, does from time to time get discussed in the media, and research has been conducted to try to determine its impact. One study conducted by D.Net[5] aimed at quantifying e-waste and assessing the awareness level of residents regarding e-waste in Dhaka city. The findings of the study revealed that a huge quantity of e-waste is generated each year in Dhaka in the form of PCs and mobile phones. The majority of the respondents supported the need for developing a hazard-free e-waste management system in the country. There is a similar study by Brainstorm Researchers that is an overview of awareness and practices regarding the disposal and recycling of mobile phone batteries in the country. However, there are few activities at the grassroots level.

Climate change and ICT policy, legislation and practice

In the adopted national ICT Policy, 2009, environment, climate and disaster management is identified as one of the ten objectives. The policy aims to:

> Enhance the creation and adoption of environment-friendly green technologies, ensure safe disposal of toxic wastes, minimize disaster response times and enable effective climate change management programmes through the use of ICTs. [This] as Bangladesh is facing the dual scourge of environmental pollution due to rising industrial and consumer wastes and also global-warming-induced climate change, due to excessive carbon emissions by the industrialized countries.

Among the five strategic areas identified under this strategy, environmentally friendly green technology (9.1) and the safe disposal of toxic waste resulting from the use of ICTs (9.4) have been mentioned.

In the ICT Policy there are 306 action items. Under strategic area 9.1, three action items were proposed:

> 249. Mandate energy-saving and low-power-consumption ICT devices for government procurement based on pre-determined, internationally accepted consumption benchmarks.
>
> 250. Set and enforce regulatory standards to control the dumping of ICT devices to prevent e-waste. Establish safe disposal and recycling mechanisms and organizations.
>
> 251. Reduce the use of paper in offices by increasing electronic communication, file processing, information sharing and archiving.

However, the implementation of the above action items is yet to be visible. Under action item 251, the government has now established electronic communication in its field and central administration. All field level officers in the administration (Deputy Commissioners and Upazilla Executive Officers) are now provided with laptops for maintaining electronic communications with the central government. The manual of field administration (the Secretarial Instruction) has now recognised email as an official document. A recent initiative by the Cabinet Division (the ministry supervising the field administration) introduced the online submission of fortnightly Deputy Commissioner reports. Previously this generated a good number of paper documents, both at district and central administration levels. Other moves that will result in less paper being used are afoot.

Action item 263, under strategic area 9.4, proposed to build plants for "cannibalising" e-waste to extract precious metals. It also sets labour standards for such an industry. This action item has a five-year time line.

New trends

There are some individual interventions where people have tried to rescue some parts of used PCs and reuse them in assembling a product for the local market. One such initiative involves the conversion of a monitor into a television in the southern district of Bagerhat.

Few corporate offices have taken the initiative regarding their e-waste. Typically, according to corporate policy, businesses have to replace their existing computer setup every few years. Some of them dump the old computers in junkyards. Some have tried to distribute them to different organisations. At the corporate level, it is believed that only Standard Chartered Bank has tried to redistribute their used PCs to schools. They have a programme with D.Net,[6] an

5 www.dnet.org.bd/KP_Files/KP_e-waste_Research_Paper_first_6_pages. pdf

6 www.dnetbangladesh.org

NGO, and Computer Jagat,[7] an IT magazine, to redistribute the used computers to schools in remote areas.

In Bangladesh mobile phone manufacturer Nokia tried to promote its green technology campaign in order to collect used mobile phones for its recycling plant. Each of its eighteen customer centres has a designated collection box for collecting old and used mobile phones. However, the response has not been significant for two reasons: there is a lack of awareness and unfamiliarity with the concept of recycling; and people are interested in getting paid for their old technology. Even a journalist we interviewed asked, "What will I get by handing my old set in?"

Usually people throw their used mobile phones in the nearest dustbin. From there the municipal authority collects them with the solid waste and dumps them on the landfill. There are some mechanisms to separate medical waste and some solid waste, but there are no such activities for e-waste.

Action steps

Bangladesh does not have comprehensive policies nor the capacity to handle e-waste challenges. The action items proposed below address the above two issues:

- Awareness campaign: This should include both the traditional media (newspapers, TV) and new media (web, blogs, social networks). The campaign should address policy makers as well as the general public.
- Baseline and action research: It is important to understand the current and future impacts of e-waste in the country. More research has to be done to find the current status and identify the future trends.
- Policy advocacy: A solid waste management policy is underway in the country. However, no e-waste policy is in sight. Bangladesh needs a comprehensive e-waste policy. The policy advocacy plans should include a facts-based campaign targeting policy makers, and efforts to sensitise lawmakers.
- Pilot projects: Based on the research findings, the government should launch pilot initiatives to establish environmentally and socially friendly e-waste recycling processes in the country. ■

7 www.comjagat.com.bd

BENIN

GOREeTIC
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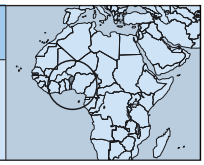
www.goreetic.org



Introduction

The world has become a global village. It is now obvious that physical borders no longer exist. Information and communications technologies (ICTs) have the advantage of gathering people around the same objectives and goals despite their different activities all over the planet. These activities have a direct impact on the environment. Global warming of about 2ºC, the ravages of climate change, and environmental degradation generally are problems which endanger the future of our planet. The release of greenhouse gases (GHGs) must be reduced because they weaken the development policies of Western as well as Southern countries. At the same time, the pollution of the environment must be halted for the sake of future generations.

Political and legislative context

The Republic of Benin has set up strategies to mitigate climate change. The atmospheric pollution caused by the gases released by engine exhaust pipes has forced its hand, resulting in an integrated strategy in partnership with the United Nations (UN). Benin signed the UN Framework Convention on Climate Change (UNFCCC)[1] on 13 June 1992 and ratified it on 30 June 1994. The country also signed the Kyoto Protocol, ratifying it on 25 February 2002.

At the national level, Benin's Initial National Communication to the UNFCCC was officially released on 29 February 2000, and enabled the country to put in place a national policy on climate change called the National Action Programme for Adaptation to Climate Change.[2]

While national policy on climate change does not specifically mention ICT strategies to control the problems related to climate change, several programmes and projects have been initiated, some of which use ICTs.

At the local level, the country's laws on decentralisation, specifically Article No 97-029 of 15 January 1999 related to the administration of municipalities, gives town councils the lead in protecting and safeguarding the environment. These laws, together with others, grant departmental and municipal structures the opportunity to impact directly on programmes related to the fight against climate change.

However, this does not include electronic waste (e-waste), which appears to have been forgotten, despite Benin signing the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal. The take-up of new technologies has increased the quantity of e-waste in the country (recycled computers, refrigerators, freezers, TV sets, etc.) which now lies scattered on our streets and plays an important part in the environmental damage noted these last decades in Benin.

Challenges in implementing ICTs for environmental causes

At the institutional level, the efforts made by the Ministry of Environment and Protection of Nature are considerable. Benin's Initial National Communication on climate change enabled, amongst other things, the sharing of knowledge on climate change, and the exchange of information between all the stakeholders (government, academic institutions, private institutions, NGOs, research consultancies, etc.). It also helped to identify suitable technologies for the prevention of climate change in Benin. The National Action Programme for Adaptation to Climate Change is a process by which the levels of vulnerability of different groups is assessed, in order to determine priority needs. Another climate change programme, TRAIN,[3] intends to raise awareness amongst ministries and NGOs on the content of the UNFCCC, and to share information related to the negative effects of climate change in Benin.

After the signing of the UNFCCC in 1992, many projects were initiated. Among these were the GLOBE Project[4] (Global Learning and Observations to Benefit the Environment), created following the UN Conference on Environment and Development held in Rio de Janeiro in 1992. The GLOBE Project, started in 1996, brought together about 75 schools nationwide. The goal of the project was to raise the awareness of students and others about environmental issues at a global level, and to improve scientific understanding of the planet through networking and knowledge sharing. The Scientific and Technical Environmental Information System (SIST),[5] set up by Benin in partnership with the French Ministry of Foreign Affairs, has similar objectives. This project intends to emphasise the organisation of scientific and technical research and the use of ICTs.

On the one hand, these projects and programmes are not generally known to the public. This is a problem that needs a solution, and it is also important that everyone becomes aware of the harmful effects of climate change. On the other hand, using ICTs to combat climate change also

1 unfccc.int/resource/docs/convkp/convfr.pdf

2 Ministère de l'Environnement et de la Protection de la Nature, PNUD (2007) *Programme d'Action National d'Adaptation aux changements climatiques du Bénin (PANA-BENIN).*

3 Djibril, I. (n.d.) *Initiatives du Bénin en matière d'éducation, de Formation et de sensibilisation du public sur les Changements Climatiques.*

4 www.reseauafricanet.org/anais/APPLICATIONS/FICHE90.HTML

5 www.sist-sciencesdev.net/IMG/pdf/sist_benin.pdf

raises important structural problems. Infrastructural realities remain and tend to lessen the potential use of ICTs in helping with environmental issues. It becomes crystal clear that we are far from the end of our problems. The lack of solutions that can help the country reach the level of development that is so dear to policy makers is disheartening, and the country is a long way off from becoming the promised "Digital Headquarters of Africa".

While Law No. 2002-002 of 31 January 2002 relates to the basic principles of the telecommunications regime in Benin, many other laws have yet to be voted in to improve the legislative and regulatory framework for the telecommunications sector. Many of the prevailing laws are obsolete, putting Benin in the position of a country under construction, and in the process of reorganisation and reorientation. The priorities of Benin in terms of ICT development are based on two main foundations: e-government and e-business.

The electrical network is faulty (untimely power failures, high electricity bills, difficult access to the power grid, etc.). Moreover, the limited availability of computers and the human resources to train students and teachers, as well as internet connection problems, make it difficult to access information. All these factors have failed ICT programmes in schools, and are likely to have the same impact on using ICTs to mitigate climate change, or in sharing environmental information.

Besides the interventions mentioned above, it seems that the fight against climate change is not being conducted in synergy. People think that climate change is only the business of the Ministry of Environment and Protection of Nature. If we have a closer look at the impact of the use of ICTs on the environment, as well as the potential of ICTs to mitigate climate change, we can say that the Ministry of Communication and Promotion of New Technologies should play a major role together with the Ministry of Environment. And why not the Ministry of Health? Authorities at different levels should avoid intellectual confusion, a kind of traffic jam that creates conflicts of interest between the central administration and the municipal authorities. New laws voted in should enable real freedom in the management of projects to achieve the best results.

On the side of the environmental impact of ICTs, there is very little public knowledge about e-waste. The actual users of the equipment do not understand how they are polluters because they do not or cannot discard their old equipment properly. On the side of climate change, ICTs should be used for information dissemination: TV stations, commercial and community radio broadcasters and the internet should be used to reach and educate the public.

New trends

The political and administrative authorities of Benin are aware that things are not perfect and that there are things left to be done. Given this, Benin is getting ready to launch its Second National Communication on climate change. The new document is almost ready and will certainly correct mistakes noticed during the assessment of the first document, while launching new perspectives on the fight against climate change. Some 83,000 tonnes[6] of GHGs are released into the air by motorcycle taxis commonly known as *Zemidjan*. But owing to the efforts from different actors, measures to control GHGs released by engines have reduced air pollution by 12%[7] in Benin.

To fight against atmospheric pollution and to conform to international standards, the Ministry of Environment has been equipped with up-to-date technical tools. This includes a laboratory that helps to scientifically measure the rate of emissions released by two-wheeled and four-wheeled vehicle engines. These tests help create rules that drivers can follow in order to reduce the quantity of emissions released by their vehicle engines.

Action steps

The immediate action to be taken is to improve the legislative and regulatory framework so that ICTs are given specific consideration, in terms of both their ability to be used as tools to mitigate climate change, and their potential harmful environmental effects.

It is also necessary to build the capacities of students and parents, as well as ICT users generally, so that they have access to information related to the impact of ICTs on the environment.

Finally, it is critical for the state to facilitate access to the internet, and to stabilise electricity supply, so that the potential of using ICTs to fight climate change can be maximised. ■

6 chabigodfroy.blogspot.com/2008/10/bnin-la-pllution-un-pige-lurbanisation.html

7 Ibid.

BOLIVIA

REDES Foundation for Sustainable Development
José Eduardo Rojas
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Introduction

Bolivia's transition towards the information society presents new, complex and multidimensional issues affecting peoples' daily lives. The exponential increase of the consumption of information and communications technologies (ICTs) is a clear example, since they become electronic waste (e-waste) once their useful life is over. The Swiss Foundation for Technical Cooperation (Swisscontact)[1] confirms that "the formal import of electrical and electronic items rose considerably, from 15,000 to 25,000 tonnes, between 2003 and 2007, particularly in the category of telecommunications and informatics," which become e-waste when no longer in use.

Despite the lack of a law for integrated management of solid waste,[2] some municipalities, specifically department capitals and intermediate towns,[3] have carried out e-waste collection initiatives since the mid-2000s. Environmental NGOs, international aid agencies and – on a smaller scale – universities and institutes, as well as civil society, are aware of the problem. Sadly, it is not on the agenda of ICT stakeholders.

Although no enterprises exist that recycle e-waste, in 2001 some private proposals were developed to collect and export the waste. At present most of the country's 327 municipalities lack the sufficient technical, financial and human resources capacity to assume this task.

Regulatory and institutional framework for e-waste management

At the international level, Bolivia has signed Agenda 21, the Millennium Declaration, the Convention on Biological Diversity, the Vienna Convention, the Montreal Protocol, the UN Framework Convention on Climate Change, the Basel Convention, the Cartagena Protocol and the Kyoto Protocol.

National regulation shows significant progress in the New Political Constitution of the State,[4] the Law on the Environment No. 1333 (1992), its regulations,[5] and Rules 759[6] (1994) and 758[7] (2005). The laws also establish administrative responsibilities in the areas of Customs (1999), Municipalities (1989), Popular Participation (1994), and Administrative Decentralisation (1995). In February 2009, Supreme Decree 29894 declared the Ministry of Environment and Water the sector's national authority, and established the Department of Integrated Waste Management under the Vice Ministry of Drinking Water and Basic Sanitation.

Experts confirm that "in spite of the progress in the country's legal framework, it still lacks an integrated vision, and the means for its application are missing, as well as the instruments to make it work. There are voids in the definition of institutional competences and responsibilities, as in the determination of functions of the entities involved in integrated solid waste management, which confirms the need for a national framework."[8]

Integrated management of e-waste: Bringing sustainable development, digital inclusion and technological consumption together

Environmentally sustainable development gives priority to actions that will mitigate the social and environmental impact caused by contamination and exposure to dangerous waste. Technical and financial assistance is directed towards strengthening institutional and technical components, as well as regulations.

Stakeholders working in the area of ICT for development (ICT4D) focus on bridging the digital divide and, guided by this objective, push for access and widespread use of new technologies. However, they are not considering sustainable strategies for their management once their useful life is over.[9] Various stakeholders (prefectures, municipalities, NGOs, social organisations, and the academic, education and health sectors) promote the acquisition of new and/or second-hand equipment via donations, not taking into account that they will become an environmental problem in the near future.

Consumption patterns, powered by the lack of rules to control the entry of ICTs under strict environmental protection standards, result in an increasing e-waste problem. E-waste creates new responsibilities for municipalities, without the participation of producers and importers.

1 Delfín, M. et al (2009) *Diagnóstico de Residuos Electrónicos en Bolivia*, Swisscontact/CAINTEC/Delfín Consultora, p. 1.

2 In May 2010 a tender for a proposal for the law was launched.

3 La Paz, Santa Cruz, Cochabamba, Oruro.

4 In addition to references to environmental aspects, Article 33 and Article 344 establish reforms regarding the territorial organisation of the state and regional, indigenous, departmental and municipal autonomies, proposing new planning strategies that include e-waste.

5 Including, for example, General Regulations on Environmental Management, Air Pollution, Solid Waste Management, and Management of Substances that Deplete the Ozone Layer.

6 Referring to "characteristics for sites confining dangerous waste."

7 Ibid.

8 Abasto, S., García, G. and Zarco, A. (2010) *Dos décadas de la historia de la basura en Bolivia*, Colegio Departamental de Arquitectos de La Paz/Fundación EMEGECE, La Paz, p. 34.

9 Amongst the main strategies regarding digital inclusion are the ICT Strategy for Development (ETIC, 2005), the National Plan for Digital Inclusion (PNID, revived in 2009), the NICT Programme from the Ministry of Education, the Total Coverage Project by ENTEL, and the *Evo Cumple* ("Evo Delivers") programme from the Ministry of the Presidency.

According to the Law on the Environment, the person "who generates hazardous waste is responsible for it and has to guard and store it *until a viable environmental alternative exists*. Therefore, the population needs depots for the equipment they are discarding because the municipal garbage collecting agency does not take them as trash."[10] This perspective tends to only focus on the final users of ICTs without taking into account the structural factors that determine the consumption of technology.

To address this problem, REDES proposes to analyse the "structural chain of e-waste production", in order to identify the levels of participation and responsibility of all the stakeholders involved in the generation of e-waste, from the moment of production, to import, trade, use and final disposal.

Need for an official classification of e-waste

Bolivia lacks an official classification of its e-waste. The integrated management of e-waste, from all angles, requires differentiated treatment and a specific, official classification that qualifies and quantifies the levels of danger for each component, particularly taking in consideration that many appliances contain hazardous and non-hazardous components.[11]

Three suggestions to categorise e-waste in Bolivia are the following:

- The Customs Tariff for Import to Bolivia: A system of codes exists that includes general and specific characteristics of all imported products, which could be recognised by the National Institute for Statistics (INE). Nevertheless it requires an in-depth study to assess its feasibility.[12]
- Swisscontact, based on a Diagnosis of Electronic Waste in Bolivia conducted in 2009,[13] proposes ten categories of e-waste: large domestic appliances, small domestic appliances, ICTs, electronic consumer goods (such as TVs and DVD players), light bulbs and lighting equipment, electrical tools, toys and sports equipment, medical appliances, security equipment and vending machines.
- The REDES Foundation, which represents Bolivia in the E-Waste Working Group of the ECLAC Information Society Programme (eLAC 2010), proposes differentiating e-waste into three broad categories: electronic (informatics, entertainment and telecommunication equipment), electrical (household and office appliances, among others), and batteries.[14]

This process of categorisation is not complete. However, it shows a favourable outlook for a collective take on the e-waste concept that the country needs.

E-waste in numbers: The strategic importance of data systems

Sergio Toro, an expert in ICT and development, says that "it is necessary to develop reliable data systems that include the participation of sectoral stakeholders, including the National Customs of Bolivia, and the National Institute for Statistics.[15] Various stakeholders from the private sector (formal and informal), organisations of users and the public in general need to be informed and know more about the practices and responsibilities regarding the disposal of their ICTs once their useful life is over."[16] However, Bolivia lacks indicators to measure e-waste.

According to the national newspaper *El Deber*, in its response to the Swisscontact report:

> [E]ach Bolivian produces more than 2 kg of electronic waste annually. According to predictions, within five years, each Bolivian will be responsible for 3.3 kg of electronic scrap. This means that we have to face a mountain of 33,000 tonnes per year. And the numbers are likely to rise, since the formal import of electronic equipment increased from 15,000 to 25,000 tonnes during the period 2003 to 2007, not taking into account that informal import or smuggling is high.[17]

The Swisscontact report itself[18] offers the following:

- During the period 2008-2015, the amount of imported electronic and electrical items will double to 53,000 tonnes, of which 11% will be made up of large household appliances and ICTs.
- By 2015, the generation per capita of e-waste will grow by 50% compared to 2008 – which means from 2.2 to 3.3 kg/inhabitant/year – and the ratio of e-waste to urban solid waste will rise from 1.2% to 3%.
- With regard to households, the highest demand for electronic and electrical items that become e-waste is for lighting equipment, including light bulbs and lighting

10 Interview with Pablo Sauma, Foundation for Recycling (FUNDARE), 7 June 2010.

11 Neighbouring countries like Chile (CONAMA) and Peru (CONAM–DIGESA) regulate e-waste specifically (e.g. PCs, laptops and mobile phones).

12 For example, the importation code for ink printers is (8443.39.10.00), for laptops (8771.30.00.00) and domestic and electrical batteries (85.06). www.aduana.gov.bo

13 This study offers solid groundwork for e-waste management, focusing on the problem in Santa Cruz, La Paz, Cochabamba, Oruro, El Alto, Montero and Quillacollo. Furthermore, the technical and financial assistance that the foundation offers a number of municipal governments for the management of solid waste and e-waste is significant.

14 Fundación REDES para el Desarrollo Sostenible (2010) *Hacia la conceptualización integral de los RAEE*, working document.

15 According to information from the Agency for the Development of the Information Society in Bolivia, INE included indicators of ICT access and use in the National Household Survey for the year 2010.

16 Interview with Sergio Toro, coordinator of the TICBolivia National Network and ICT4D specialist, 8 June 2010.

17 Published in the EXTRA supplement, 7 March 2010.

18 We appreciate the effort by the Swisscontact Foundation, which provided a copy of its report to complement this report on request.

cables (used in 96% of homes), mobile phones[19] (95%), refrigerators (90%), sound equipment (83%), cathode ray tube (CRT) TVs (77%), and central processing units (CPUs) (76%). The average life span of refrigerators, TVs and sound equipment is between eight to ten years. Monitors, CPUs, mouses and irons have a life span of between four and six years. For mobile phones and light bulbs, the life span is less than three years – light bulbs can even be considered a disposable good.

- Most of the demand from businesses is for telephones (92%), CPUs (83%) and printers (79%). The useful life of these items is no more than four years, reflecting the depreciation policies applied to asset administration. Printers are not kept longer than two years. CPUs and telephones have 3.7 years of useful life.[20]

Action steps

- The design of effective e-waste management policies calls for the effective integration of three key areas: environment (with a focus on the reduction of the impact on the environment), digital inclusion (an integrated, ICT-driven approach to environmental sustainability), and patterns of usage and consumption of ICTs (which should include a focus on civic and environmental education campaigns).
- As e-waste is a complex and multidimensional problem, it is recommended to design and implement trans-disciplinary proposals based on the analysis of the e-waste production chain, including the design of multi-sectoral working methodologies and establishment of multi-stakeholder networks.
- Based on the success of sub-contracting small and medium businesses for urban sanitation, the municipal regulation framework should stimulate small business activities in e-waste management, and explore the possibility of subsidising appropriate recycling technologies.
- To implement the extended producer responsibility model, it has to be complemented with an extended consumer responsibility model through the design of a system that responds to the socio-cultural characteristics of the country.
- It is imperative to design and implement an integrated system of e-waste indicators. ■

19 "As of March 2010 there were 6,145,570 registered mobile phone users. Cultural tendencies show that three out of every ten people replace their mobile phone every year (either due to technical failures, obsolescence/renewal, loss or theft), resulting on average in 1,843,671 discarded mobile phones per year." Fundación REDES (2010) op. cit.

20 Delfín et al. (2009) op. cit., p. 1-2.

BOSNIA AND HERZEGOVINA

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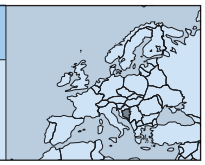

Introduction

It seems that after a long sleep, Bosnia and Herzegovina is waking up and taking a position among the countries that are reflecting on climate change and their contribution to it, and on the role of information and communications technologies (ICTs) in this context. This year, a number of events support this observation. One of them was a regional conference which brought to light two new organisations: the IT Services Management Forum (itSMF) of Bosnia and Herzegovina, which organised the conference, and the Energis Centre for Education and Raising Awareness of Energy. This year also saw the launch of a website on climate change which concluded a long effort by the United Nations Development Programme (UNDP) office in Bosnia and Herzegovina for the adoption of the Initial National Communication (INC) report under the United Nations Framework Convention on Climate Change (UNFCCC). Both events happened in the last days of May 2010. For those following the ICT scene in Bosnia and Herzegovina it has been reminiscent of 2004 when, thanks to the efforts of the UNDP office, the policy, strategy and action plan for the development of an information society were adopted and signed by the Bosnia and Herzegovina Council of Ministers. Furthermore, green civil society actors have been encouraged to use the Aarhus Convention and become more and more visible through the strategic use of ICTs for networking and communication.

Policy and legislative context

Bosnia and Herzegovina signed the UNFCCC in 2000, and a UNFCCC Focal Point was nominated: the Ministry of Physical Planning, Civil Engineering and Ecology of the Republic of Srpska.[1] In 2002, a Climate Change Committee with 32 members was formed, and later on a Bosnia and Herzegovina Sub-Committee for Climate Change was established too. In 2004 Bosnia and Herzegovina formalised its relationship with the Global Environmental Facility (GEF), becoming eligible for technical assistance. Still, due to the weakness of the specific institutional composition of the Bosnia and Herzegovina state, nothing was initiated even after signing, in 2007, the Kyoto Protocol. That year, in December, "to overcome internal technical difficulties of the government in preparing the tender for the INC, it was agreed that the UNDP should take the administrative responsibility for its implementation."[2] Finally, in 2009, the INC was approved at the entities level by the Republic of Srpska, the Ministry of Environment and Tourism of the Federation, and the Bosnia and Herzegovina Council of Ministers at the state level. However, the limited state jurisdiction of the Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina (MOFTER) is still visible, with a vacuum at state level in policy and legislation on the environment.

ICTs and the environment: Fragmented spaces, new possibilities

Government

The Bosnia and Herzegovina mosaic of responsible ministries looks at first sight like a crazy puzzle where pieces are missing or have not been properly shaped, so that it is difficult to build a proper and functional system. Going through the INC report, a very thick and comprehensive document, the final recommendations present the scenario of Bosnia and Herzegovina being strongly dependent on and influenced by international developments which framed the relevant issues of policy. While the report put together multidisciplinary groups, and provides recommendations, the implementation will depend on the Bosnia and Herzegovina government administration. But the risk that Bosnia and Herzegovina's internal institutional fragmentation will act as a major constraint is aggravated by its track record of poor planning, poor investment and poor knowledge. For example, previous strategic documents developed with funds from international agencies such as the UN, World Bank and European Commission, even if drafted in collaboration with the entity authorities, have never become official state documents (of the Bosnia and Herzegovina government) and remain only on paper.

The main question for Bosnia and Herzegovina society is how to make strategies work and how to monitor what has been produced with the support of international funds and expertise. Government accountability is the critical point, shown by the fact that some of the projects designed to reduce CO_2 are considering building small hydroelectric plants. This looks like nonsense in a framework of climate change and environmental protection, since building these

1 Bosnia and Herzegovina encompasses two entities with their own governments and parliaments: the Federation of Bosnia and Herzegovina and the Republika Srpska (also known as the Republic of Srpska).

2 "With reference to the MDGs 7, Achieve environmental sustainability, and 8, Develop a global partnership for development, UNDP is supporting the government to establish the institutional and legislative framework (Designated National Authority – DNA, Clean Development Mechanisms – CDM) and to develop and implement the National Climate Change Plans." UNDP (2009) *Initial National Communication of Bosnia and Herzegovina under the United Nations Framework Convention on Climate Change (UNFCCC)*, Banja Luka, UNDP.

small hydro plants will destroy the biodiversity of the rivers in the country and impoverish its natural resources. It also shows the weakness of both entity ministries responsible for environmental issues, which are not vetoing the plans.

When it comes to green ICTs, there is an apparent absence of strategic thinking, judging by the process of public tenders, which show the tendency of public institutions to buy new equipment (hardware) without any thought to the optimisation of their use to prevent the growth of electronic waste (e-waste) and an increase in energy consumption (e.g. maintenance and cooling of the machines/servers). The initial INC report states that "the most significant source of CO_2 emissions is certainly the energy sector, which contributes 74% of total CO_2 emissions."[3] While waiting for the establishment of a national body to coordinate climate change response, there are four reported Clean Development Mechanism (CDM) projects, created in order to reduce N_2O, CH_4, SF_6 and CO_2. These projects focus on the possibility of obtaining energy from renewable sources (biodiesel, wind power, solar energy and small- to medium-sized hydroelectric power plants), and on better waste management.[4] Since Bosnia and Herzegovina's ICT policy and strategy need to enter a new cycle of planning (the first one covered 2004-2010),[5] there is a window of opportunity for non-state actors (the private sector and civil society) to contribute to setting priorities, plan interventions, or propose cross-cutting approaches. The possibility of working with CDM projects and paying attention to energy issues when it comes to ICT implementation should be explored.

Private sector

Technology requires investment and strategic thinking. The recent regional conference showed an emerging interest in green ICTs from some of the main industry players in Bosnia and Herzegovina, such as BH Telecom (Federation of Bosnia and Herzegovina) and Elektroprivreda Bosnia and Herzegovina (the public energy company in the Federation of Bosnia and Herzegovina). It is important to say that the expertise regarding green ICT solutions is also coming from abroad, from some of the main global vendors: Microsoft, Oracle, IBM and EMC.[2] Even if government representatives did not participate in the conference it is encouraging that two public giants in the Bosnia and Herzegovina IT market have shown interest in saving costs and energy and are developing their plans in this direction. Considering the dependency of a number of small IT companies and IT professionals on these giants, this could start a very positive and interesting trend of green ICT solutions contributing to the better management of existing resources, the localisation of global solutions, and, possibly, the development of original and local responses.

Civil society

When thinking of civil society engagement we need to distinguish between two groups of organisations: environmental organisations, which mainly use ICTs for promoting their goals and focus on quality-of-life standards and respect for natural resources; and ICT organisations, which have their focus on enhancing and introducing green technologies. The latter are also interested in proposing solutions for the management and development of big ICT departments inside ministries and the private sector (e.g. banks, industries). These solutions also look at electrical power consumption for running servers, and consider the short life cycle typical in institutions when it comes to buying and decommissioning hardware. These two types of civil society organisations are still not well networked. Environmentalist organisations focus on monitoring and lobby for development and implementation of green policies, while ICT organisations focus on the relationships with the ICT industry (big vendors and local small and medium-sized enterprises) and IT professionals.

However, collaborations do exist. A good example was the recent collaboration on the Energis Centre for Education and Raising Awareness of Energy and the itSFM, a not-for-profit network organisation that connects IT professionals, vendors and clients. The regional conference on green ICTs held in Sarajevo was the first of this type and had more than 100 participants, mainly IT professionals and the main industry players.

Regional initiatives

In such a divided space, potential connectors are regional initiatives and bodies that offer a framework for public policy development at the national level, and regional projects that foster collaborations between research centres and universities. The latter are a strength and an essential element for connecting the otherwise separated worlds of government, the IT industry and civil society. Three relevant initiatives need to be highlighted: the Regional Cooperation Council,[6] whose active involvement resulted in the

3 "Other emissions sources include agriculture (12%), industrial processes (11%), and waste (3%). In the energy sector, solid fuels-coal make the largest proportion (77%), followed by liquid fuels (17%) and gas (6%). The largest source of CO_2 in industrial processes is iron and steel production, with more than 67%. The main sources of methane are agriculture (cattle breeding), fugitive emissions from coal mines, and waste disposal. The largest amount of N_2O emissions result from agricultural soils through soil cultivation and crop farming. According to the collected data, forests in Bosnia and Herzegovina represent a significant CO_2 sink: 7,423.53 Gg CO_2 for the base year of 1990." UNDP (2009) op. cit.

4 Omićević, A. (2010) *Climate instability: Basic concepts and the situation in Bosnia and Herzegovina.* www.ekoakcija.com/en/content/climate-instability-basic-concepts-and-situation-bosnia-and-herzegovina

5 Konvent (2010) *Treće zasjedanje radne grupe Obrazovanje, mladi i informacione tehnologije.* eukonvent.ba/convent/stream.daenet?kat=48

6 Launched on 27 February 2008 as the successor of the Stability Pact for South Eastern Europe, the RCC is intended to foster regional cooperation and support for European and Euro-Atlantic integration in Southeast Europe. Its work focuses on six priority areas: economic and social development, energy and infrastructure, justice and home affairs, security cooperation, building human capital, and parliamentary cooperation. www.rcc.int

first Ministerial Conference on Combating Climate Change in Southeast Europe, in Sarajevo on November 2008; the Belgrade Climate Change Initiative,[7] which saw the establishment under ministerial agreement of the Southeastern Europe Virtual Climate Change Centre for Research and Systematic Observation, Education, Training, Public Awareness and Capacity Building (SEE/VCCC), a network of national institutions from the different countries which involves, apart from ministries, civil society organisations, scientific institutions and hydro-meteorological services; and the Igman Initiative[8] for the non-governmental sector, which organised an *ad hoc* Energy Forum in Belgrade on the theme "Regional Energy Safety and Solidarity – Challenges and Perspectives" in January 2009.

There are interesting initiatives that focus on improving access to environmental information using ICTs, that could become involved in the implementation of green IT technologies and strategies as a means for improving environmental sustainability. One example is the project of the Regional Environmental Centre (REC)[9] of Bosnia and Herzegovina, which this year in May organised a conference for promoting the Aarhus Convention and its mechanism in Bosnia and Herzegovina. In the same project, the REC together with the Organization for Security and Co-operation in Europe (OSCE) is expected to revamp the section on environment and sustainable development on the MOFTER website. Since access to information has always been critical for civil society organisations, the synergy between the climate change initiatives in the country and an effective use of the Aarhus Convention could eventually bridge the divide between the most active environmental civil society organisations with researchers. In the same direction is the NEWEN[10] project, a very interesting initiative which focuses on establishing environmental curricula in the Southeast Europe region and in Bosnia and Herzegovina. There are four faculties involved in a three-year programme from Tuzla University: the Faculty of Natural Sciences–Department of Environmental Chemistry; the Electro-technical Faculty-Energy and Environment; the Faculty of Mechanical Engineering-Environmental Energetics; and the Faculty of Technology-Process and Environmental Engineering.

New trends

It might be too early to say that there are new trends emerging in our country. What is true is that there are more and more organisations, both from the private and civil society sectors, which have recognised climate change as a relevant issue of development and sustainability.

The database of practitioners[11] created from climate change initiatives in Bosnia and Herzegovina now has 41 entries. Many of them have been taken from the database of the Western Balkans Environment Programme,[12] a regional initiative by the UNDP. According to the UNDP database, eleven organisations from the public, civil society and private sectors, and 45 individuals (researchers, engineers, pollution specialists, etc.) engage on issues such as air pollution and wastewater management in Bosnia and Herzegovina. This represents a good base for starting an advocacy platform with a specific focus on energy and on the intersection of ICTs and climate change, considering the majority of them are involved in measurement, monitoring and renewable energy.

The novelty compared with previous initiatives is that all the information is available on the internet already, and that a few key things are happening at the same time which push for more interaction and collaboration. So the ICT activist is not necessarily breaking new ground. At the same time MOFTER is involved in climate change initiatives and in the Aarhus Convention, universities and research centres are focusing on technology and are investing in environmental curricula, and REC is involved in many of them. It seems that with some additional effort these parallel initiatives could be joined and cross-cutting initiatives shaped.

What is sure is that we are approaching a new cycle for national ICT policy, the preparation of a national policy on climate change together with the Second National Communication to the UNFCCC, and the active promotion of the Aarhus Convention. All in all this constitutes a very specific and encouraging set of circumstances for the development of an advocacy effort which should join the small pieces of the separate worlds of environmentalists, IT specialists and governmental institutions.

Action steps

At this time there is the potential for creating real synergies among the different stakeholders. There is a general awareness and comprehension regarding the power of ICTs as a facilitating tool, as well as a generator of changes and jobs. Moreover, there is an interest in environmental issues that goes beyond the usual civil society actors and includes universities, researchers and industry. The combination of

7 "The Belgrade Initiative's general objective is to support sustainable economic development for the environment in Southeast Europe countries, through attempts to reduce vulnerability to climate change and adaptation, effective implementation of the UNFCCC and its Kyoto Protocol, and the establishment of the Southeast network for climate change research." Dacic, M. and Spasova, D. (2008) Belgrade Initiative on Climate Change, presentation to the Workshop on Facilitation of Climate Policy in CEE and Turkey for the Post-2012 Period, Budapest, Hungary, 13-14 March. tinyurl.com/2a87mp2

8 www.igman-initiative.org

9 *Projekat: Podrška implementaciji Aarhuske konvencije u Bosni i Hercegovini Radionica: Uloga i odgovornosti u implementaciji Aarhuske konvencije u Bosni i Hercegovini, 17-18 May 2010, Sarajevo.* www.rec.org.ba/aarhus%20WS%202010.html

10 NEWEN (Netherlands and Western Balkans Environmental Network) is an environmental cooperation and capacity-building programme with partners from six universities in the Western Balkans and three universities and institutes in the Netherlands. www.newenproject.org/sitegenius/index.php

11 www.unfccc.ba/en/nc-experts

12 The database aims to provide access to a roster of practitioners (i.e. individuals and organisations/institutions who are directly or indirectly related to remediation of environmental hot spots from all participating countries/territories) and to enable the practitioners to offer their services. westernbalkansenvironment.net/index.php?option=experts&task=list

these elements can generate a virtuous cycle for moving from statements and policies into real results on the ground.

To achieve this the advocacy tasks ahead should include:

- Monitoring and following up on the implementation of the recommendations from the INC, which include preparing a national strategy and action plan on climate change and preparation of the Second National Communication report.
- Following up on the nomination of the Bosnia and Herzegovina focal point for communication with the Secretariat of the Aarhus Convention.
- Connecting industry with civil society, and ICT-focused civil society organisations with traditional environmental organisations.
- Raising capacity among environmental civil society organisations on green ICTs.
- Creating an easy-to-access resource/repository platform and following up on the revamp of institutional platforms.
- Involving environmental organisations in public-private partnerships.
- Working with the media to help them understand the intersection between sustainable environment and clean ICTs. ■

BRAZIL

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Introduction

Updated data on the Brazilian information and communications technology (ICT) market point to its strong growth: in 2010, the milestone of 180 million mobile phones was reached, with the expectation of the number of phones exceeding 200 million in 2011, according to data from the Brazilian telecommunications agency Anatel.[1] The sale of PCs increased 23% in the first quarter of 2010 when compared to the first quarter of 2009. In absolute numbers, almost three million PCs were sold in the last three months (as of August 2010), according to data from the Brazilian Electrical and Electronics Industry Association (ABINEE).[2]

On one hand, Brazilian economic growth leads to strong sales, but on the other, estimates on electronic waste (e-waste) disposal point to a decrease in the useful life of these products, due to fast technological evolution and consumerism. Mobile phones are changed at an average of every two years or less, and computers last an average of four years in companies and five in homes.[3]

This scenario in Brazil is confirmed by a recent United Nations Environment Programme (UNEP) study on the management of e-waste in emerging countries. Brazil was presented as one of the countries with a high per capita production of e-waste. And the lack of data on production and recycling resulted in the following criticism: "E-waste seems not to be a high priority for the federal industry association representing the majority of the ICT producing and assembling industries."[4]

Policy and legislative context

It seems that this criticism, among other factors, might have motivated the signing, in May 2010, of an agreement between the Brazilian Environmental Ministry and the NGO Brazilian Business Commitment for Recycling (Cempre) for the creation of the first inventory on production, collection and recycling of e-waste in Brazil. According to Environment Minister Izabella Teixeira,[5] the aim of the agreement is to measure the generation and destination of e-waste in the country. The ministry predicts that the inventory will be finished in four months, and that all companies that are members of Cempre's electrical and electronics committee[6] will take part in it, as well as other associations representing the electrical and electronics sector in Brazil. The study is expected to help further develop public policies for recycling e-waste, and identify the main bottlenecks in the recycling value chain.

Undoubtedly, the great highlight of 2010 in relation to Brazilian environmental legislation was the approval in July of a bill to establish a National Policy on Solid Waste in the Brazilian Senate, after taking 21 years to get through the Chamber of Deputies,[7] and its subsequent approval by President Luiz Inácio Lula da Silva in August, with regulations expected to follow.

The delay of more than two decades can be explained by the pressure of several sectors in society on a subject with numerous implications. More specifically, in relation to e-waste, the industry lobby managed to withdraw the reference to e-waste from the part of the legislation that regulates the mandatory recycling of special products. However, pressure from civil society[8] was able to reinstate the reference, and the legislation now obliges manufacturers, importers, distributors and vendors to collect both used products and packaging. This system also includes batteries, tires and oils.[9]

Moreover, the concept of shared responsibility is introduced in the legislation, involving society, companies, municipalities, and both state and federal governments in the management of solid waste. The legislation establishes that people must adequately pack their waste for collection, and are also responsible for separation in areas where selective collection is made.

The legislation establishes that the national and state governments can grant incentives to the recycling industry. Cities will only receive money from the federal government for projects in public cleaning and handling of solid waste after they approve their management plans. Cooperatives dealing with recycled material were included in the shared responsibility, and will also be eligible for government incentives.

It is expected that the new legislation will finally enforce social responsibility from electrical and electronics

1 Anatel (2010) Data from the mobile telephony sector. sistemas.anatel.gov.br/SMP/Administracao/Consulta/AcessosPrePosUF/tela.asp?SISQSmodulo=18267

2 ABINEE (2010) Mercado de PCs cresce 23% no primeiro trimestre de 2010. www.abinee.org.br/noticias/com05.htm

3 Secretaria do Meio Ambiente do Estado de São Paulo – Mutirão Lixo Eletrônico. www.ambiente.sp.gov.br/mutiraodolixoeletronico/oque_e_lixo.htm

4 United Nations Environment Programme (2009) *Recycling – From E-waste to Resources*, p. 65. www.unep.org/PDF/PressReleases/E-Waste_publication_screen_FINALVERSION-sml.pdf

5 Ministério do Meio Ambiente do Brasil (2010) MMA e Cempre firmam convênio para diagnóstico de reciclagem de eletroeletrônicos. www.mma.gov.br/sitio/index.php?ido=ascom.noticiaMMA&idEstrutura=8&codigo=5770

6 www.cempre.org.br/eletroeletronicos

7 Senado Federal do Brasil (2010) Vai a sanção a Política Nacional de Resíduos Sólidos. www.senado.gov.br/noticias/verNoticia.aspx?codNoticia=103389&codAplicativo=2&codEditoria=2

8 Blog Lixo Eletrônico (2010) *Manifesto Lixo Eletrônico.* www.lixoeletronico.org/manifesto

9 www.camara.gov.br/sileg/integras/501911.pdf

manufacturers, and ensure that society understands the economic potential of e-waste, but also its environmental impact. It is very important to highlight that the stage following the presidential approval of the legislation, the regulation of the law, is a crucial phase in finalising outstanding issues, and creating the kind of framework that was intended by the law.

At the state government level, data from 2009[10] show that eight of Brazil's 26 states have a policy on solid waste. However, e-waste is only mentioned in the policy developed by the State of Pernambuco, while the State of São Paulo has enforced specific legislation dealing with e-waste since 2008. It is expected that from now on, discussions dealing with e-waste will become more and more evident in assemblies, chambers and councils at all legislative levels.

Recovery of e-waste

Isolated initiatives seek to minimise the problem of e-waste. One of the solutions has emerged from the Electronic Computing Center at the University of São Paulo (CCE-USP). In December 2009, an e-waste recovery and processing centre (CEDIR) was opened at the university,[11] following the adaptation of a 400-square-metre warehouse with areas for loading and unloading and a depot for categorising, screening and dismantling.

The Massachusetts Institute of Technology (MIT) Sustainability Lab is one of USP's partners in this project. Besides collecting e-waste, the initiative has resulted in the acquisition of eco-friendly computers manufactured without lead or other heavy metals, and the creation of a green seal of approval, with its own certification, identifying equipment using eco-friendly materials and manufactured in environmentally safe conditions.

Recycling and social inclusion

The federal government has been running another initiative for recycling e-waste since 2004. The Computers for Inclusion Project (Projeto CI)[12] consists of a national network for recycling IT equipment, training and digital inclusion. Equipment discarded by government institutions, companies and households is recovered in collection centres, refurbished, and later donated to telecentres, schools and libraries throughout the country.

The project is coordinated by the Logistics and Information Technology Secretariat of the Ministry of Planning, which establishes local partnerships for the maintenance and recovery of the equipment. Centres have already been set up in the cities of Porto Alegre, Guarulhos, Belo Horizonte, Gama and Recife.

The Science and Technology for Social Inclusion Secretariat has invested in a project that involves the training of approximately 400 people, including students and unemployed people, in the city of Planaltina, located 38 kilometres from Brasília. The group took part in a computer maintenance and assembly course and went on to recover equipment donated by public institutions and universities.[13]

Environmental project for the electrical and electronics sector

The Renato Archer Information Technology Centre, which is connected to the Science and Technology Ministry, is now working on a new environmental project for the electrical and electronics sector.

The project, called *Ambientronic*,[14] is expected to work on four fronts: supporting manufacturers in adapting products, promoting ecodesign, analysing the life cycle of technology, and stimulating the recycling industry's ability to adapt to international practices.

The development of the project proposal started two years ago with the collection of information and workshops with several sectors related to electrical and electronic equipment. One of the practical results was an agreement signed with the Association of Medical and Dental Equipment Manufacturers (Abimo). The pilot project will help companies from this sector secure the appropriate environmental certifications. The intention is to extend this process to the entire electrical and electronics sector.

Action steps

It is the responsibility of society as a whole to deal with e-waste. It may be important to mobilise public opinion in order to ensure that the new legislation on solid waste is regulated, and that proper inspection of e-waste recycling plants is conducted.

Some points that are fundamental to promoting the good management of solid waste in Brazil still need to be discussed:

- The definition of government responsibilities and the responsibilities of consumers.
- The management of orphan equipment acquired on the black market or from manufacturers that are no longer operating.
- Gradual targets: the amount (percentage) over time of e-waste that must be collected and recycled is not defined in the legislation.
- Periodic studies on progress in the management of e-waste and periodic analysis of the efficiency of the law. ■

10 Andueza, F. (2009) *Legislação Brasileira Comparada de Lixo Eletrônico e Resíduos Sólidos.* www.lixoeletronico.org/blog/legislacao-brasileira-comparada-de-lixo-eletronico-e-residuos-solidos

11 Centro de Descarte e Reúso de Residuos de Informática (CEDIR) www.cedir.usp.br

12 www.computadoresparainclusao.gov.br/index.php

13 Ministério da Ciência e Tecnologia (2010) *Brasil busca projetos para redução dos resíduos eletrônicos.* www.mct.gov.br/index.php/content/view/316667.html

14 www.cti.gov.br/index.php?option=com_content&view=article&id=49&Itemid=25

BULGARIA

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Introduction

While key Bulgarian NGO networks such as BlueLink have fostered the use of conventional and innovative information and communications technologies (ICTs) in the work of environmentalists for some time, discussions on electronic waste (e-waste) and ICTs and climate change are just budding in Bulgarian society.

E-waste management is nominally dealt with by national legislation, applying the European Union WEEE (Waste Electrical and Electronic Equipment, or e-waste) Directive,[1] but meets many implementation problems. Moreover, ICT take-up is rarely in focus in climate change and e-waste debates in Bulgaria. ICTs are mainly viewed as a tool for implementing civil society actions for positive change and not as energy-consuming and polluting technology.

However, businesses stress the importance of technology and have actively identified themselves as responsible, climate-conscious and environmentally friendly by minimising their electricity consumption and using low-energy ICTs – which also save money. As a result, the market for "green" technologies has increased. Additionally, due to repeated warnings from the European Commission on inefficient waste management in Bulgaria, e-waste policy implementation has also become topical for both the government and the businesses licensed to recycle e-waste. E-waste schemes have been introduced on the market through trade-in offers that help e-waste management companies keep their quotas up, and also boost sales through more affordable prices on new equipment for the mass consumer.

Policy and legislative context

Since 2008, ICTs in Bulgaria have mainly been associated with the increasing social role of new media (blogs, online media, etc.), and public alarm has been provoked by persistent legislative and policy pressure to infringe on privacy in online communications. Given this background, 2009 and 2010 have been marked by a new government that has not changed the inherited negative processes. It has not attempted to prevent the continuing year-long non-transparent monopolisation in the sphere of traditional and electronic media: 2009 was marked by the termination of electronic media models oriented towards public debate (e.g. RE:TV[2] and Radio France International-Bulgaria).[3] While the freedom of both online and traditional media are pointed out as problematic by international[4] and national[5] observers – in terms of self-censorship and monopolies – internet activists and bloggers provide an alternative. After almost two years of lobbying for changes to the Law for Electronic Communications, new regulations establishing government access to personal online and mobile communications have continued in the direction of the previous government – despite the alternative the new government had promised before the 2009 elections.

The positive effects of the continuing political mishaps in this sphere are the improved capacity of civil society to organise a strong public response and dialogue with various opposition parties in order to prevent drastic legislative changes (e.g. the public protests and information campaign in December 2009 to January 2010[6] against the proposed amendments to the Law for Electronic Communications). The civil protests have been successful in preventing police being granted direct access to traffic data, but have not been able to prevent adding the category "computer crime" to the one of "serious crime" which gives the right to the court to grant investigators access to traffic data.[7] The December/January protest coalition was chaired by a newly founded political party rooted in re-emerging green activism, "The Greens", supported by key figures of the Bulgarian blogosphere. This signalled the important link between environmental causes and ICT usage in Bulgaria.

Equally relevant policy developments are the e-government ICT tools that the government started to apply in line with EU ICT policies. However, e-governance in Bulgaria is mostly aimed at facilitating communication between government and citizens, and the green ICT aspect is overlooked. In early 2010, an integrated e-government platform[8] was introduced by the Bulgarian Ministry of Transport, Information Technology and Communications (MTITC). Another official effort – in line with EU policies – is the EU-funded

1 The WEEE Directive is European Community Directive 2002/96/EC on Waste Electrical and Electronic Equipment which, together with the Restriction of Hazardous Substances (RoHS) Directive 2002/95/EC, became European law in February 2003, setting collection, recycling and recovery targets for all types of electrical goods. More at ec.europa.eu/environment/waste/weee/index_en.htm

2 A Bulgarian private online TV channel focusing on public debate issues. www.retv.bg

3 An analysis by Human Rights Bulgaria is available at humanrightsbulgaria.wordpress.com/%D0%B8%D0%B7%D1%80%D0%B0%D0%B7%D1%8F%D0%B2%D0%B0%D0%BD%D0%B5

4 www.freedomhouse.org/template.cfm?page=251&year=2009; http://en.rsf.org/report-bulgaria,96.html

5 www.svobodata.com/page.php?pid=3094&rid=31; http://ivo.bg/2010/05/30; www.mediapool.bg/show/?storyid=161869

6 www.bluelink.net/en/index.shtml?x=42251; svobodata.org; www.bluelink.net/en/index.shtml?x=42264

7 These amendments were finally voted on in parliament on 17 February 2010.

8 www.bluelink.net/en/index.shtml?x=42490

Operative Programme for Administrative Capacity, which prioritises e-governance projects and e-services for citizens and businesses.[9]

The application of the EU WEEE Directive

The EU directive on e-waste in Bulgaria is widely felt to exist on paper only.[10] The WEEE Directive is intended to both reduce the amount of electrical and electronic equipment being produced and to encourage everyone to reuse, recycle and recover it. The directive stipulates that businesses either do this themselves or delegate the task of recycling any e-waste produced to joint organisations (so called "collective bodies"). In Bulgaria, it is the national administration that oversees the issue, represented by a state enterprise called Environment Protection Action Management Enterprise (PUDOOS),[11] which has traditionally been tasked with administrating green policy projects. This enterprise is the ultimate body responsible for the activities to do with the EU WEEE Directive. PUDOOS annually reports at national level on the product taxes received for e-waste and the volumes of e-waste treated, as well as on the collecting and recycling activities which PUDOOS finances.

Article 17 (3) of the national Act on the Utilisation of WEEE[12] stipulates that a producer must pay a product tax to PUDOOS for its e-waste. In doing so it is exempt from any further responsibility. According to the Bulgarian Association of Electrotechnics and Electronics (BASEL), the tax does not go to the state budget but to an account held by the Ministry of the Environment and Water (MOSV). However, BASEL complains that MOSV does not explain how the product tax is calculated, and suspects that the ministry spends the e-waste product tax on tasks not related to e-waste.

The EU WEEE Directive offers only two possible ways for e-waste management: either the producer company collects its e-waste, or a collective body is created by different companies in order to ensure that the necessary e-waste management activities are carried out. However, in Bulgaria, the companies certified by MOSV for e-waste management are not actually formed as collective bodies on behalf of producers. Another basic issue is that no clear actions have been set for e-waste management.

According to the directive, producers have the obligation to accept equipment when a customer wants to send it back. They need to organise this via contracts with distributors. Producers are also obliged by the directive to finance the collection and recycling of their products. Neither of these actions are now required for Bulgarian businesses.

The extent to which product taxes collected are not being spent on e-waste recycling initiatives is suggested by the fact that in the whole of Bulgaria, there is only one e-waste recycling facility: Nadin, built in 2009 and not fully operational yet. Regarding the treatment of hazardous components in e-waste, Bulgaria mostly exports the components to other EU countries.[13] So we can conclude that no real actions with regard to e-waste are taking place in Bulgaria and regulations only nominally implement the EU WEEE Directive.

However, over the last year licensed recycling companies have significantly grown in number, which gives hope that competition will develop and real services will be offered in the field of e-waste management.

ICTs for environmental causes

Over the past year, government institutions have supported pilot initiatives that use ICTs in environmental protection, in line with environmental policy.[14] However, state support is usually inefficient. It supports civil society projects in its speeches but lacks the budget for concrete action. That is why institutions only agree with but do not react to civil society efforts, such as introducing ICT applications for the environment.

An example of a very successful initiative is *Spasi gorata* ("Save the Forest" in Bulgarian),[15] which has been initiated by BlueLink and supported by leading environmental NGOs in Bulgaria and the Executive Forestry Agency of the Bulgarian government.[16] *Spasi gorata* is an online platform for posting citizens' alerts about suspected illegal logging activities.[17] Illegal logging is high on the public agenda and is an issue raised in the debate over the new Law of Forests. The online posting of illegal logging alerts has encouraged civil society's monitoring of forestry management, and has had a significant awareness and prevention effect in some key forest areas, such as Samokov and Velingrad. However, *Spasi gorata* is not regularly utilised by the Executive Forestry Agency for control and penalties on illegal logging.

The *Spasi gorata* initiative combines traditional and innovative interactive tools requiring online actions that eventually facilitate sustainable participation in the real, "offline" world. It has proven to be relevant to Bulgarian civil society more generally, and similar initiatives have been started elsewhere in the environmental sector.

9 www.opac.government.bg/index.php?option=com_content&view=article&id=534:----31-q----------q&catid=7:closedprocedures&Itemid=3&lang=en

10 www.infoweek.bg/display.php?show_category=10&show_subcategory=10&open_article=1780

11 www.moew.government.bg/funds/nat_env_fund.html

12 www.moew.government.bg/recent_doc/legislation/waste/bg/Naredba_pazarEE.doc

13 See Todorova, D. (2009) *Assessment of E-Waste in Bulgaria After EU WEEE Directive 2002/96*, Master's thesis at the University of Chemical Technology and Metallurgy, Sofia, p. 5.

14 BlueLink's project www.spasigorata.net in partnership with the Executive Forestry Agency, as well as two Nature Park Directorates supporting a business project for GIS data application in the implementation of the EU INSPIRE Directive in Bulgaria. www.ursit.com/all/nasdi/initiative.html

15 www.spasigorata.net

16 www.spasigorata.net/partners

17 An idea similar to *Spasi gorata* was later launched by Google in 2009, but is not yet in use. See earth2tech.com/2009/12/10/copenhagen-google-launches-forest-monitoring-tool

The environmental NGO coalition "For Nature" maintains a highly interactive website[18] and is testing an online ICT platform for volunteer task management. The organisation Veloevolution, which is concerned with promoting sustainable urban transport, uses a variety of ICT instruments on its website,[19] which allow online working groups on specific tasks to be formed. Another action-oriented online platform that allows for online submission of alerts on the misuse of public funds has been created in partnership with BlueLink by the Coalition for Sustainable Use of EU Funds.[20] Over the last year, a network of sustainable education and permaculture initiatives has been formed.[21] Most of its members are located in remote rural and mountainous areas, so their coordination and joint work is mainly done online (shared online calendar, mailing list, etc.). BlueLink is currently working on an online activist platform which aims to address the needs of citizens for online communication and will provide more innovative ICT tools for environmental activism. The platform will be open and available to be used as a communication hub and online activity space for different civic causes, and was anticipated to be available at www.grajdani.eu by the end of July 2010. Similar online initiatives with interactive features have been started by organisations working on education for sustainability, aimed at youth and children.[22]

Apart from civil society, business interest has also been seen in the field of green ICTs, such as the use of geographic information systems (GIS) data in the management of natural resources. A very recent business project was developed in partnership with the administrations of two Nature Parks[23] for the implementation of the EU INSPIRE Directive[24] in Bulgaria. In order to minimise the threat of the monopolisation of environment spheres (e.g. managing all administrative plans in the forestry sector is currently done by the state company Agrolesproject),[25] more public-private partnerships in online GIS data registers are needed.

E-waste management

Until the current government was formed in August 2009, MOSV had monopolised the sphere of e-waste by licensing two business organisations for carrying out all e-waste collection and recycling: Ekobultech and Eltechresource. Though licensed by MOSV as collective bodies for ensuring the necessary e-waste management activities, these two companies had purely contractual relations with the companies producing e-waste and were not created by them. Producers paid their e-waste product taxes to Ekobultech and Eltechresource instead of to PUDOOS, as it was cheaper. In return, their documents (accounting for the quantities of e-waste managed, as obligated under the law) were managed for them by the companies. However, this mechanism was efficient on paper only, and resulted in no real e-waste management practices.

MOSV has significantly raised the number of licensed companies over the last year – there are currently sixteen, the four most recent certificates having been issued since December 2009. The competition seems to be aimed at improving e-waste management services, an observation supported by MOSV's recent cancellation of the licence for one of the new e-waste companies, certified for battery recycling.[26]

The importance of e-waste seems to be more evident for the general public too, and the media has started discussions on the topic. However, it seems that household appliances are currently the most visible part of the e-waste problem,[27] as well as light bulbs and batteries, as suggested by recent developments: a new site for light bulb storage near the town of Targovishte and a battery collection campaign at Sofia University.

In terms of spending the e-waste tax, the total revenue from e-waste taxes that entered the state budget in 2009 is BGN 1,096,011 (approximately USD 702,000), and no e-waste project has been funded in the past year.[28]

With regard to activities by the licensed companies, computer e-waste is being addressed only marginally by some of the e-waste collection schemes (home collections by certified companies after citizens phone them; trade-ins for used equipment at advantageous prices at the stores of partner businesses).[29] Dealing with PC waste in storage has been announced as an upcoming part of the activities at the Nadin plant that was officially inaugurated in June 2010.[30]

Greenwashing and green marketing of businesses in questionable "green" ICT approaches

Since the environmental civil society sector is the most influential one in Bulgaria, supporting green causes adds to the legitimacy of Bulgarian businesses and is an effective model for advertising, aimed at the growing target group of

18 www.forthenature.org

19 velobg.org

20 www.fesbg.org/node/add/signal

21 aliveplaces.org

22 www.futurefriendly.bg and www.gudevica.org/moodle/mod/wiki/view.php?id=391

23 www.ursit.com/all/nasdi/initiative.html

24 The INSPIRE Directive, in force since 15 May 2007, aims to create EU spatial data infrastructure. This will enable the sharing of environmental spatial information among public sector organisations and better facilitate public access to spatial information across Europe. More information at inspire.jrc.ec.europa.eu

25 www.agrolesproject.com

26 www.bluelink.net/index.shtml?x=42654

27 paper.standartnews.com/bg/article.php?d=2009-11-24&article=303091; eltechresource.com; www.ecobultex.com/?page=news&id=20

28 www2.moew.government.bg/recent_doc/funds/predpriatie/godishen_otchet_pudoos_2009.doc

29 www.bluelink.net/index.shtml?x=41800; paper.standartnews.com/bg/article.php?d=2009-11-24&article=303091; news.ibox.bg/news/id_1239947346

30 nadin.bg/?page=dei&id=3&lang=2; www.seenews.com/news/latestnews/bulgarianmetalcompanynadinopens20_5mlneurorecyclingplant-173752

environmentally conscious consumers. This approach has been used by many a controversial business in Bulgaria. For example, the main investor[31] in a ski resort project that led to the deforestation of Pirin National Park has established an "environmental" foundation[32] over the last year to legitimise its new ski investment plan for the Vitosha Nature Park, which again envisages illegal deforestation and construction in a protected area.

With regard to the area of green ICTs, public opinion on technical innovation that leads to environmental protection is positive, as can be seen by the growing number of blogs and civil society initiatives focusing on the topic.[33] In this milieu of green ICTs being a "politically correct" topic, a method for marketing one's label by using the generally accepted "sustainability" discourse can be seen – for instance, by promoting office practices that save electricity, including the use of energy-saving ICT hardware. A similar trend has even appeared in the guise of civil society: promoting green actions (e.g. planting trees) has been accompanied by marketing of specific clothes and food brands, as in the case of the very popular initiative *Gorichka* ("Shrubbery" in Bulgarian).[34] As "green" products are proving a successful model for marketing, ICT vendors stress the fact that their newest products are greener[35] and that is why customers should buy them, even if their old equipment satisfies their needs. This is a business practice that eventually leads to a commodity-driven lifestyle that directly contradicts the logic of green ICTs: saving nature's resources. In general, using more energy-efficient hardware is a positive development in business practice, insofar as it inevitably leads to the lowering of the human impact on the environment. However, it is doubtful whether introducing green ICT hardware would be so popular if it did not lead to economic savings as well.

Action steps

In order for Bulgarian civil society to adequately respond to the recent developments regarding ICTs and environmental sustainability, the following directions should be taken:

- Innovative online action tools for green causes need to be formally recognised by state institutions, and NGO online alerts need to be treated as administrative documents, submitted by citizens.
- State online registers need to be made available, and GIS data needs to be used in environmental protection.
- E-waste management needs more efficient state monitoring, and efficient and innovative plants for treating electronic waste need to be built. To this end, PUDOOS should also be monitored and required to provide evidence that e-waste product taxes are actually being used for e-waste recycling.
- "Green technology", introduced by businesses, should be discussed in view of its real impact on the environment and not only marketed as being vaguely "environmentally friendly". More practical information about the necessity of sustainable technology is needed, and there should be an emphasis on the usability and affordability of green ICTs with everyday consumers in mind. ■

31 www.fibank.bg

32 topbloglog.com/blogs/prirodata.com

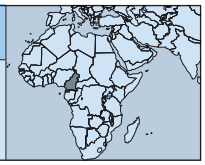
33 E.g. greentech-bg.net; greenjotter.org; www.passive.bg; www.bpva.org

34 www.gorichka.bg

35 E.g. Philips, with the words "sustainability" and "green" repeatedly displayed on their homepage in all languages (www.philips.com/global/index.page) and Siemens boasting of their "environmental portfolio" (www.siemens.com/about/en/worldwide/bulgaria_1154594.htm) and "[s]ustainability as a central pillar of our corporate strategy" (www.siemens.com/entry/cc/en).

CAMEROON

PROTEGE QV
Emmanuel Bikobo, Serge Daho and Sylvie Siyam
www.protegeqv.org



Introduction

Our society has entered an era where information and communication, previously conveyed by means based on fairly renewable resources (paper, words, etc.), now use "electronic" conveyors.

Information and communications technologies (ICTs) have an image of being "clean technologies". They can be a catalyst for the development of poor countries. Given the impact of their use in rich countries, it is certain that Africa can prosper thanks to these technologies. The current problem is that they consume energy, produce more and more waste which is difficult to treat,[1] and spread toxins impossible to recover.

According to United Nations (UN) statistics, electronic waste (e-waste) amounts 20 to 50 million tonnes per year globally. And a Greenpeace report claims that half of this "electronic junk" is sent to the developing countries.[2] In Cameroon, the government's commitment to improve access to new ICTs in order to reduce as quickly as possible the digital gap between the North and South has resulted in the arrival in the country of hundreds of thousands of second-hand computers with a reduced life span. This has contributed significantly to an increase in e-waste.

What becomes of them? Who is in charge? What are the channels for distribution and disposal? What are the contributions and responsibilities of different actors, companies, local authorities, associations or consumers? Is there a danger of pollution? Do these computers contribute to the fight against the digital divide?

There are many questions to which we need to find answers. The objective of this report is to begin to shed light on the environmental aspects of digital infrastructure in Cameroon, focusing on the management of e-waste.

National policy

The Cameroonian policy landscape on e-waste is still very poor. In fact, e-waste is given very little or even no attention in our country. The National Waste Management Strategy is the sole body of rules broadly dealing with waste. The strategy lays out principles such as the principles of sustainable development, the principle of "polluter pays", the principle of equity and the right to information, and that the public should be aware of the dangers of dealing with waste. These principles derive from Law No. 96/12 of 5 August 1996, dealing with environmental management in the country.

Legislative context

There is no specific legislation dealing with e-waste in Cameroon. Nevertheless, various laws can be read to impact on e-waste. First of all, the country's constitution, in its preamble, states that: "Every person shall have the right to a healthy environment. The protection of the environment shall be the duty of every citizen. The state shall ensure the protection and improvement of the environment."

Secondly, Law No. 89/027 of 29 December 1989 deals with hazardous and toxic materials,[3] mainly in its Article 42. Thirdly, Law No. 96/12 of 5 August 1996 deals with the legal framework for environmental management.

Cameroon has also ratified the Basel Convention[4] (on 11 February 2001) and is part of the Bamako Convention related to the prohibition of importing hazardous or toxic materials into Africa.

Overall, Cameroon's legislation has yet to deal properly with hazardous waste. The National Waste Management Strategy concerns itself primarily with categorising waste, but has not looked specifically at how to sort out different kinds of wastes such as plastics or e-waste.

E-waste entering the market

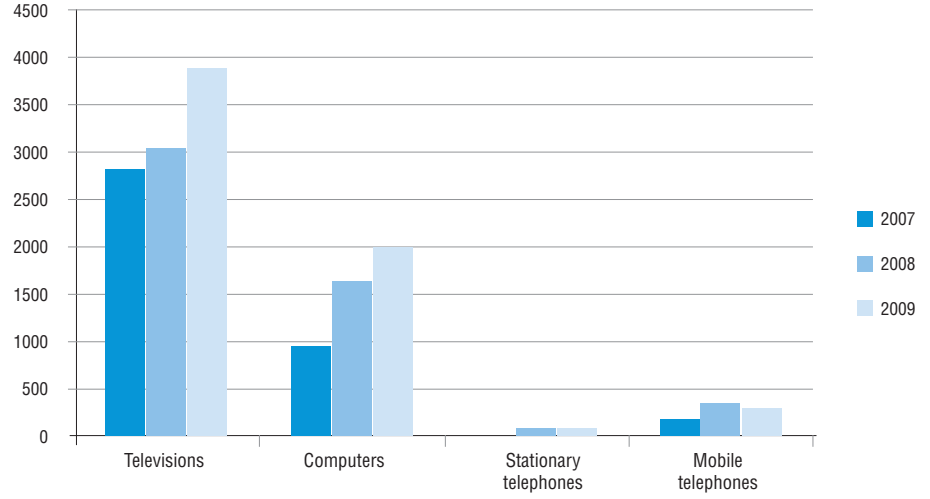
Cameroon does not manufacture ICT equipment; the country imports these products through various channels.

While there are regular importers, which work via other African countries, countries in the Middle East, Europe and the United States, a lot of equipment comes into the country as a result of migration to other African countries and throughout the diaspora. The informal market is supplied by the equipment sent by families residing in Europe or the United States to their relatives, after first use.

Moreover, thousands of "obsolete" computers pour into the country disguised as donations to institutions, NGOs and associations. In 2003, World Computer Exchange (WCE), an NGO working in the educational sector, delivered, via the United Nations Development Programme (UNDP), containers of 200 to 400 second-hand computers.[5] In 2007 the organisation Computer Aid International sent a large number of recycled computers to Cameroon (some 44 containers with 225 computers in each).

1. Finlay, A. (2005) *E-waste challenges in developing countries*, APC, Johannesburg.
2. Cobbing, M. (2008) *Déchets électroniques: Pas de ça chez moi*, Greenpeace France, Paris.
3. The law states that waste will be dealt with to reduce its harmful effects on human health, the environment and natural resources.
4. The Basel Convention seeks to restrict the movement of hazardous waste between countries, specifically from developed to developing countries. It is also concerned with waste minimisation and the environmentally sound management of waste.
5. UNESCO (2003) Rapport final de la première réunion internationale des spécialistes sur les nouvelles synergies pour le recyclage des équipements de technologie de l'information, Paris, France, 14-15 March.

Table 1. **ICT equipment entering the Cameroonian market (in tonnes)**



According to Cameroonian customs authorities, the import of new and second-hand computers into the country was estimated to be 3,949 tonnes in 2007 and more than 6,240 tonnes in 2009. However, this does not distinguish between new and used computers. But, from observation, most of these computers are used, given the large number of flea market stalls selling second-hand computers in Cameroon.

Table 1 shows the distribution of total tonnage of ICT equipment put on the market, by category and year (based on figures from Cameroonian customs).

The data recorded at customs reflect a global trend of increasing imports of computers, televisions and mobile phones of about 33% overall. This may increase to more than 40,000 tonnes of e-waste entering Cameroon in the years to come.

Market exit

End-of-life technology becomes e-waste if not repaired or reused. It then changes its status from second-hand or third-hand "product" to "waste". Some of this waste is stored in offices, government buildings and homes. Some is sent to landfills or incinerated, which affects the environment and health.

In Cameroon, the amount of end-of-life equipment is increasing, because of an increase in the number of users, but also because most of the products bought are second-hand.

According to Law No. 96/12 of 5 August 1996 concerning the legal framework on environmental management, waste "is considered any residual waste from a process of production, processing or use, any substance, material, product, or more generally any personal property abandoned or that the holder intends to discard."

Following discussions and debates related to the classification of waste, a typology for a waste management strategy was adopted that included:

- Household and similar waste (municipal solid waste, toxic waste in dispersed quantities, liquid household wastes, sewage, and gaseous wastes)
- Industrial, commercial and artisanal waste
- Hospital waste.[6]

The average production of general waste per person per day is between 500 g and 600 g in Cameroon. As a result, the daily quantity of solid household waste products throughout the territory is estimated at 9,545 tonnes for the total population (17,354,431 inhabitants), or a total of 3,483,902 tonnes per year.[7]

Although no legislation deals specifically with e-waste, it is found predominantly amongst industrial and commercial waste, as well as, to a degree, in household waste. According to our interviews, repairers discard little of their e-waste for fear that the owners of the devices they have repaired may come back to claim the discarded waste. Similarly, it is difficult to get households to clear out their e-waste because of the perceived value of old technology, and the high cost of new technology.

6 Government of Cameroon (2008) *Stratégie Nationale de Gestion des Déchets au Cameroun (période 2007-2015).*

7 Ibid.

Reuse

The systematic reuse of discarded technology is difficult without an effective collection system.[8] On the other hand, be they computers, televisions or mobile phones, they are recovered by some business, for instance Popular Electronics, where training occurs on the job. Their tools are basic: a screwdriver, brush, tongs, wax and soldering iron and, for the richest among them, a tester, which is more or less reliable, to ensure the refurbished equipment works well. Circuit boards are stored for easy reuse, and equipment is repaired several times before being finally abandoned.

Recovery and recycling

In Cameroon, plastic casing for things like computers is burned or discarded. There is no capacity for metal recycling. We also did not find any smelting activities to reclaim metals such as in other emerging countries like South Africa or China. Toxic compounds and precious metals have no other fate than ending up in the environment, with the consequences that follow.

End-of-life mobile phones are often found in rural areas. Old casings and used-up batteries are often found in the street, or on landfills where waste pickers collect them. The current waste management system is not suited to this type of material. It is created, rather, for the management of biodegradable waste or solid waste (i.e. construction materials).

Given the problems posed by the inclusion of e-waste into the general waste stream in Cameroon, the consequences must be taken seriously. The management of e-waste in Cameroon is still in its infancy, and there remains much left to do.

Impact on health and the environment

Unfortunately there are no mechanisms in Cameroon to monitor and fully appreciate the problems posed by e-waste on health and the environment. Furthermore, no study on the problems posed by e-waste in Cameroon has yet been conducted. However, we believe that the data on the health and environmental impacts of e-waste generally apply perfectly to Cameroon. As a result, areas where there is the public disposal of industrial waste are strongly suspected of being contaminated by polychlorinated biphenyls (PCBs). Examples of these areas include the Ngousso "open pit" (Yaounde) and sites at Makepe (Douala) and Nkolfoulou (Soa Yaounde).

Impact on the economy

It is difficult at present to determine the economic impacts of the e-waste sector. No studies have been conducted on the pollution level at the collection sites to determine the possible costs of decontamination.

Otherwise, this industry has had positive economic impacts by improving incomes through job creation. There remains potential to integrate actors of the informal sector into the recovery and recycling of e-waste.

It is true that Africa generally, and Cameroon in particular, should not be a dumping ground for unusable second-hand equipment, but given the standard of living of the population and the political will of governments to fight the digital divide in order to develop the continent, would this second-hand e-waste not be an asset to exploit? Particularly if some measures are taken on setting up structures for both reuse and recycling?

Action steps

Given the results obtained from our research, and in order to work towards a better understanding and management strategy of e-waste and its damage to human health and the environment, we propose:

- Lobbying actors in charge of waste management in Cameroon to develop an appropriate national policy, regulatory and legislative framework for e-waste.
- Lobbying the government for the establishment of an official system of collection and storage of e-waste to help with monitoring and environmentally sound disposal.
- The systematic sensitisation of different actors on the dangers posed by e-waste.
- The promotion of collaboration between the public and private sector and the involvement of civil society in the development of an effective education programme.
- Strengthening the technical capacities of resource persons to conduct an inventory of e-waste with the view of elaborating sectoral strategies and plans for managing e-waste in Cameroon.
- Conducting a study of certain public dumping sites and repairers' workshops, to better appreciate the impact of e-waste on workers in these places. ■

8 Ibid.

CHILE

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Introduction[1]

As is the case in the majority of countries in Latin America, Chile does not yet have specific regulations or laws related to electronic waste (e-waste). A crucial aspect to understanding this challenge is related not only to political will on this issue, but also to a lack of a national vision and strategy around recycling and disposal of dangerous and toxic waste materials and products.

Some steps were taken in order to prepare regulations for hazardous and toxic waste, which included e-waste. However, with the recent change to the new administration of President Sebastian Piñera, and the unexpected consequences of the earthquake of 27 February in central and southern Chile, it is not clear when this legislation will be ready to be adopted.

Since 2004, the Regional Platform on Electronic Waste for Latin America and the Caribbean (RELAC Platform),[2] a civil society initiative, has been working to systematise information, research and studies in this area, and has created a public-private working group to promote the implementation of an e-waste management system in Chile. This includes a voluntary agreement with international companies in order to reduce their e-waste and to help build recycling capacity as part of their "extended producer responsibility".

In this context, we have identified at least two e-waste recycling companies in Chile, two initiatives in the area of computer refurbishment, and some non-profit initiatives that are promoting mobile phone recycling to help charity organisations.

Policy and legislative context

The Chilean constitution guarantees the right to life, the right to health, and the right to live in an environment free of pollution, among other fundamental rights. The constitution also provides an expeditious judicial remedy against illegal and/or arbitrary conduct that jeopardises those rights. However, the absence of specific legal provisions on e-waste reduces the efficacy of the constitutional provisions on the matter.

In 2003, Chile adopted specific regulations for dangerous and toxic waste which set health and safety measures for the storage, transportation, reuse, recycling and processing of hazardous residuals. Later, in 2007, domestic waste regulations were adopted. However, Chile does not yet have specific legislation for e-waste. Therefore, any initiative that intends to work with e-waste must fall under the standards related to toxic waste, which seem inappropriate to handling the recycling of e-waste, and increase costs and paperwork for e-waste recycling initiatives.

In Chile there is no national public strategy dealing with domestic recycling (despite the regulations), but over the last twenty years the country has made important improvements in domestic waste disposal facilities, as well as at the level of treating industrial and hazardous waste, according to the National Environmental Commission (CONAMA).[3] Today about 60% of waste disposed is processed in appropriate facilities, both from an environmental and health perspective. Thanks to advances in solid waste management policy, the country is moving towards goals aimed at reducing waste generation and encouraging reuse. Since 2005, Chile has had an Integrated Solid Waste Management Policy. Its Plan of Action is implemented, evaluated and, if necessary, reformulated by the National Waste Executive Secretariat, an entity formed by various state agencies.

In addition, CONAMA has developed guidelines for processing waste. By 2010, guidelines were available for industrial oil waste, lead batteries, and hazardous waste. However, there are neither guidelines nor best practices available for e-waste.

Today, the e-waste management market is still limited, focusing mainly on the recovery of equipment to extend its use in social projects, and on disassembly and export of parts for recovery in industries outside the country. This waste is now legally classified as hazardous due to the presence of toxic components.

E-waste in Chile: Getting recycling off the ground

CONAMA has estimated that Chileans discard over 7.5 million units of electronic equipment (computers and accessories as well as mobile phones) every year – the equivalent of about 8,000 tonnes. It also estimates that since the 1990s, more than 13 million mobile telephones have become obsolete. Given an average weight of 200 grams each, this translates into 2,600 tonnes of e-waste.[4]

According to international statistics, with a growth of 407%, Chile is No. 13 in the world in the ranking of countries that have experienced the highest growth in number of computers per capita in the period 1993-2000. A study conducted by the RELAC Platform estimates that by 2010, Chile will have 10,500 tonnes of computer waste.

1 The authors want to thank Uca Silva, coordinator of the RELAC Platform project, for her time and collaboration in this report.

2 www.residuoselectronicos.net

3 www.conama.cl

4 www.conama.cl/rm/568/article-38368.html

One of the major obstacles to having regulations on e-waste is the lack of good alternatives for its collection and treatment. It is expected that during the coming years this challenge will became a central part of the environmental agenda of the country as well as digital development goals. Since 2009 Chile has been a member of the Organisation for Economic Co-operation and Development (OECD), which demands the implementation of a legal framework that regulates the management of e-waste.

One of the major civil society initiatives to promote public and private work in this area is the RELAC Platform, coordinated by the Chilean NGO SUR. It has been working since 2004 all over Latin America. In Chile, RELAC, in collaboration with CONAMA, has made important contributions towards systematising information and conducting research and studies at country level, such as a report on electronic products and waste in Chile. As a result of its work, in February 2009 a voluntary agreement was signed by four technology companies that committed to an extended producer responsibility programme.

Uca Silva, coordinator of the RELAC Platform, says that although local legislation and regulation is very important, the major information and communications technology (ICT) companies have very specific corporate mandates in the area of e-waste, in line with global company policies. Any local legislation must be compatible with these global norms in order to have the commitment of these companies.

In relation to formal electronic recycling companies, only two have authorisation to operate, with good installations and professional processes according to international standards. The existing system of computer recycling involves disassembling them, thereby recovering valuable elements that have a national market or exporting fraction to treatment plants outside of Chile. Fraction that cannot be sold should be disposed of in line with current regulations in authorised landfills.

Recycla is one recycling company that has received many awards, recycling anything from mobile phones to industrial telecommunications systems. Their process includes collection, dismantling and classification according to different materials (especially aluminium and copper) and toxicity level. They have international partners (like the Swedish company Redoma) and promote education through their website.[5] Another recycling company, Degraf,[6] receives e-waste which is disassembled, then recyclable fraction is separated from hazardous components. It is important to note that both companies operate only in the city of Santiago.

There are also a number of initiatives that promote the refurbishment and recycling of PCs and mobile phones on a small scale. However, they need to be coordinated and supported in order to have an impact on a national level. There are two computer refurbishment initiatives (Chilenter Foundation and the Committee for the Democratisation of Information Technology) that recover computers with certain specifications. These are then donated to schools and other social and non-profit organisations, contributing to reducing the digital divide.

Chilenter Foundation[7] is a non-profit institution founded in 2002, and part of the Network Foundations of the Presidency of the Republic. To date they have refurbished over 15,000 computers, benefiting 1,200 schools, day care centres and social organisations of different types. Currently, they are working with Computer Aid International, a UK non-profit organisation that has years of experience in this area.

The Committee for Democratisation of Information Technology (CDI) Chile[8] is a non-profit organisation and a member of an international network of social enterprises, founded in Brazil in 1995. CDI works in digital literacy programmes for digitally excluded communities and sets up community telecentres as part of the Chilean Telecentre Association Network (ATACH). Through its campaign "Donate Your Computer", it collects computers that are no longer used to be refurbished in recycling plants located in educational institutions. These are then used in its own digital schools and telecentres, but also in other educational and non-profit projects. CDI Chile is also part of the Donatec Project,[9] an initiative of several Chilean NGOs that promotes technological donations, in software and hardware, by major companies.

In addition, the Children and Cancer Foundation,[10] another non-profit organisation, uses a local video club network to promote a recovery and recycling campaign for old mobile and computer equipment, as a means of raising funds for the organisation.

The Chilean branches of Movistar and Nokia collaborated recently to create a recycling programme for discarded mobile phones, no matter the brand. These are collected in boxes specially created for the purpose, which are located in Movistar offices around the country. The phones are sent out of Chile in order to recycle their components (displays, integrated circuits, speakers, microphones, cases, batteries and accessories). Another collaboration is that of the telecom company Entel PCS and the Hogar de Cristo Foundation.[11] They launched a solidarity campaign to raise funds to benefit the Foundation, encouraging all mobile phone users to donate phones that have become obsolete. These are collected at different branches of the company, shopping centres and community centres, amongst other locations.

5 www.recycla.cl

6 www.degraf.cl

7 www.chilenter.cl

8 cdichile.org

9 www.donatec.cl/about-pngoprogramme

10 www.ninoycancer.cl

11 www.entelpcs.cl/noticias/01foto.iws?id_noticia=55

New trends

An interesting experience in Chile has been the work of RELAC as a platform that opens up the debate around producer responsibility, and also is an opportunity to create trust and coordination among actors that generally do not work together in this area.

There are a growing number of initiatives and projects that promote the refurbishment and recycling of PCs and mobile phones. Although these are not enough to really create an impact at the national level, they show the willingness of companies to take action and also the interest from people in having more options to recycle their old technology.

Action steps

Given the size of the Chilean economy, it seems necessary to work on a common solution for the e-waste problem – at least at the Latin American level. This includes the adoption of harmonised legal frameworks and public policies across the region.

However, before the adoption and implementation of public policies and legal rules, it is necessary to work on capacity building in the civil society, public and private sectors. The number and capacities of actors in the country are still limited, which undermines the efforts and results of the few initiatives already existing. Organising seminars, conducting research, and developing guidelines, among other things, could still be appropriate initiatives given the level of the discussion in the country.

The continuity of the RELAC Platform project in Chile, as well as in the Latin American region, is crucial in order to promote and increase research and the coordination of the different actors that can work together looking for new and better solutions, beyond legislation. ■

COLOMBIA

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Introduction

According to an electronic waste (e-waste) assessment in Colombia[1] conducted recently by the National Centre for Cleaner Production[2] and the Swiss Federal Laboratories for Materials Testing and Research (Empa),[3] it is estimated that Colombia could accumulate between 80,000 and 140,000 tonnes of e-waste between 2010 and 2013 – waste that will be dumped in the country's landfills. For Colombia's current population of 44 million people, it would mean around 3.18 kg of e-waste per capita by 2013. According to the same study, it is estimated that in Europe, e-waste generated amounts to 15 kg per capita and in China 1 kg per capita.

It is a matter of urgency for the country to regulate its e-waste management, even more so given that the recycling of old technology could save the country large amounts of resources such as copper (the same study estimates that each tonne of waste contains 6.6% copper by weight). Moreover, regulations must differentiate between the handling of non-hazardous solid waste and hazardous waste,[4] which Colombia does not do now.

It is the right moment in Colombia to implement a system of e-waste management, taking into account that the amount accumulated to date is relatively small compared with the waste expected to be accumulated in the years ahead.

In May 2009, three bills[5] were presented to the Congress related to e-waste management, which have as objectives:

- To establish guidelines for the development of public policy aimed at regulating the management of e-waste, and to establish the extended responsibilities of importers, producers, distributors and final users within a comprehensive e-waste management system in Colombia.
- To implement the collection of e-waste, including batteries, by manufacturers.
- To establish guidelines and policies for the implementation of comprehensive solid waste management plans, including seeing recycling as a resource tool for all.

It is important to note that presently e-waste recycling is carried out informally, and in several of the legislative proposals informal recyclers are excluded. Despite this, the Colombian Supreme Court halted a tender for the management of solid waste in Bogota because it did not include a significant number of informal waste recyclers in the process. This decision shows how important it is to involve them as recognised actors in the production chain.[6]

General environmental policy and legislative context

Colombia has been setting up and strengthening legislation for the protection of the environment and has established governance policies and instruments in order to control the use of the country's natural resources. The principles of the Declaration of the United Nations Conference on the Human Environment (Stockholm Declaration) of 1972 are embodied in Colombia by Decree Law 2811 (1974) on the National Code of Renewable Natural Resources and Environmental Protection. The new Constitution of Colombia adopted in 1991, in Title II, Chapter 3, clearly sets out collective rights and environmental rights.

Every four years since 1974, the National Council on Economic and Social Policy (CONPES) has been updating its environmental policies, which are included in the national development plans. This is the highest national planning authority and works as an advisory body to the government on all aspects of economic and social development in the country.

Climate change policy

Climate change policy is focused on the study and protection of vulnerable areas already known to be rapidly deteriorating, such as the glaciers, volcanoes, wetlands, high mountain plains, the Amazon jungle, and so on. These projects and processes are focused on the objectives of United Nations (UN) climate change initiatives, but also include components specific to Colombia.

In 1994, Law 164 approved the UN Framework Convention on Climate Change (UNFCCC), and the issue was included in the country's development policies in order to attract foreign investment in the area of climate change and carbon dioxide capture.

Colombia has defined the issue of adaptation to climate change as a national priority, and the Integrated National Adaptation Plan for High Mountain Ecosystems, Caribbean Insular Areas and Human Health (INAP) was the first climate change adaptation project submitted to the Global Environmental Facility (GEF) in 2005. INAP aims to fund projects that will serve as examples of the transition between the

1 www.cnpml.org/html/archivos/GuiasDocumentos/GuiasDocumentos-ID22.pdf

2 www.cnpml.org

3 www.empa.ch

4 www.andesco.org.co/site/assets/media/Lineamietos%20tecnicos%20para%20RAEE.pdf

5 raee.org.co/proyectos-de-ley

6 Informal recyclers, who have joined together in the National Association of Recyclers, are demanding to be taken into account in the legislative proposals. www.anr.org.co

stage of climate change impact assessment to the stage of formulating and implementing adaptation measures. INAP funds three specific activities:

- Formulation of adaptation programmes
- Implementation of priority measures for adaptation
- Monitoring and evaluation systems.

INAP is implemented by the Institute of Hydrology, Meteorology and Environmental Studies (IDEAM),[7] with the participation of autonomous regional environmental agencies. Other entities involved in INAP are the Ministry of Environment, Housing and Territorial Development,[8] the Ministry for Social Protection,[9] the National Institute of Health,[10] the Ministry of Mines and Energy,[11] the Ministry of Foreign Affairs,[12] the Alexander von Humboldt Biological Resources Research Institute,[13] and representatives of the country's academic and scientific communities.

E-waste in Colombia

Policy context

According to an analysis of potential e-waste legislation: "Colombia is a country prolific in terms of regulations. The Comptroller General's Office has identified more than 3,000 existing rules on environmental issues."[14] However, the country does not yet have specific legislation dealing with e-waste.

Since 2001 Colombia has provided a tax exemption (Decree 2532 of the Ministry of Finance and Public Credit, 27 November 2001) to encourage the use of technology that benefits the environment and health.

In 2005 the Ministry of Environment, Housing and Territorial Development submitted a policy paper entitled "Environmental Policy for Waste Management and Hazardous Waste". This policy paper contains several objectives and long-term goals, as well as an initial action plan. However, here too, the paper does not take e-waste into account. The paper refers to the concept of "common but differentiated responsibility", which was already considered in Law 430 of 1998 regarding hazardous substances. Law 1252 of 2008 extends the concept of the issue of liability, including dangerous substances, and these concepts can be applied to the issue of e-waste or general waste.

In Colombia there is an institutional programme for educational and technological achievement in electronic waste management called *Computadores para Educar* (Computers for Education),[15] whose founding members are the Communications Fund of the Ministry of Information and Communication Technologies, the Ministry of Education, and the National Learning Service (SENA).[16] The purpose of the programme is to provide access to information and communications technologies (ICTs) to public educational institutions through the refurbishment of computer equipment donated by private companies, government agencies and individuals, and to promote their meaningful use in educational processes.

E-waste in practice

Colombia has been implementing several initiatives to recover e-waste, led mainly by the Ministry of Environment, Housing and Territorial Development. These initiatives include the recovery of mobile phones and their accessories, as well as lithium-ion batteries, used computers and peripherals, and toner and printer cartridges; the recycling of refrigerators (including recovery of refrigerant gas to prevent damage to the ozone layer); and encouraging consumers to switch to energy-saving light bulbs, among others.

The initiatives by the ministry started around 2000 with the recycling of mobile phones with the support of operators and manufacturers. However, the most important campaigns for recycling e-waste started in 2007.

Between June 2007 and November 2009, the ministry recovered 3,290,006 units of used mobile equipment: mobile phones themselves, assorted accessories and lithium-ion batteries (378,632 units).

Two campaigns related to the recovery of computers and peripherals were able to recycle 5,822 units in 2008, with the support of supermarkets, private recyclers and other governmental organisations; 41% of the units were recovered in the capital, Bogota.

A major one-month campaign took place during 2009 to recover all kinds of e-waste in four major cities (Bogota, Cali, Barranquilla and Medellin), leading to the recovery of a total of 465 tonnes of waste.

As mentioned, other campaigns include the recycling of toner and printer cartridges and a drive to switch to energy-saving lightbulbs.

The recovered e-waste is recycled mainly by private companies: Lito,[17] Gaia Vitare[18] and Recycables.[19]

Future campaigns should be aimed at ensuring the active participation of civil society in the recycling of electronic materials. These campaigns should raise community awareness on the importance of recycling. It is also important that these campaigns promote companies that produce electronic products that are environmentally friendly such as green phones (i.e. phones that use solar energy to recharge).

7 www.ideam.gov.co

8 www.minambiente.gov.co

9 www.minproteccionsocial.gov.co

10 www.ins.gov.co

11 www.minminas.gov.co

12 www.minrelext.gov.co

13 www.humboldt.org.co

14 Ott, D. (2008) *Gestión de Residuos Electrónicos en Colombia*, p. 30. www.cnpml.org/html/archivos/GuiasDocumentos/GuiasDocumentos-ID22.pdf

15 www.computadoresparaeducar.gov.co

16 www.sena.edu.co

17 www.litoltda.com

18 www.gaiavitare.com

19 www.recycables.com.co

New trends

There are concerns in the region regarding e-waste. For instance, in Mexico, it is reported that the country is drowning in e-waste, generating between 200,000 and 300,000 tonnes of e-waste per year, enough to fill up 100 Olympic swimming pools. It is estimated that by 2013 the consumption of electronic devices in Mexico will increase by 20% per person,[20] leading to even larger amounts of e-waste.

No country in Latin America will escape this trend, largely due to the reduction in price of electronic equipment, and the shortening of its useful life.

Action steps

There is very little information available regarding the situation of informal recyclers in connection with e-waste. It is important that the country consider the experiences of countries such as India in tackling the problem of recycling by providing technical assistance and transfer of knowledge to informal recyclers in order to improve their living conditions.

Equally important is the mandatory availability of producer information on the internet regarding their recycling processes, so that formal and informal recyclers know the best way to recycle.

Although the Ministry of Environment, Housing and Territorial Development and private companies have joined the e-waste management campaigns, it is necessary to put in place mechanisms in order to ensure that these campaigns become permanent – and not just once-off – so that citizens and companies all over the country (not only in the major cities) who are interested in recycling e-waste can do so at public collection centres and other places.

Colombia has efficiently implemented reuse models for computer equipment through its *Computadores para Educar* programme. It is very important to strengthen these kind of initiatives, not only to encourage the reuse of equipment, but also to ensure that the final disposal of the same equipment is the most appropriate.

It is important to be up to date on how e-waste recycling is carried out in developing countries that generate high volumes of waste, in order to adopt the best practices for recycling.

We must insist on the involvement of all stakeholders (producers, vendors, informal and formal recyclers and end-users) involved in the process of managing, handling and disposal of e-waste.

The phenomenon of climate change is being felt in the three mountain chains of the Andes in Colombia. The permanently snow-covered mountains that in the 1970s allowed Colombian tourists to plan ski trips are rapidly disappearing.

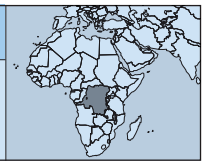
Colombia produces only 0.35% of global CO_2 emissions, but we are already suffering the effects of global warming. The country supplies 66% of the hydroelectric power produced to its neighbours. This does not directly generate greenhouse gases but has caused untold damage to the environment and biodiversity loss, and in many cases the extinction of unclassified species.

Colombia will increase its energy production by 50% in the next eight years, in order to sell to neighbouring countries. These projects are affecting the environment and forcing the displacement of poor people by multinationals. The cost related to adapting to the changes resulting from power generation will not be compensated by the royalties paid to the owners of the projects. ■

20 www.bbc.co.uk/mundo/ciencia_tecnologia/2010/06/100603_basura_electronica_mexico_mr.shtml

CONGO, DEMOCRATIC REPUBLIC OF (DRC)

Alternatives; University of Cape Town
Michel Lambert and Antoine Bagula
www.alternatives.ca; www.uct.ac.za



Introduction

As key players in the earth's carbon cycle, tropical rainforests contain a myriad of living organisms that use photosynthesis to remove carbon from the atmosphere by incorporating it into organisms that respire by breaking down carbohydrates. While the role of undisturbed tropical forests as a net source or sink of carbon is still debated by the scientific community, global warming is widely recognised as a result of the effects of a human-driven deforestation process whereby the carbon stored in the wood is released into the atmosphere when forests are cleared for crop or grazing land. This leads to the soils becoming a large source of carbon emissions that exacerbate the greenhouse effect, depending on how the cleared land is managed.

Stretching across the heart of Africa, the tropical rainforest of the Congo Basin has the greatest expanse of rainforest in all of Africa. Located in the heart of the African tropics, the Democratic Republic of Congo (DRC) is custodian to the world's second largest area of tropical rainforest after South America's Amazon rainforest, covering 58.9% of its territory and storing 8% of global forest carbon. The DRC tropical rainforest is a true natural treasure, home to over a thousand species of plants and hundreds of species of mammals, birds, reptiles and amphibians, and which enjoys considerable leverage in attracting the international mobilisation of funds to mitigate greenhouse gas (GHG) emissions.

As a country with almost universal extreme poverty, with 70% of its population living on subsistence rain-fed farming and non-timber forest activities, the DRC faces numerous climate change-related challenges. These include:

- The uncertain and unreliable predictions of climate computer models
- Little consistency in projections of rainfall patterns in its four climatic zones
- The impact of higher temperatures on the sensitive tropical ecosystem of the rainforest attracting little attention in reports about climate change in DRC
- The effect of deforestation on micro-climatic conditions in the forest region.

Alignment of the DRC to the REDD mitigation and adaptation strategies

Mitigation of climate change consists of reducing the amount of future climate change using activities that reduce GHG emissions, or enhancing the capacity of carbon sinks to absorb GHGs from the atmosphere. For many countries, such activities include the use of cleaner and less-polluting technologies to aid mitigation and reduce CO_2 emissions. Mitigation may also involve carbon capture and storage, a process that traps CO_2 produced by factories and gas or coal power stations and then stores it, usually underground.

The use of policies for climate change mitigation includes using targets for emissions reductions, increased use of renewable energy, increased energy efficiency for future reductions in emissions, and the adoption of adaptation to climate change measures, either planned, for example, by local or national government, or spontaneously, when done privately without government intervention. The engineering of climate change – also referred to as geoengineering – is another policy response to climate change which is sometimes associated with mitigation.

Reducing Emissions from Deforestation and Forest Degradation (REDD) is a global initiative that plays a key role in the context of fighting climate change. Some of the mitigation strategies proposed[1] in the context of REDD include:

- Setting mitigation targets using carbon budgeting, setting emission reduction targets, and resolving targeting problems in carbon budgeting.
- Putting a price on carbon, including benefiting from cap-and-trade lessons from the European Union Emission Trading Scheme.
- Involving regulation and government action through power generation, changing the emissions trajectory, residential sector low-cost mitigation, setting standards for vehicle emission and using research and development and the deployment of low-carbon technologies.
- Using international cooperation to expand the role for technology transfer and finance and reducing forest deforestation.

The DRC has entered the implementation phase of its REDD national programme towards readiness through coordinated efforts of the United Nations-REDD Programme and an initial grant from the Forest Carbon Partnership Facility.[2] These efforts involve the engagement of a wide range of national stakeholders, such as indigenous peoples and other forest-dependent communities. The efforts have the

1 de Wasseige, C. et al. (2009) The Forests of the Congo Basin: State of the Forest 2008, Office of the European Union.

2 UN-REDD Programme (2009) *Engaging Civil Society in REDD – Best Practice in the Democratic Republic of Congo.*

objective of addressing key issues, such as rights to lands, territories and resources and social justice, and how the estimated 400,000 to 600,000 indigenous pygmy peoples in the DRC could be involved in the conservation efforts and benefit directly from the economic, environmental and social benefits resulting from REDD.

A Climate-REDD working group was established in June 2009 by civil society. As a result of this process of engagement with representatives from *Groupe de Travail Forestier*, the National League of Indigenous Pygmy Organisations of the Congo (LINAPYCO), *Dynamique des Groupes des Peuples Autochtones*, and the National Resources Network, among others, a decree supporting REDD by establishing a National Coordination Committee, an Interministerial Committee and a National REDD Committee was approved by the Council of Ministers in October 2009, with the expectation of being signed subsequently by the prime minister.[3]

It has been recommended that countries develop their own adaptation plans, but with the assistance of the international community made available to developing countries through initiatives such as the United Nations Environment Programme and United Nations Development Programme partnership launched in Nairobi during the climate convention in November 2006. The objective of this adaptation strategy is to provide assistance in reducing vulnerability and building the capacity of developing countries to more widely reap the benefits of the Clean Development Mechanism (CDM). This particularly in areas such as the development of cleaner and renewable energies, climate proofing and fuel-switching schemes. Following this adaptation initiative, the DRC has started its own adaptation initiative under the National Adaptation Programme of Action (NAPA). Among its actions, NAPA revealed in 2006 that DRC rural communities have identified greater intensity of rainfall and periods of extreme heat as their major concerns. Its report also revealed that they witnessed during that period primitive farms and freshwater structures being destroyed by flooding and outbreaks of disease associated with the explosion of insect populations and shortages of safe water that often occur during heat waves.

Using ICTs for climate change mitigation

As established in 2000, one of the UN Millennium Development Goals consists of making the benefits of new technologies – especially information and communications technologies (ICTs) – available to both industrialised nations and developing regions. Following these goals, many projects have been founded by the International Telecommunication Union (ITU), Organisation for Economic Co-operation and Development (OECD), World Wide Fund for Nature (WWF) and other organisations with the aim of looking into ICTs and climate change.

Despite this engagement, one of the main challenges faced by many African countries with regards to the concerns and effects of climate change lies in the uncertain predictions of climate computer models, and the lack of appropriate climate sensors to be used for accurate assessment of changes in the climate. In the case of the DRC, this might hinder consistent projections of rainfall patterns in its four separate climatic zones. Furthermore, the efficiency and role played by civil society may be reduced if the policies defined and actions planned within the context of the REDD programme are not supported by preventive actions resulting from climate data obtained using the climate sensors launched into the environment.

As currently implemented, climate change monitoring is based on macro-infrastructures that use climate monitors sparsely deployed at a relatively small number of fixed locations by governmental organisations. This creates a visibility gap that needs to be addressed through complementary technologies, systems and strategies. To bridge this gap, civil society needs to use micro-infrastructures using off-the-shelf devices to extend the available climate maps by:

- Collecting climate data using climate sensors
- Analysing this data
- Modelling climate change in cities and the whole country
- Deriving sound policies based on the derived climate models
- Providing awareness to citizens, official organisations, NGOs and private organisations.

Actions steps: The need for participatory sensing

Participatory sensing using mobile phones and sensor/actuator technologies is one of the enabler technologies which can be used to support this process due to the wide penetration of mobile phones in Africa and the emergence of general packet radio service (GPRS)-enabled sensor/actuator devices. A participatory sensing system is one that allows individuals and communities to collect, share and organise information through data collection using mobile phones and other mobile platforms, in order to make a case for change, and to explore and understand their life and relationship with the environment.[4]

Participatory sensing emphasises the involvement of citizens and community groups in the process of sensing. It can range from private personal observations to the

3 Ibid.

4 Burke, J. et al. (2006) Participatory sensing, *Proceedings of the World Sensor Web Workshop*, ACM SENSYS, Boulder; Shilton, K. et al. (2008) Participatory Privacy in Urban Sensing, *Proceedings of the MODUS Workshop*, St. Louis; Campbell, A. T. et al. (2006) People-Centric Urban Sensing, *Proceedings of the 2nd ACM/IEEE Annual International Wireless Internet Conference*, Boston; Reddy, S. et al. (2007) Sensor-Internet share and search: Enabling collaboration of citizen scientists, *Proceedings of the Workshop for Data Sharing and Interoperability*.

combination of data from hundreds or even thousands of individuals that reveals patterns across an entire city. Most important, participatory sensing begins and ends with people, both as individuals and members of communities. The type of information collected, how it is organised and how it is used, may be determined in a traditional manner by a centrally organised body, or in a deliberative manner by the collection of participants themselves.

The main features of mobile phones that make them a special and unprecedented tool for engaging participants in sensing their local environment include:

- Their sheer ubiquity across the demographic and geographic spectrum.
- The broad proliferation of cellular infrastructure and mobile phone usage making it possible to collect data over large areas for little incremental cost.
- The possibility for participants scattered across a city or the world to easily coordinate activities and upload data to servers that can process it and integrate it with other data.
- The possibility for most modern phones to record images, motion, and other signals, automatically associating them with location and time.

As an example of a participatory sensing process, a multi-interface device endowed with GPRS, Wi-Fi and Bluetooth connectivity, and different gas sensors and a GPS, can be used in DRC cities, villages and its rainforest to measure ground-level ozone, particle pollution also known as particulate matter (PM), sulphur dioxide, carbon monoxide, nitrogen oxides, temperature and humidity. Using its Bluetooth module, it can connect to the user's own mobile phone. It can be programmed to send SMS messages using its GPRS interface to some defined mobile phone numbers in the case that some of the sensed values have reached a given threshold in a given place.

Wireless sensor nodes (or motes, as they are commonly called) may also be used to provide a quasi-static sensing infrastructure where the motes are launched into the environment and probed periodically to measure climate change variables. The values of these variables can also be used to build a climate map which can be analysed and used for climate change mitigation through awareness. Current generation motes can use different means of radio communication to send data to a gateway where measured data are stored. Several motes can be equipped with external GPRS modules and use the ubiquitous GSM network to send data either as SMS or with a GPRS data connection. Some of the emerging motes can be equipped with different 802.15.4/ZigBee transceivers, while also hosting a GPRS module which, when programmed, is capable of sending and receiving SMS, making and receiving calls and connecting to the GPRS network to transfer data.

However, some requirements should be met for mote deployment in climate change. These include:

- Minimum power consumption with hibernate mode capability
- Flexible architecture allowing extra sensors (such as gas or physical events) to be easily installed in a modular way
- The provision of GPS for positioning and a secure digital (SD) card for storing data on board
- The presence of a lithium battery and/or possibility of recharge through a solar panel. This option is especially interesting for deployments in developing countries where power supply is not stable. ■

CONGO, REPUBLIC OF

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Introduction

The latest advances in the information society are having consequences on public health and the environment in the Republic of Congo. As Africa makes progress in reducing the digital divide, electronic waste (e-waste) – discarded computers, mobile phones, etc. – is becoming a real concern. In the Congo, the concern is due in part to the lack of adequate management and treatment of e-waste, and in part to the lack of adequate policy in this area.

This report identifies problems relating to e-waste management in the Congo, and aims to raise awareness among policy makers and other stakeholders about the link between e-waste and environmental pollution in the country.

The methodology adopted for this research is a participatory approach. We first collected data relating to legislation on waste management and then held meetings with various government officials and private stakeholders, including managers of internet cafés and electronics repairers.

Policy and legislative context

The Congo, like other African countries, formalised the preservation of a healthy environment by including requirements in this regard in its Constitution of 20 January 2002. According to Article 35: "Every citizen has the right to a healthy, satisfying and sustainable environment and has the duty to defend it. The State shall protect and preserve the environment."

Section 36 in turn states that "the conditions of storage, handling, disposal and incineration of toxic waste, pollutants or radioactive waste from factories and other large or small-scale industrial entities on the national territory are governed by law."[1]

Internationally, the Congo has ratified and signed the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal.

Law 003/91 of 23 April 1991 on environmental protection undertakes, among other things, to "prevent and combat damage to the environment and the health of persons or their property."[2] However, this law does not address the issue of e-waste specifically. In fact, sections VII and VIII of the Act only address the issue in a general way, referring to municipal waste and hazardous nuclear and industrial waste, or other waste of a similar nature.

All this amounts to a legal vacuum in e-waste handling, exacerbated by the fact that the country must continually adapt to the progress of science and new technologies.

Definition of e-waste

The concept of e-waste in the context of this report includes all waste emanating from electronic and computing devices and their components; that is to say, it involves the disposal of things like PCs, printers and mobile phones, as well as other hand-held electronic devices and IT peripherals. One notable difference between electronic and other categories of waste is that it is composed of a complex assembly of different kinds of materials: a mixture of recyclable materials (plastic, glass, copper, aluminium, gold, silver, palladium or platinum, indium, tellurium) and hazardous materials (mercury, cadmium and lead, amongst others).

General waste management

The issue of e-waste management in the Republic of Congo cannot be addressed properly without prior review of general waste management, which is a municipal service. This service is offered both by the municipality itself and through public service concession. In the first instance there is direct intervention of the city in organising and financing waste collection, removal, disposal and recycling. Public service concession is an administrative contract under which the city delegates these activities to third parties.

Waste management in the country has been through several stages. Before 1980, management was under municipal control: appropriate vehicles were put to use for collecting rubbish in streets and local markets. After 1980, these activities weakened due to a lack of funding.

The outsourcing of waste management has existed since a 2008 agreement between the city of Brazzaville and the subsidiary of a privately owned German company to provide service for Brazzaville only. Other cities do not yet have specific policies: associations and individuals collect waste for disposal in landfills. Consequently, the tragic sight of piles of rubbish can often be seen in Congolese cities, out in the open, at entrances to lanes and next to public byways.[3]

E-waste in the Congo

The issue of e-waste in the Congo raises several questions: Where does e-waste come from and who are its main generators? What practices are encountered in this area? What is the point of view of governments and civil society?

1 Constitution of the Republic of Congo, 20 January 2002.

2 Law 003-91 of 23 April 1991 on the Protection of the Environment.

3 Odika, M. (2008) Presentation at the International Workshop on Waste Management in Africa, Abidjan, Côte d'Ivoire, 12-15 May.

Where does e-waste come from?

An analysis of e-waste in the Congo requires an understanding of how computer and electronic equipment is acquired and who the main generators of electronic waste are.

Firstly, to help reduce the digital divide between North and South, used electronic and computing equipment is exported from developed countries to African countries, including the Congo, sometimes in the form of donations to NGOs. Secondly, because of the high cost of electronic and computer products, consumers prefer second-hand devices of lower quality. This means that in general the life of hardware is reduced to a maximum of only two years, after which time the equipment becomes waste.

Moreover, the Congolese market for electronic devices such as mobile phones is supplied by counterfeit products whose shelf life is short, and there is no effective control over the quality of imported products. As a result, these devices are quickly reduced to waste, as consumers are estimated to only use them for a maximum period of two years.

No study has yet been conducted to determine the quantity of e-waste, but the use of electronic devices has become so widespread that quantities are expected to increase. Our study showed that to varying degrees, the primary users of low-cost second-hand electronic and computer equipment are internet cafés, schools, NGOs and households.

While the main suppliers or donors of second-hand hardware and electronics are the government, private companies, and agencies of the United Nations network, who generally do not need the equipment anymore, several private companies have moved into the growing business of ordering and reselling second-hand computer and electronic equipment at highly competitive prices.

What practices can be observed?

It is difficult at present to give statistics on electronic waste. Firstly there is the problem of a lack of knowledge about how harmful e-waste is. For example, 60% of people interviewed (internet café staff mostly) said they did not know that e-waste has negative effects on health and the environment. Others were surprised to hear of e-waste. This suggests that one of the reasons for poor disposal practices is a lack of knowledge of the harm e-waste can cause. However, the authorities, as well as other stakeholders, while recognising that e-waste is harmful, noted that no action has been taken in this area, as it appears not to be a priority.

Several practices can be distinguished in this area:

E-waste is simply thrown in the bin

Due to the lack of policy on management of this category of waste, people tend to mix e-waste with regular garbage and throw it in public bins. "The waste is mixed up and taken to the landfill without any pre-sorting," say internet café staff.

E-waste is kept in houses

Consumers in the Congo view old electronic equipment as in need of repair and find it difficult to dispose of it even when it is useless. While some throw the old equipment in public bins, the majority prefer to keep it in their homes, for several reasons, including ignorance of the consequences of e-waste and the health threat it poses, and a need for "luxury".

For most people, owning a computer is a luxury because they are so expensive to buy, so there is a sense of loss when it comes to throwing it away. According to one person we spoke to, it is better to keep it so at least "one has the feeling of having a computer at home, because one day we can repair it." Alternatively it must be sold, and at a low price.

E-waste is taken to a repair shop

The absence of a policy for managing e-waste properly is leading to a rapidly increasing problem of dangerous repair practices, sometimes by unqualified people, posing a serious environmental and public health problem.

Most of these devices are left in the homes of maintenance staff and repairers. Repairers' workshops are all full of old computers, ostensibly to recover parts that are still in good condition. Most people interviewed agreed that their hardware, including defective mobile phones, ends up in the houses of repairers, who after first trying to repair it, keep it to recover spare parts. It should be noted that in the Congo, it is not yet common to recycle these electronic devices.

The government and civil society point of view

The issue of e-waste concerns some authorities, particularly the Ministry of Environment which, via the departmental director of environment in Brazzaville, recognises that e-waste is hazardous, and is a growing problem. However, it seems that the issue is not yet viewed as a priority by the government. Indeed, no policy is envisaged for the collection of e-waste. According to the departmental director of environment, there is still no distinction between regular waste and e-waste, even though e-waste is classified as a hazardous waste in the Basel Convention.

Action steps

Waste issues in the Republic of Congo are showing several trends. Although waste in general has only been partially addressed, e-waste needs special policies with strict enforcement taking into account its special nature. These policies need to address collection, processing, disposal and recycling of e-waste.

These policies also need to target education and public awareness about the dangers of e-waste for a better understanding of how to dispose of it, due to a general ignorance of its problems. This waste is not separated and is often burned with other rubbish in houses or tips.

Moreover, the applicable Congolese law (on environmental protection) does not currently take into account the specificities of e-waste, so legislation needs to be put in place that not only takes into account these specificities, but also clarifies the responsibilities of actors in the field, so that the provisions of Article 35 of the constitution are respected.

It should also be noted that the implementation of sound policies in this area will contribute to job creation, because in the same way that computer usage has created jobs, so recycling them should create jobs as well. Skills transference should also be promoted and practical proposals created to deal with old technology once it reaches its end of life. Legal measures should therefore be accompanied by capacity development programmes.

To summarise, the following steps are necessary in the Congo:

Government and development partners need to:

- Develop a clear national policy for the collection and management of e-waste.
- Encourage private investment in recycling that takes into account both environmental and human health.
- Implement programmes to educate the public about e-waste management.

Civil society needs to:

- Develop projects to raise awareness about recycling and the dangers of e-waste. ■

COSTA RICA

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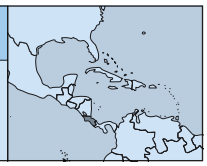

Introduction

Costa Rica has a very interesting context regarding the topic of green information and communications technologies (ICTs). On the one hand, in the public eye Costa Rica is seen as a "green" country that has based an important part of its development on environmental preservation. On the other, there is significant penetration of mobile telephony (45%)[1] and internet (40%)[2] and a very dynamic information technology (IT) sector – large companies, such as Intel and Hewlett-Packard, sit alongside local software developers and some ten data centres. An ecosystem of enterprises has developed throughout the country, among which one can find call centres, internet cafés, hardware repair workshops and distributors of mobile phones and other technological equipment.

These enterprises offer services that have a high energy consumption and generate electronic waste (e-waste). Between 1996 and 2007 there has been an accumulation of 24,000 tonnes of e-waste through the growth of the country's IT sector[3] and there is a projected increase of 4,000 tonnes per year.

Since 2003 multiple stakeholders from civil society, academia and state enterprises have been working on the topic of e-waste,[4] developing assessments and promoting regulations; but the citizens are yet to become truly aware of the consequences of handling these materials badly. Although the population of Costa Rica is aware of the importance of good solid waste management, good, safe waste management practices are not widespread. The country has not yet implemented the recently approved regulations for the adequate management of e-waste.

In 2007 two pilot tests were carried out in order to check the procedure that could be implemented at a national level to manage e-waste, and as a demonstration to advocate for public policy on e-waste. The tests were developed in eight phases that included an information and awareness campaign, collection, disassembly, commercialisation, packaging, permits to export hazardous materials, and transport. The pilots generated awareness about the issue of e-waste, especially with large exporting companies and the state.

In Costa Rica several public and private initiatives have been developed to manage e-waste; they have operated in the absence of regulation so far. Some of them are targeted at gathering e-waste that is selected, organised, packaged and exported to countries like Vietnam or India, as in the case of the Costa Rican Institute of Electricity and Telecommunications (ICE) and La Bodeguita. These enterprises have to accumulate a significant amount of e-waste for the export to be profitable.

Very few enterprises have been able to process e-waste, either partially or in whole, within the country (this is the case of Fortech mainly and, to some extent, Holcim and Fruno). Some of these initiatives have created international partnerships with enterprises that have ample experience in the field (for example, the relationship between Holcim and Global Electronic Processing from Canada).[5]

Public universities have made an effort to implement internal policies of solid waste management that include e-waste. For example, the National University (UNA) has a programme called UNA Sustainable Campus. At the same time, several private companies such as Walmart, Office Depot and the National Television Channel have developed e-waste collection campaigns.

Policy and legislative context

Since 1994 Costa Rica has signed several international treaties regarding climate change and environmental protection. Among the most important are the United Nations Framework Convention on Climate Change and the Basel Convention on hazardous wastes. Change in government is very recent (May 2010) and the National Development Plan 2010-2014 is not available yet. For the 2006-2010 period, the environmental sector had the objective of developing and implementing the National Climate Change Plan to mitigate greenhouse gas effects. In the assessment of this plan, one can observe relatively little progress, and it has been proposed to extend the objectives of the plan into the next period. However, no actions related to ICTs have been mentioned.

Nevertheless, in 2010 there were three important advances in the legal arena: the General Law on Solid Waste Management (13 July 2010),[6] the Regulations for Integrated Management of E-waste (5 May 2010)[7] and the Regulations

1 Rectoría de Telecomunicaciones (2010) *Informe de avance de la Brecha Digital de Costa Rica 2010.* www.telecom.go.cr

2 International Telecommunication Union (2010) *Measuring the Information Society 2010.* www.itu.int/ITU-D/ict/publications/idi/2010/Material/MIS_2010_without%20annex%204-e.pdf

3 Roa Gutiérrez, F. (2008) *Sistema de manejo de residuos electrónicos en Costa Rica.* www.tec.ac.cr

4 ACEPESA (2007) *Gestión de residuos electrónicos en Costa Rica: sistematización de la experiencia.* www.acepesa.org

5 Camacho, A. C. and Salas, D. (2007) Negocio con basura electrónica, *El Financiero,* 23 September. www.elfinancierocr.com/ef_archivo/2007/septiembre/23/enportada1239841.html

6 La Gaceta (2010) *Ley para la gestión integral de residuos sólidos.* www.gaceta.go.cr

7 La Gaceta (2010) *Reglamento para la gestión integral de residuos electrónicos en Costa Rica.* www.lagaceta.go.cr

for Waste Recovery Centres (5 May 2010)[8] were published. Once the laws and regulations have been approved there are important steps to be taken regarding the implementation and effective application of these regulations.

One of the good practices that can be highlighted in the process of creating and approving the regulatory framework on e-waste is that it is a result of the work of a multi-stakeholder National Technical Committee. This committee integrates the perspectives of multinational private companies, academia, local companies, final consumers, the state and public enterprises. The regulations referred to above were the result of this committee's work over several years.

The regulations consider e-waste management as part of the production chain and clarify the responsibilities of producers throughout the whole life cycle of electronic products. There is an obligation for producers to establish places and mechanisms to collect e-waste, and they are assigned the responsibility of informing final consumers of the processes for proper disposal, including designated collection places. The regulations also commit the consumers (whether individual or collective) in terms of their obligation to follow the procedures and hold them responsible for the consequences of handling e-waste inadequately.

Those who manage e-waste are also regulated and the conditions under which they can exercise this business are defined, as well as the obligation of being registered and supervised by the Ministry of Health, the regulating entity for solid waste, including e-waste.

This year the National System for Integrated Management of e-Waste (SINAGIRE) was created as a multi-stakeholder entity responsible for developing an action plan to implement the new e-waste regulations.

Raising awareness for ICTs and environmental sustainability

The management of e-waste as well as solid waste in general is a responsibility of all social stakeholders. Most people, rich and poor, use ICTs in Costa Rica. An e-waste programme should be conceived as part of a strategy that promotes responsible consumption, especially taking into account that this is an historic moment that combines the consumer society with the information society, and that there is a strong consumer impulse to continually upgrade to newer technology.

A key issue in this discussion is who should assume the *cost* of recycling in a society invaded by electronic products. In Costa Rica large technology companies have been established, and the country has given them special conditions to operate – and they are high energy consumers. These companies should also have a responsibility in terms of social and environmental costs.

At the end of 2009 the Central American civil society groups dealing with climate change gathered, with active participation from different organisations from Costa Rica. Two key actions were defined, among several others: civil society will actively develop educational, training and awareness initiatives about climate change targeted at citizens; and concrete actions will be taken to advocate for climate change regulations. At these discussion tables there were no specific conversations on the issue of climate change and ICTs.

It is important to highlight two initiatives that use ICTs for climate change. One of them is led by the National Emergency Commission (CNE). It is a communication system to prevent natural disasters that uses an early warning system based on community observation. To implement this system alliances have been established with community organisations that use a radio communication system, internet and satellite communication to keep the community and the CNE updated of possible threats. Similarly, the Volcano and Earthquake Observatory uses text messaging to keep support entities and community organisations informed.

Finally, we should mention the REDDES (Digital Resources for Sustainable Economic Development) programme. It is a regional programme promoted by Hivos in Central America. Led by Cooperativa Sulá Batsú and Fundación Galileo, it seeks to foster the use of ICTs to transform consumption habits and strengthen green entrepreneurship in the region. One of the most important strategies of this programme is the use of ICT campaigns for a citizen awareness and discussion process about climate change, energy efficiency and sustainable energy.

New trends

This is a broad field that can be approached from multiple perspectives. Civil society organisations that work in the ICT sector have a fundamental role to play in the matter.

It is necessary to develop information, awareness and promotion campaigns for the public, not only to effectively transform the consumption habits of individuals and families, but also to advocate for enterprises working in the sector to apply the law and assume responsibility as e-waste generators, and for local and national governments to create the infrastructure and adequate procedures to handle e-waste.

The most important challenge for this period is to enforce the approved regulations. It is very important to develop different strategies for each stakeholder involved: individual consumers, local enterprises, multinational companies, public and autonomous entities, social organisations, local governments and the national government.

Private companies merit a special mention, especially telecommunications multinationals and the large technology enterprise sector (Intel, Hewlett-Packard, call centres, data centres) regarding their responsibility when it comes to the country's e-waste. Currently these enterprises have developed isolated initiatives that will be more effective if they can be coordinated.

8 La Gaceta (2010) *Reglamento de centros de recuperación de residuos valorizables.* www.gaceta.go.cr

Organisations that work in environment, responsible consumption, energy efficiency and social economy do not currently have e-waste on their agenda. It is necessary that these organisations develop joint actions at a national level.

Action steps

From the perspective of Cooperativa Sulá Batsú, we consider it our responsibility to develop an e-waste awareness and information campaign for the public, social organisations and social-economy enterprises. We should have a special approach with the cooperatives that currently offer electrification services and will soon be offering telecommunication services. For this we will use ICTs, especially social web tools.

On the other hand, we believe it is necessary to develop an instrument or protocol that allows organisations, local governments and social enterprises to assess if they are behaving responsibly when it comes to e-waste. This could also be used to follow up on the behaviour of other organisations, especially multinational private companies.

It is important to develop alliances between organisations that work on ICTs and those that work in environment, responsible consumption, sustainable development and sustainable energy. Of course, it is important to join the ongoing efforts of those stakeholders that in the past years have been working and advocating on the issue of e-waste.

An important path for future actions is work with local governments, since the new regulations place a lot of emphasis on the responsibilities of municipalities. This is an opportunity for social organisations and municipal governments to work together.

It is also necessary to promote collective entrepreneurships dealing with e-waste. It is evident that e-waste-related business can be very profitable, and it could be promoted amongst sectors of the population with fewer opportunities. In this sense, it is necessary to contact technical schools that are a breeding ground for new entrepreneurs, as well as to encourage financial entities to provide seed funding for initiatives. Universities should be encouraged to offer technical expertise to collective enterprises in urban and rural areas to harness the opportunity presented by e-waste. ■

CROATIA

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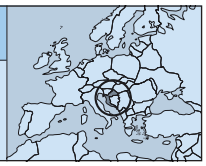

Introduction

Electronic waste (e-waste) is the fastest growing type of waste in Europe, with only 19% of it being recycled. This has led to questionable disposal practices for the remaining waste and illegal exports outside of Europe.[1] A large amount of Europe's e-waste is currently exported to developing countries globally, where it is often dealt with in conditions dangerous to both human health and the environment. For instance, the European Environmental Bureau (EEB), Europe's largest federation of environmental citizens' organisations, has long pressed for the European Union (EU) to seize opportunities for improving the management of e-waste in the revision of the Waste Electrical and Electronic Equipment (WEEE) Directive. In June 2010, the Environment Committee of the EU Parliament accepted amendments to the directive. Improved legislation should increase the collection target and improve the registration and reporting by all actors along the waste chain.

Policy and legislative context

The Waste Management Strategy of the Republic of Croatia (OG 130/05) and the Waste Management Plan of the Republic of Croatia (OG 85/07) govern the management of different types of waste, including e-waste, for the period 2007-2015.

In Croatia, separate collection systems have been set up for special categories of waste (batteries and accumulators, e-waste, end-of-life-vehicles, waste oils and some categories of non-hazardous waste). The Ministry of Environmental Protection, Physical Planning and Construction (MEPPPC) has transposed most of the EU waste directives into national legislation, and the Croatian Environment Agency (CEA) has gradually established the Waste Management Information System (WMIS) and improved the availability of waste data. However, the level of participation in the waste management information system is low.[2]

E-waste disposal costs are borne by manufacturers and importers through charges payable into the Environmental Protection and Energy Efficiency Fund (EPEEF) when placing the product on the market. The EPEEF pays indemnities to waste collectors and processors for e-waste quantities collected and treated. If there are no technical and workforce capacities in Croatia for treatment and recovery of components of e-waste or for the treatment of fraction, the treatment operator has to export them from Croatia at its own expense and deliver proof to the Fund that the waste exported for recovery or disposal has been recovered or disposed of properly.

E-waste is collected by private companies that won concession rights in a public tender. Waste collection service in cases where the fee has been paid is completely free for waste holders such as households.

Croatia, as a candidate country for membership of the EU,[3] is required to fully harmonise national legislation with the *acquis communautaire.*[4] The legislative framework for waste management in Croatia comprises the Waste Act (OG 174/04, 111/06, 60/08 and 87/09) and bylaws that are focused on special categories of waste.[5]

In line with the Accession Partnership,[6] Croatia completed the transposition of Directive 2002/96/EC on e-waste in 2007, with the adoption of an ordinance on e-waste devices (with amendments in 2008 and 2009).

In line with the ordinance,[7] e-waste is:

- End-of-life or discarded electrical and electronic equipment including assemblies and component parts from economic activities (industry, trade and craft, etc.).
- End-of-life or discarded electrical and electronic equipment generated in households or in manufacturing and/or catering industries when by type and quantity similar to WEEE from households.

The ordinance regulates the obligations and responsibilities of producers of electrical and electronic appliances and equipment, the manner of marking them, the types and amounts of fees paid by those who are subject to the payment of fees, the method and deadlines for calculation and payment of fees, the amount of fees paid to persons authorised for the collection, treatment and recovery of the items when they become e-waste, and other issues related to management of e-waste.[8]

The application of the EU directive

Advances in technology, together with the shortening lifespan of electronic goods, has led to an increase in the volume of e-waste being generated every year. An

1 www.eeb.org/index.cfm/news-events/news/eu-paves-the-way-for-better-e-waste-management/

2 Republic of Croatia, Waste Management Plan 2007-2015, OG 85-207. www.mzopu.hr/doc/WASTE%20MANAGEMENT%20PLAN%20OG%2085-207.pdf

3 On 18 June 2004 the status of a candidate country for EU membership was granted to Croatia.

4 The body of EU legislation which candidate countries must adopt to become EU members.

5 www.un.org/esa/dsd/dsd_aofw_ni/ni_pdfs/NationalReports/croatia/waste.pdf

6 Accession partnerships are a pre-accession strategy instrument which determines the candidate countries' particular needs to which pre-accession assistance should be targeted.

7 www.mzopu.hr/doc/Ordinance_on_the_management_of_waste_%20electrical%20and_electronic_appliances_and_equipment_OG_74-07.pdf

8 Ibid.

estimated 55,000 to 60,000 tonnes of e-waste are generated in Croatia each year. These quantities grow by an estimated 10% annually.[9]

The target for the separate collection of e-waste was 4 kg per inhabitant per year by 31 December 2008, with an appropriate increase in the following years. This goal was not realised in 2008, when only 1.29 kg of e-waste per inhabitant was collected.[10]

According to EPEEF data, there were 73,004.09 tonnes of e-waste produced or imported into Croatia in 2008. As of 3 December 2009, 5,718.56 tonnes of e-waste were collected and 5,420.66 tonnes were processed. A total of 876.28 tonnes of e-waste were exported.

Of the e-waste collected, 35% was from households and 65% from other sources. Almost 50% of the e-waste collected was composed of large household appliances, 30% was obsolete IT equipment and 13% was small household appliances and other consumer equipment. Most of the e-waste was collected in the City of Zagreb (the capital of Croatia) as well as Zagreb County (44.5%), Primorsko-goranska County (11.4%) and Dubrovnik-neretva County (8.6%).

According to the EPEEF data, 26,201.34 tonnes of e-waste were produced or imported into Croatia in 2007, 359,781 tonnes were collected and 169,144 tonnes processed.[11] E-waste export in 2007 was not reported.

If the authorities would like to boost the relatively low rates of e-waste collection, they should consider communicating with consumers, both households and enterprises, as a critical function. According to the 2009 data on usage of ICTs in households and by individuals, 55% of households have PCs and 82% have mobile phones,[12] while the 2009 data on ICT usage in enterprises shows that 98% of enterprises use computers.[13]

Croatia has 2,244,400 internet users (estimated in mid-2009), making up a 50% penetration rate, according to the International Telecommunication Union (ITU). Internet penetration in Croatia is the highest in the Balkans region, and is more in line with levels found in the Eastern European EU countries. Broadband penetration is rising, driven predominantly by the incumbent, Croatian Telecom, which plans to use the platform to offer triple-play services. Mobile penetration in Croatia is among the highest in the region, estimated at 137.4%.[14] According to Croatian Telecom, users discard their mobile phones after only one year of use.

According to the director of one licensed e-waste treatment operator, approximately 100,000 PCs are sold in Croatia every year, while the number of mobile phones sold is three or four times higher.[15] In three to four years, this equipment becomes e-waste. In 2010, e-waste operators noticed significant increases in discarded TVs due to the country's transition to digital broadcasting, which should be completed by the end of 2010.

Householder participation in e-waste management programmes is fundamental. Therefore campaigns that will educate consumers and raise awareness of electronic recycling have to be implemented systematically. Out of 277 projects on the WMIS projects database, only one addressing e-waste, called Eco Mouse, was found. The aim of Eco Mouse was, among other things, to raise awareness of e-waste. It was implemented in Varaždin County in 2008 by a not-for-profit ecological association called Franjo Košćec. However, there were activities by other environmentalist NGOs, such as Sunce and Zelena Istra, that were focused on raising awareness of the proper way to discard used batteries. Leading mobile service providers occasionally organise awareness-raising campaigns and collect obsolete mobile phones as well.

In Croatia, the targets set for e-waste were the recovery of 70-80% and the recycling of 50-80% by 31 December 2008.[16] Producers and importers of ICTs and e-waste collection operators, recyclers and exporters must report to the EPEEF as well as to the Croatian Environment Agency. The forms to be filled in by treatment operators have a section on "treated"[17] e-waste and "recovered"[18] e-waste, but do not have a section on recycling.[19] Therefore it is not possible to assess whether targets are met or not.

The Croatian Environment Agency has warned that e-waste importers and recyclers do not report regularly to the Agency. For instance, in 2008, 1,526 companies submitted their reports to the Fund while only 176 companies submitted reports to the Agency. Even though the present system for monitoring waste flows regulates the collection of all data needed for a quality evaluation[20] of the current situation, the existing data are deficient and the quality of part of the data is questionable.[21]

9 Republic of Croatia, Waste Management Plan 2007-2015, op. cit.

10 Croatian Environment Agency, Report on WEEE 2008. www.azo.hr/IZVJESCAOELEKTRICNOM

11 Croatian Environment Agency, Report on WEEE 2007. www.azo.hr/IZVJESCAOELEKTRICNOM

12 Croatian Bureau of Statistics www.dzs.hr/Eng/Publication/2009/2-1-9_1e2009.htm

13 Croatian Bureau of Statistics www.dzs.hr/Eng/Publication/2009/2-1-8_1e2009.htm

14 Croatian Telecom www.t.ht.hr/eng

15 www.vjesnik.hr/html/2010/06/01/Clanak.asp?r=tem&c=1

16 Article 5, Ordinance on the Management of Waste Electrical and Electronic Devices. www.mzopu.hr/doc/Ordinance_on_the_management_of_waste_%20electrical%20and_electronic_appliances_and_equipment_OG_74-07.pdf

17 "Treatment" means recovery or disposal operations, including preparation prior to recovery or disposal. Definitions we use here are based on the revised Directive 2008/98/EC.

18 "Recovery" means any operation the principal result of which is waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfil a particular function, or waste being prepared to fulfil that function, in the plant or in the wider economy, in accordance with the revised Directive 2008/98/EC.

19 "Recycling" means any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes, in accordance with the revised Directive 2008/98/EC.

20 Some discrepancies in waste treatment definitions have been observed due to the revision of the EC Waste Framework Directive (WFD, 2008/98/EC3). A different definition for recycling is established in Article 3 (17) of the new Waste Framework Directive (WFD, 2008/98/EC). All references to the old Waste Framework Directive (WFD) will be automatically replaced with new references when the new WFD is applied (end of 2010). As a result, references to the definitions of "recovery" and "disposal" in the WEEE Directive will be replaced. However, the definition for "recycling" in the WEEE Directive will remain as it currently is until it is formally harmonised with the definition of the WFD.

21 Croatian Environment Agency www.azo.hr

Action steps

As explained in the Republic of Croatia Waste Management Plan (2007-2015), no integrated waste management system can be implemented if viewed from a techno-economic perspective only, and if the role of environmental education is neglected.

For a long time it was thought that a significant part of production process issues associated with the environment would be solved with the use of advanced technologies, but today it is clear that this is not the case. The assumption that new technologies enable simpler and more cost-effective production and significantly reduce the negative impacts of the production process on the environment is correct. However, this leads to a rebound effect.[22]

Eco-education and eco-culture are interrelated and have a cause-and-effect relationship. Ecological education is intended to help individuals develop new perceptions and build up new values that will encourage them to change their behaviour.[23]

The recently adopted national Sustainable Development Strategy (2009)[24] includes a thematic chapter exclusively dealing with sustainable consumption and production (SCP).[25] Although SCP issues are not included in official educational curricula, an educational campaign for teachers has been organised by the Croatian Education and Teacher Training Agency in order to inform teachers on sustainable consumption and production, as well as to promote the United Nations Environment Programme (UNEP) "resource kit" on these issues.[26]

All stakeholders should work together to raise awareness among the public, ensuring that e-waste and particularly battery recycling becomes regular practice in households. In the case of batteries, it is important to ensure in-store take-back programmes and that a number of other high-traffic locations offer collection facilities. Even though most e-waste is generated in large urban areas, similar services should be available throughout the country. ■

22 Rebound effect: by accelerating and simplifying the production process, products become cheaper and therefore more available, increasing their consumption and, consequently, the production itself. This in turn leads to generating larger quantities of waste and larger total consumption of resources used in production while products, due to increased production intensity, exponentially lose quality and their life cycle is reduced.

23 Republic of Croatia, Waste Management Plan 2007-2015, op. cit.

24 www.mzopu.hr/doc/Strategy_for_Sustainable_Development.pdf

25 Sustainable production and consumption are aimed at satisfying basic human needs and improving the quality of life in such a way so as to minimise the use of natural resources, generation of toxic substances, emissions into the air, water and soil, and to prevent or reduce the generation of waste at the point of origin throughout the whole product life cycle in order not to compromise the needs of future generations.

26 www.un.org/esa/dsd/dsd_aofw_ni/ni_pdfs/NationalReports/croatia/scp.pdf

ECUADOR

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Introduction

In Ecuador, new constitutional principles that are the legal framework in which new laws, rules and regulations are developed have defined a development model of environmental sustainability that in addition guarantees universal access to information and communications technologies (ICTs).

Climate change has been an ongoing concern on the public agenda, particularly focused on the Yasuni-ITT[1] project. Yasuni Park is one of the areas with the greatest biodiversity in South America. Yasuni-ITT aims to stop the exploitation of oil reserves in the area, in return for monetary compensation from the international community. The main purpose of this project is to prevent the emission of 410 million tonnes of carbon dioxide through the exploitation of oil, ensuring the conservation of biodiversity, and respecting indigenous populations who have yet to be contacted but are known to live within the park's boundaries.

There are no national policies related to the treatment of electronic waste (e-waste) in Ecuador. There are private initiatives by mobile companies regarding the recycling of mobile phones, but there are no consistent and structured approaches with regard to e-waste such as computers, printers, fax machines, batteries, and so on. These materials are being deposited in municipal landfills and mixed with normal trash, becoming a danger to public health.

Policy and legislative context

In recent years, Ecuador has experienced important changes and progress in environmental matters. One of the biggest changes happened in 2008 with the adoption of the new constitution, in which the rights of nature were recognised. The objective of this change was to strike a balance between development and the environment.

The most relevant part of the constitution is Article 71, which states that *Pachamama*, or nature, has the right to be respected. This refers to respect for its existence, and responsibility for its maintenance and regeneration.

On the other hand, the constitution also states in Article 16 that "All persons, individually or collectively, have the right to: ... 2) Universal access to information and communication technologies."

In 2009 the government drafted the National Development Plan, called the National Plan for Living Well (2009-2013). This plan is used by the government as an instrument to coordinate public policies within the administration and public investment. Among the strategies related to the environment and ICTs are the drive towards universal connectivity, the change of the energy mix, and social investments in the context of sustainable macroeconomics.

Green ICTs: First steps in Ecuador

Environmental awareness is just starting to emerge in Ecuador. Despite being a country with a unique biodiversity, there has not been a culture of environmental protection or waste recycling. The delay in the country regarding access to ICTs is perhaps the main reason that recycling of e-waste has not been taken seriously into account.

In recent years there has been an unusual interest in the issue of climate change, not only for being a very interesting topic on the global agenda, but also due to the following initiatives promoted by the government:

- The Yasuni-ITT initiative.
- With regard to changing the energy mix, the state has promoted the construction of hydroelectric plants to reduce dependency on fossil fuels. At the same time, the first pilot wind-power plants are being developed and photovoltaic solar panels installed. The state is also promoting the use of renewable energies such as biofuels and other alternative fuels.
- Energy efficiency projects have been launched, such as those that replace incandescent lights with energy-saving light bulbs and encourage the gradual replacement of inefficient household appliances.

The Ministry of Telecommunications and Information Society (MINTEL), through the National Connectivity Plan,[2] is actively promoting digital inclusion; nevertheless, potential environmental impacts that could result from the introduction of computers on a large scale have not been considered. The exponential growth of mobile telephony and the ongoing renewal of terminal equipment should be a concern with respect to the management of e-waste, including batteries – especially taking into account that in the last five years, the number of users of ICTs has tripled.

According to figures from the Central Bank of Ecuador, during the last decade the country imported a total of USD 947 million in computers and other electronic data processors. This is equivalent to 21,000 tonnes of equipment, which in the next five years is likely to become e-waste.

The Superintendency of Telecommunications (SUPERTEL), the institution responsible for the control of telecommunications, has recommended establishing

1 ITT: the initials of three oil exploration blocks in the Ecuadorian Amazon region that fall within the protected area of Yasuni Park: Ishpingo-Tambococha-Tiputini. For more information see www.yasuni-itt.gov.ec

2 The National Connectivity Plan for the period 2008-2011 foresees the investment of some USD 900 million in connectivity and technology infrastructure.

regulations for smart devices in terms of energy conversion, types of plugs used, and their reuse; encouraging research into energy accumulation and storage systems; promoting integrated technologies for services; and developing capacity for the recycling and safe disposal of technological waste, especially the most polluting technologies.[3]

In addition, SUPERTEL is promoting policies that contribute to the development and implementation of remote services, such as telework, tele-education, and tele-health.

For the National Telecommunications Council (CONATEL), the strategies designed to mitigate the consequences of climate change focus on the implementation of networks and devices that have low power consumption, promoting the use of next-generation technologies. It also supports the reuse and recycling of computers and peripherals (e.g. batteries, circuit boards, LCD monitors, cables), to prevent the proliferation of e-waste, and to enable the diffusion of ICTs in less-developed areas.[4]

Another important initiative was the approval of regulations on access and sharing of physical infrastructure necessary to promote healthy competition in telecommunications services. One of the greatest benefits of this is likely to be environmental benefits, especially energy saving.

Even if the telecommunications-related projects promoted by various governmental institutions are aimed at the efficient use of energy and the use of integrated technologies, the country does not have a law-making policy that deals in a coordinated and systematic way with the e-waste that is being discarded by citizens, private companies and public institutions. This waste is increasingly occupying space in landfills in cities.

Mobile telephony has experienced unprecedented growth in recent years, and this expansion has become a new threat for the environment. Mobile handsets are composed mostly of non-biodegradable materials – they need specific processes to decompose. Additionally, the unavoidable use of a battery per phone makes these devices a real threat. Faced with this reality, private mobile phone companies in partnership with civil society organisations and universities are carrying out mobile phone recycling programmes. Phone components are then being exported abroad for proper treatment.

The multinational Porta America Movil, in partnership with the NGO Fundación Natura, has promoted the recycling of mobile phones. The campaign was aimed at sensitising the public to the environmental damage produced by discarded phones. This project, entitled "Reduce, Reuse and Recycle for Life", began with awareness campaigns, which were followed by collection programmes. The mobile phones were then exported to the facilities of the company Belmont Trading for proper recycling.

"Recycle and Communicate with the Earth" is the name of a campaign by Telefónica Movistar, which aims to promote good environmental management practices in Ecuador and collaborate with citizens in the responsible treatment of e-waste. Movistar is also developing its programme in partnership with Belmont Trading.

Telefónica Movistar also promotes a national forestation programme called "Green Ecuador", which uses renewable energy in its operations, and promotes the reduction of greenhouse gases, according to its report of best business practices.

In addition to these initiatives that help to decrease the effects caused by global warming, there are others carried out by local governments. The cities of Quito and Guayaquil have departments responsible for the environment that sponsor initiatives to collect batteries in parks and schools. A notable model is the town of Loja, which years ago began campaigns to collect and classify garbage from households. It currently has an awareness campaign and has set up 30 battery collection points in schools throughout the city. The batteries will be treated through a chemical process to neutralise their harmful effects.

In the field of computers, the Ecuadorian market has also benefited from initiatives by companies like Hewlett-Packard (HP). According to its Director of Sustainability for the Americas, "HP has reduced the power consumption of its family of desktop and notebook PCs by 41% compared to 2005."[5]

Amongst the strategies implemented by the Ministry of Environment to protect the environment are ones that look at efficiency and the optimisation of resources, such as the reduction of paper consumption, saving energy, and maximising the advantages of water resources. The aim is to generate in the medium term a culture focused on good environmental practices in the public and private sectors and civil society.

New trends

As mentioned earlier, Ecuador is taking its first steps with respect to environmental awareness. This is reflected in recent initiatives related to the contribution of ICTs to the problem of climate change and to electronic recycling. However, in the last five years these initiatives have been emerging in an isolated and disjointed way.

With regard to legislation, there could be a consolidation of governmental proposals and the implementation of programmes and projects included in the National Development Plan. The development of specific laws and regulations to manage e-waste will be very useful. Some local governments have already made progress in this area; however, the challenge is to extend these initiatives nationally.

When it comes to private companies, it is expected that the recycling of electronic devices will continue, especially in terms of mobile technology.

3 Jaramillo, F. (2009) Presentation to the Fourth World Telecommunication Policy Forum, Lisbon, Portugal, 22-24 April.

4 Guerrero, J. (2009) Presentation on the ICT Policy Framework in Ecuador to the Third International Symposium on ICTs and Climate Change, Quito, Ecuador, 8-10 July.

5 www8.hp.com/mx/es/hp-news/article_detail.html?compURI=tcm:230-114362-16

Action steps

- It is a priority to start working on a national policy on e-waste recycling technologies so that e-waste being deposited in landfills at the risk of contaminating water sources in cities can be recycled safely.
- It is also important to define the proper recycling process for each class of technological waste. Recycling a computer is not necessarily the same as recycling mobile phones or batteries, the latter being the most risky because they are indiscriminately discarded with ordinary trash.
- It is essential for the state and private companies to invest in the construction of recycling facilities and in the refurbishment of electronic equipment.
- Appropriate treatment of e-waste should include various actors; it requires efforts by the state, the private sector and civil society in order to build a truly sustainable environmental culture.
- To provide an effective solution, the global context should be considered, including for generating legal regulations that are appropriate for the reality of each region or area.
- E-waste management requirements should be incorporated in programmes that deal with universal access.
- The intensive introduction of new computer equipment in schools as part of the government's connectivity drive should include green technology.
- Finally, it is the responsibility of Ecuadorian society as a whole to educate future generations in ethical values related to respecting the environment and the efficient use of scarce resources, to achieve harmonious development in the country. ■

EGYPT

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Introduction

The Intergovernmental Panel on Climate Change (IPCC)[1] estimates that the Mediterranean Sea will rise by a metre by 2050 as a result of global warming, ending in the loss of one third of the Nile delta. The delta is one of the most fertile areas of Egypt. It spans the area between the two branches of the Nile before the river empties into the Mediterranean Sea. Today, agriculture in the delta uses the Nile water nearly to its last drop. This has created an inverse sea water intrusion, a "salt wedge" into the area – as the water levels of the Nile have been receding over the years, the void has been sucking sea water into the agricultural lands bordering the northern edge of the delta. This salt wedge reaches nearly 30 kilometres inland. Besides a rise in sea levels, the delta is experiencing severe water quality deterioration. Fertilisers, sewage and industrial waste are accumulating as there is not enough water to flush them out to the sea.[2]

An average of 100 million tonnes of sediment per year were deposited by Nile water before the building of the Aswan Dam. These annual silt deposits compensated for the sea coast erosion and soil depletion as a result of the intense agricultural activity in the region. With the building of the Aswan Dam, the sediment has been held behind the dam now for over 40 years, resulting in the subsiding of soil in the delta: in other words, the delta is sinking slowly below sea level. The government has countered this loss of land by building concrete barriers along some of the most eroded coastal areas and is replenishing the sand on beaches on a yearly basis. These remedial actions, though, are not enough to salvage the delta, especially if the Mediterranean Sea is going to rise due to climate change.

Along with the loss of an important living and agricultural area, Egypt's most industrial cities and some important historic sites like Alexandria, Damietta, Rosetta, Edco and Port Said would be victims of the Mediterranean Sea inundation. Furthermore, the delta's inhabitants' living space is endangered; this affects to a greater or lesser degree approximately 50 million out of a total population of 80 million, which increases by one million every nine months. This means that there could be a massive population displacement of ten to fifteen million people if the sea level rises by one metre.[3]

As a new and potential alternative agricultural and living area, the government has developed infrastructure in Toshka in the south of the country, bordering Sudan. Toshka features one of the most powerful water pumps in the world that diverts water from the Nile to this former desert for irrigation and living needs. Yet despite these measures, to date there has been no relevant migration to Toshka, as was initially planned, due to the hot climate and inadequate social services in the area.

Adding to potential water scarcity scenarios for the future is the Nile Basin Initiative (NBI),[4] through which the Nile riparian countries are trying to change the traditional water quota allocation to Egypt and Sudan. The present Nile water quota was set in 1929 between the then colonial Britain and Egypt, allocating more than 80% of the Nile water to Egypt and Sudan. Ethiopia and Tanzania have been threatening to build dams for years. If this should finally materialise, it could have serious consequences for Egypt.[5]

Accordingly, the Egyptian government has three climate change priorities:

- Sea level rise
- Water resource deficiency
- Agricultural crop deficiencies and extinction of some crops.[6]

Policy and legislative context

Egypt does not have climate change-specific policy or legislation, although the country has ratified the United Nations Framework Convention on Climate Change (UNFCCC). In lieu of a climate change policy, the Egyptian Environmental Affairs Agency (EEAA) put forth its Initial National Communication on Climate Change in June 1999.[7]

Egypt also signed the Kyoto Protocol in 1999 and ratified it in 2005, which led to the establishment of the Egyptian Designated National Authority for the Clean Development Mechanism (DNA-CDM) in 2005.

The umbrella environmental law in Egypt is Law 4 of 1994, which deals with the protection of the environment, and which was amended by Law 9 of 2009. The law assigns the roles and responsibilities of the Ministry of State

1 www.ipcc.ch

2 Agrawala, S., Moehner, A., El Raey, M., Conway, D., van Aalst, M., Hagenstad, M. and Smith, J. (2004) *Development and Climate Change in Egypt: Focus on Coastal Resources and the Nile*, OECD. www.oecd.org/dataoecd/57/4/33330510.pdf

3 Ibid.

4 www.nbi.org

5 Zahran, N. A. (2010) Navigating the regional difficulties of the Nile, *Foreign Policy*, 18 May. mideast.foreignpolicy.com/posts/2010/05/18/egypt_s_existential_worry

6 EEAA (1999) *The Arab Republic of Egypt: Initial National Communication on Climate Change*, prepared for the United Nations Framework Convention on Climate Change (UNFCCC). unfccc.int/resource/docs/natc/egync1.pdf

7 Ibid.

for Environmental Affairs (MSEA) and EEAA.[8] The law and its executive regulations govern data collection for environmental planning, studies and reports and the integration of environmental information into a national action plan. The law also governs monitoring and enforcement of environmental laws and rules.

As part of this monitoring and enforcement role, MSEA prepared a second National Communication to the UNFCCC and a greenhouse gas (GHG) inventory covering different sectors in 2007. This inventory is the first baseline assessment regarding GHGs in Egypt. MSEA has also prepared directives for private sector investments in clean energy, waste recycling and afforestation enterprises.

As climate change is a priority issue for Egypt, it formed an inter-ministerial National Climate Change Committee (NCCC) in 1997, and restructured it in 2007, so that it can function as the effective coordinator of climate change on the national level. The committee is chaired by EEAA's executive officer and its members encompass a broad range of governmental, academic and non-governmental representatives. The committee facilitated the establishment of Egypt's Climate Change Action Plan (CCAP) and the Initial National Communication on Climate Change, both in 1999. In its newer version, the committee is putting out ideas for needed strategies, policies, and the mechanisms for their implementation. The CCAP has also been instrumental in coordinating governmental, non-governmental and private sector climate change projects with substantial international financial and technical aid.

Although Egypt is one of the countries highly vulnerable to climate change, it only contributes 0.5% to global GHG emissions.[9] Because of this, Egypt's main concern is adaptation. Towards this end the government has been mainstreaming climate change adaptation into national policy and investment frameworks, including increased CDM financing opportunities.

EEAA encourages private sector investment in clean energy, waste recycling and afforestation. It initiated a three-year Climate Change Risk Management Programme (CCRMP) in May 2009, which addresses national climate change adaptation and mitigation issues involving multiple ministries and sectors.

With the involvement of different ministries and sectors the Ministry of Communications and Information Technology (MCIT) also became involved in Egypt's climate change initiatives. MCIT participated for the first time in the United Nations Climate Change Conference in Copenhagen (COP 15) in December 2009. During the conference, MCIT raised the issue of the information and communications technology (ICT) industry's green footprint, and the reduction of GHG emissions.[10]

How viable are environmental information systems?

For both adaptation and mitigation decision making, planning and implementation, a sound, regularly updated environmental information system is needed. Although not easy, creating an environmental information database that allows for timely storage, retrieval, processing and analysis is doable and relatively straightforward. MSEA and EEAA have been investigating several such environmental information systems in their decision-making and planning processes. However, Egypt, like many developing countries, faces challenges in collecting, on a timely and consistent basis, quality environmental data.

What has been effective are environmental information systems that target specific geographic areas like protectorates, where information gathering is more focused and specific. An example of this is the Environmental Common Information System (ECIS) run by the Egyptian Environmental Information System, and situated inside EEAA, which was established in partnership with the Canadian government. In the early 2000s, ECIS had information regarding the St. Catherine protectorate, with plans to include other Red Sea protectorates.

Another information system initiative was launched regarding environmental assessments of new development zones, appropriately called the New Development Zones Information System (NDZIS). Likewise, an Environmental Contingency Plan Information System (ECPIS) was established, and the Industrial Pollution Information System (IPIS) was set up to assist the Environmental Inspection Unit to track the industrial sector's compliance towards environmental regulations and laws. The Cairo Air Improvement Project (CAIP) is another important air quality monitoring network. The CAIP is linked to the Early Warning System which monitors the air quality of the Greater Cairo area.

Other systems include the Cement Factories Monitoring System and the Egyptian Hazardous Substances Information Management Systems (EHSIMS). Many of these include digital mapping information systems and databases.

The establishment of such environmental information systems is, however, only one side of a complex issue. These information systems are only as effective as the enforcement that is being based on the available data and information is. Enforcement capacities and compliance is a weak point in Egypt, as it is in many developing countries. Strengthening institutional capacities for monitoring and enforcement goes hand in hand with establishing environmental information systems.

This leads us to another issue that has not been resolved since the creation of MESA and EEAA, which is their lack of enforcement capacity towards other ministries and agencies. MESA and EEAA have mainly advisory and coordinating roles over environmental issues within the large network of ministries, and between the government and the private sector. The information systems allow MESA and EEAA to disseminate environmental information nationally,

8 www.eeaa.gov.eg/English/main/about.asp

9 UNDP (2008) *Egypt Human Development Report 2008.* hdr.undp.org/en/reports/nationalreports/arabstates/egypt/2008_Egypt_nhdr_en.pdf

10 www.mcit.gov.eg/NewsDetails.aspx?id=amkuLiqiKME=

locally and among the various sectors, but enforcement lies principally with sectoral ministries and agencies and not with their environmental counterparts.

Nevertheless, one has to say that MSEA and EEAA were successful in establishing an environmental information system tying the MESA and EEAA offices at the national level to branch offices in the governorates, as well as the provincial administrative units, through the EEAA environmental information systems.

Action steps

Environmental information systems in their various forms are being used in Egypt. However, their effectiveness hinges on many contingencies, the most important of which are the accuracy of the raw data, enforcement capacities, the human resources needed and the compliance levels of national and sub-national ministries, agencies and organisations towards implementation of policies and decisions based on the feedback of the system. Egypt's interest in developing its ICT potential in the region is a strong starting point for the development of these systems.

Nonetheless, with a limited budget, Egypt is better off allocating its resources to capacity building and better enforcement of climate change-related adaptation and mitigation initiatives, while pursuing a multilateral data and information system wherever possible. Sharing costs on GIS and raw data with multilateral and bilateral organisations seems a good idea, with attention on the many challenges the country faces to adapt to climate change in a short time frame in order to reduce the high risks it is facing.

The government should make water resource management its priority, especially given what might follow due to changes in Nile water quotas that could be the outcome of the NBI. Although Egypt has been talking about the importance of water resource management for decades, a lot still needs to be done, for instance in terms of reducing potable water leakage. At the same time, with the establishment of new cities around Cairo and the development of the Mediterranean and Red Sea coastal areas, water is being used to irrigate landscapes that have no agricultural benefits. These waters are diverted from the Nile and are also sourced from non-renewable groundwater resources.

With the present political focus on the upcoming presidential election in 2011, and the renewal of the emergency law, it is not realistic to expect civil society to be advocating a water management strategy as its main public demand, despite its urgency and importance. The same is true with any adaptation activity regarding coastal zone management, be it for the Mediterranean or the Red Sea. ■

ETHIOPIA

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Introduction

Concern for environmental degradation in Ethiopia has been growing in recent years. The Constitution of the Federal Democratic Republic of Ethiopia provides basic and comprehensive principles and guidelines for environmental protection and management. The constitution states that everyone has the right to live in a clean and healthy environment and the government will make every effort to provide such an environment. The constitution also holds the government and the people of Ethiopia responsible for the preservation of natural resources and maintenance of ecological balances.

Since the climate change issue has entered the scientific and policy arena in recent years, Ethiopia has given the issue focused attention nationally, and has been leading the regional agenda. An assessment of the current climate variability and observed trends reveals that there has been warming in the annual minimum temperature over the past 55 years (1951-2006). It has been increasing by about 0.37°C every ten years. The main environmental problems in the country include land degradation, soil erosion, deforestation, loss of biodiversity, desertification, recurrent drought, floods, and water and air pollution. Climate-related hazards in Ethiopia include drought, floods, heavy rains, strong winds, frost, and heat waves. Climate change could be particularly damaging to the country, given that it is dependent on rain-fed agriculture and under heavy pressure from food insecurity. Famine is often caused by natural disasters such as drought.[1]

Climate projections for Ethiopia have been generated using the software MAGICC/SCENDEN for three periods centred on the years 2030, 2050 and 2080. For the Intergovernmental Panel on Climate Change (IPCC) mid-range (A1B) emission scenario, the mean annual temperature will increase in Ethiopia in the range of 0.9-1.1°C by 2030, in the range of 1.7-2.1°C by 2050, and in the range of 2.7-3.4°C by 2080 compared to the 1961-1990 norm.

Information and communications technologies (ICTs) are both a cause of the problem and part of the solution for climate change. They contribute 2% of all global emissions – the same amount as the airline industry. However, ICTs can help to reduce energy demand, mitigate CO_2 emissions and help to save the planet.

Policy and legislative context

A number of proclamations and supporting regulations have been made that contain provisions for the protection and management of the environment, and which reflect the principles of the constitution.

Article 44 of the Constitution of the Federal Democratic Republic of Ethiopia[2] addresses the protection of the environment and declares that everyone has the right to a clean and healthy environment.

Since 1994, Ethiopia has taken important steps through the incorporation of environmental rights under the constitution, adoption of the Environmental Policy and Conservation Strategy of Ethiopia, ratification of multilateral environmental conventions, and establishment of the Environmental Protection Authority (EPA)

The most important step in setting up the legal framework for the environment in Ethiopia has been the establishment of the EPA by proclamation No. 9/1995. According to this proclamation the EPA has amongst its powers and duties:

- To prepare environmental protection policy and laws; and, upon approval, to follow up their implementation.
- To prepare directives and systems necessary for evaluating the impact of social and economic development projects on the environment; and to follow up and supervise their implementation.

In this regard, the first comprehensive statement of Environmental Policy for Ethiopia was approved by the Council of Ministers in April 1997. The overall policy goal is to improve and enhance the health and quality of life of all Ethiopians and to promote sustainable social and economic development through the sound management and use of natural, human-made and cultural resources, so that the needs of the present generation can be met without compromising the ability of future generations to meet their own needs.

Detailed reference to the role of ICTs is not given in this environmental policy. However, one of the cross-sectoral policy areas, namely the Environmental Monitoring Information System, is expected to use ICT tools to make it possible to have access to widely used information and to ascertain the type and location of any specialised data and information.[3]

The Council of Ministers adopted the following environmental laws submitted to it by the EPA:

- The Proclamation on the Establishment of Environmental Protection Organs, which assigns responsibilities to separate organisations for environmental development

1 CEEPA (2006) Climate Change and African Agriculture, Policy Note No. 25, August. www.ceepa.co.za/docs/POLICY NOTE 25.pdf

2 Adopted through Proclamation No.1/1995. www.erta.gov.et/pdf/Constitution.pdf

3 Environmental Protection Authority and Ministry of Economic Development and Cooperation (1997) *The Environmental Policy of Ethiopia*, Federal Democratic Republic of Ethiopia, Addis Ababa.

and management activities on the one hand, and environmental protection, regulation and monitoring on the other.[4]

- The Environmental Impact Assessment Proclamation, which was prepared to facilitate the implementation of the environmental rights and objectives provided in the constitution by predicting and managing the environmental effects of a proposed development activity or public (legal) instruments.[5]
- The Environmental Pollution Control Proclamation, which aims to eliminate or, when not possible, to mitigate pollution that is an undesirable consequence of social and economic development activities.[6]

On the basis of the Environmental Pollution Control Proclamation, two sets of standards were prepared: the industrial emission standards, which set maximum permissible pollutant emissions and the extent to which each sector must reduce its emissions; and the ambient environment standards, which set criteria for evaluating the air pollution to which humans and the environment are exposed, the impact-based values recommended by the World Health Organization (WHO), and compliance with ambient air quality standards which generally means that no harmful effects occur.[7]

Key issues

Although it is now clear that ICTs contribute to global greenhouse gas (GHG) emissions, with the current low level of ICT penetration in Ethiopia – a mere 532,000 PCs (2007), four million mobile subscribers and 915,000 fixed telephone lines (2009) – the contribution of the sector is insignificant. However, ICTs can play a significant role in reducing emissions through enabling smart energy efficiency and by providing a substitute for the physical transport of goods and people. Currently, the single largest source of urban air pollution in Ethiopia is the emissions from motor vehicles. Transportation is the largest contributor (52% in 1999) of CO_2 emissions in Ethiopia, followed by emissions from manufacturing and construction (25%) and residences (15%).[8] The trend has been increasing in the same direction. In the last three years alone the number of vehicles imported from abroad has increased by 17.2%.

While there are numerous ICT initiatives in the country, very few of them are dealing with environmental issues in a holistic way. However, it can be said that the implementation of the WoredaNet (see below) would make a positive impact, not only in facilitating communication and raising awareness on climate change mitigation and adaptation issues, but also in providing a substitute for the physical transport of people.

WoredaNet is a terrestrial and satellite-based network designed with the primary objective of providing ICT services such as video conferencing, messaging and voice over internet protocol (VoIP), and internet connectivity to government entities at the federal, regional and *woreda* (an administrative division in Ethiopia) levels. WoredaNet connects more than 611 woredas.

Video conferencing is one of the most utilised services of the WoredaNet. The video conference service is used for various purposes. The most common ones include government conferences, court services, training and distance education. The service has helped to encourage effective and frequent communication among different sectors and tiers of the government administration. The service has facilitated the provision of timely information to the lowest level of government institutions and reduced travel and administrative costs for sharing information. Between 2006 and 2008, WoredaNet provided a total of 2,185 hours of services for meetings, education and training, and workshops and seminars in which 186,578 participants took part. The video conferencing is also used for court hearings held at the Federal Supreme Court, as well as regional and zonal-level courts. Providing court services using video conferencing has helped citizens to avoid travelling from woredas to zonal and regional centres and to Addis Ababa. Instead of travelling long distances, people can use the video conference services of the WoredaNet near/in their hometowns to attend court. During 2007 and 2008, a total of 4,055 hours of video conferencing were used for court services for a total of 6,446 cases handled by the Federal Supreme Court (in Addis Ababa), Tigray Region Higher Court (Mekelle), and Amhara Region Higher Court (Bahir Dar). Apart from improving the efficiency of the government at all levels by allowing better use of executive time and speeding up decision-making processes, video conferencing improves the capacity of government institutions to provide better services to citizens.

The indirect effect that the use of ICTs can have in raising awareness and dialogue about the effect of climate change on vulnerable communities is critical. In this regard, the use of various ICT tools for different target communities is of great importance. For instance, the National Meteorological Agency's daily meteorological forecast through radio and TV is also available online through its website.[9] The video conference facility is also a powerful tool that the government can use to raise awareness on environmental issues and facilitate dialogue at all levels.

There are a number of NGOs active in environmental protection whose activities include providing ICT-based platforms for advocacy and communication among people and institutions concerned with the environment in Ethiopia.

4 Federal Democratic Republic of Ethiopia (2002) *Proclamation on the Establishment of Environmental Protection Organs*, Proclamation No. 295/2002.

5 Federal Democratic Republic of Ethiopia (2002) *Environmental Impact Assessment Proclamation*, Proclamation No. 299/2002.

6 Federal Democratic Republic of Ethiopia (2002) *Environmental Pollution Control Proclamation*, Proclamation No. 300/2002.

7 Tesfaye, M. (2008) Environmental Policy and Laws of Ethiopia and Clean Fuel, paper presented at the Workshop on Promotion of Clean Fuels and Vehicles organised by the Forum for Environment, Addis Ababa, Ethiopia, 22 July.

8 EarthTrends (2003) Climate and Atmosphere – Ethiopia, EarthTrends Country Profile. earthtrends.wri.org

9 www.ethiomet.gov.et

Such institutions include the Forum for Environment[10] and Tena Kebena.[11]

Finally, the goal of the Ethiopian National ICT Policy[12] is to vigorously promote an ICT-driven socioeconomic development process and transform Ethiopia from an agriculture-based economy and society to a predominantly knowledge- and information-based economy and society, with a deep-rooted democratic culture and good governance. The ICT for Development 2010 Plan,[13] which defines the e-government implementation strategy guided by an e-government functional model, identifies the Environmental Monitoring Information System as one of the elements of the functional model.

New trends

Recently, there have been a number of developments both in the ICT and non-ICT sectors which are linked to climate change issues.

In February 2010, the Information and Communication Technology Development Agency (ICTDA) inaugurated the Computer Refurbishment and Training Centre (CRTC) built with the support of the World Bank, Microsoft and International Business Leaders Forum (IBLF). The purpose is to refurbish second-hand computers imported from worldwide markets and distribute them to community-based organisations and agencies. This is designed to improve information technology access for lower-income citizens. The CRTC is also to commence de-manufacturing PCs. Instead of dumping defunct devices, this will lead to the reuse of the components in an environmentally friendly way. PC waste is a critical problem for the global environment, including in developed countries. The de-manufacture system is the latest way to disassemble PCs. At the CRTC, about 42 components are produced from a single PC that can be an input for other products. With concerns for environmental impact of importing second-hand computers, the recent government announcement of tax exemptions on ICT equipment as part of the country's "ICT for Development" campaign is a great incentive to enhance up-to-date ICT infrastructure in the country.

Ethiopia has also launched an electric car, which will make it the second African country to do so, after South Africa. Two versions of the Solaris Elettra will be manufactured in Addis Ababa, costing around USD 12,000 and USD 15,000. The cars will be sold in Ethiopia as well as exported to other countries in Africa and Europe. The car does not use any fuel or oil and so does not let off carbon emissions – it only uses ten rechargeable batteries. The challenge is whether this car will be widely used where erratic power supplies, low levels of personal wealth and poor infrastructure are common. However, given that the largest contributor of CO_2 emissions is the transportation sector, and this mainly in urban areas, the electric car is another initiative that puts the country in the direction of green growth.

Action steps

Ethiopia, like any other African country,[14] has a window of opportunity where it has at least three advantages: a late start, climate change investment and a highly skilled diaspora. This means that there is much technology Ethiopia can simply adapt to local conditions, along with the availability of financing for low-carbon development and a generation of highly skilled Ethiopians abroad, who should be encouraged to engage in and contribute to the country's development.

Addressing the climate change challenges and exploiting the associated opportunities requires the country to understand where it is and where it wants to go. In order to access global financing flows for climate change following the Copenhagen Conference (COP 15), Ethiopia would need to develop "low carbon growth plans" and "ecological footprint indicators" to plan adequately for development in an environmentally sustainable way. This is something to be considered at the macro-level, where ICTs should feature as a key instrument for climate change mitigation, monitoring and adaptation.

In this regard, WoredaNet's video conferencing service offers a good example, particularly regarding its role in travel substitution. The large-scale investment in energy generation and distribution is another development activity that caters for the need for smart power/grid systems. The increasing energy use as a result of the expansion in ICT infrastructure, real estate development and transportation infrastructure, as well as the increase in the number of motor vehicles, also triggers the need for policies, standards and procedures that introduce smart motors, smart building design and smart transport.

To ensure the cause and effect of the development activities to do with climate change, monitoring is an important area where ICTs would contribute to data capturing, processing and presentation, or dissemination. In this regard, the EPA should coordinate with the Ethiopian ICT Development Agency regarding the implementation of the Environmental Monitoring Information System, which is already identified as one of the elements of the e-government model in the ICT for Development 2010 Plan.

Furthermore, a lot of advocacy work by civil society players concerned with the environment is needed to promote how ICTs can help in adapting to climate change in the short and longer term. This can be achieved through the use of ICT-enabled applications for measuring, information and networking, predicting (risk, early warning), planning, and coping (including short-term disasters). ■

10 www.ffe-ethiopia.org

11 www.tenakebena.org

12 Federal Democratic Republic of Ethiopia (1997) *The Ethiopian National Information and Communication Technology (ICT) Policy.* www.eictda.gov.et/Downloads/Policies/ICT_Policy_English.pdf

13 Federal Democratic Republic of Ethiopia, Ministry of Capacity Building (2006) *The National ICT for Development (ICT4D) Five Years Action Plan for Ethiopia (2006-2010).* www.eictda.gov.et/strategy/The%20ICT4D-2010%20%20Plan-MAIN-FINAL.pdf

14 Ayensu, E. S. (2010) *African Innovation Framework (AIF): Unlocking Africa's Future,* prepared for the ICT, Science & Technology Division of the United Nations Economic Commission for Africa (UNECA) Addis Ababa.

FRANCE

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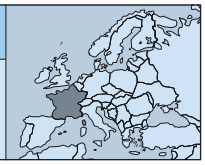

Introduction

Efforts in the collection and treatment of electronic waste (e-waste) have been ongoing in France for the past two years. This has been in an effort to catch up with other European countries. However, the national waste management policy does not significantly address issues such as the short life span of equipment, or how to reduce e-waste. Instead it is mostly influenced by the interests of telecommunications and computing manufacturers, who present information and communications technologies (ICTs) as a clean growth and energy-saving opportunity, and motivate the collection of used devices in terms of its social and digital inclusion effects rather than the environmental urgency. A number of cooperatives are involved in the field of e-waste treatment and the social enterprise sector is an historical actor in waste treatment. With them, international solidarity and environmental NGOs have developed alternatives. They are involved in the discussion of e-waste policy at the national and international level.

The management of e-waste and the environmental consequences of the use of ICTs are rarely singled out by French organisations combating the digital divide. Most information society activists ignore this face of ICTs. As a result it seems quite clear that greater awareness of the environmental consequences of ICT use among activists of ICT appropriation could contribute to a change in behaviour and in public policies related to e-waste.

WEEE, RoHS and EuP in the French context

As in all countries of the European Community, French legislation rests on a set of European directives, including the WEEE Directive[1] (dealing with e-waste) and RoHS Directive[2] (dealing with restrictions on the use of hazardous substances), both from 2002, and the EuP Directive[3] of 2005, which deals with energy-using devices. These directives will apply up until February 2011, and are under revision until then. Through extended producer responsibility (EPR), the WEEE Directive places selective collection and processing of e-waste under the responsibility of producers of devices. The RoHS Directive aims at limiting the use of hazardous substances (lead, mercury, hexavalent chromium, brominated flame retardants and cadmium) in the manufacturing of devices. Finally, the EuP Directive establishes a framework for fixing standards of eco-design of devices consuming energy.

In late 2006, the transferral of these directives into French legislation[4] gave rise to the establishment of two e-waste management sectors: the household sector, concerning devices used in the private context (for example, PCs, mobile phones, household appliances), and the professional sector, for industrial electrical and electronic devices. ICTs (a scope not easy to define) do not come under a specific heading. The French system is founded on an "eco-cost"[5] on every electric or electronic product put on sale since 2005. The eco-cost is the price of the treatment at the end of life of a device, and is reflected in the sale price of equipment. It is paid by the producer to one of the four "eco-agencies" approved by the government in exchange for the promise to process their waste at the end of the equipment's life cycle. The four eco-agencies are companies whose shareholders are primarily the producers themselves. An e-waste logo – a crossed-out rubbish bin – aims to allow users to recognise that the device in their hands falls under the e-waste category.

Following the national negotiation on environmental policy called *"Grenelle de l'environnement"* in 2008, an August 2009 law and its decree marked a step forward in relation to e-waste management:

- Collection targets increased sharply (up to 7 and 8 kg/inhabitant/year[6] for 2010 and 2011).
- Four types of e-waste, including one relating to computers, had their "eco-cost" adjusted according to the eco-design effort.
- Pilot collection projects that do not entail the condition to buy something are running in some parts of France with volunteer chain stores. These replace the "one-for-one" exchange rule (an obligation for traders to collect one item for disposal when a client buys a new piece of equipment).
- A "harmonisation of sectors" commission attached to the National Council on Waste (CND) was created.

The impact of ICTs on the environment

The amount of waste (including pollution) produced by the use of ICTs is higher than usually imagined. Their impact on the environment is very diverse. A computer for example is a

1 Directive 2002/96/CE on waste electrical and electronic equipment.

2 Directive 2002/95/CE on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

3 Directive 2005/32/CE establishing a framework for the setting of ecodesign requirements for energy-using products.

4 Decree No, 2005-829 of 20 July 2005.

5 www.ecologic-france.com/communication-green/texte-loi-doc-deee/bareme-deee-menagers.html

6 Ministry of Ecology, Energy, Sustainable Development and the Sea (2010) Chantal Jouanno, Secretary of State for Ecology, presents report for the sector for the 2006-2009 period and new challenges set for 2010-2014, press release, 22 February.

vehicle for the production of waste all through its life cycle. It is usually assumed that its manufacturing necessitates the use of 1,500 litres of water, 240 kg of fossil energy, and 22 kg of chemical material. The use of ICTs represents 13-15% of the French energy bill[7] and therefore produces CO_2. This pollutant factor rose by approximately 6% a year between 2005 and 2008, and at this time, it has not been offset by savings in energy resulting from the use of ICTs. After two to three years of use, the more than 10.5 million computers[8] and the 20 to 25 million mobile phones[9] put on the market every year in France represent almost as much equipment that enters the waste stream. This waste has the distinctive feature of containing a large quantity of hazardous materials.

The collection of e-waste is making progress…

The collection of e-waste (all electronic and electrical appliances) from households has made remarkable progress since the WEEE Directive came into force in November 2006. Taken as a whole, 1.3 million tonnes of e-waste[10] is produced each year in the household sector, and this figure increases by 2-3% a year.[11] According to the French Environment and Energy Management Agency (ADEME), the tonnage collected has risen from 157,000 tonnes in 2007 to 284,000 tonnes in 2008, and should represent 371,000 tonnes in 2009. Collection therefore represents approximately 28% of e-waste generated by households. Over 70% of this waste will be buried, incinerated, stored or will "disappear" in the informal economy.[12] The rate of e-waste collected per inhabitant should reach 5.7 kg in 2009.[13] This increase represents a success, but it remains below that of other European countries. Already in 2006, the United Kingdom's rate was 10 kg/inhabitant/year, Germany 8 kg/year and the Scandinavian countries 15 kg/year.

… but remains small for ICT waste specifically

ICT equipment in the household sector only represents approximately 15% of the collected tonnage of e-waste overall; and this time the rate of recovery of potential ICT e-waste is estimated at less than 10%.[14] For instance, manufacturers consider that only about 8% of the 25 million telephones distributed in France each year are collected.[15]

Processing companies have long alleged that it is complicated to collect e-waste from private individuals. Unlike household appliances (e.g. refrigerators, gas cookers, washing machines), the replacement of a computer does not necessitate getting rid of the old one. This is even truer for phones, which will be passed on among family and even friends. It is therefore estimated that on average each household possesses four to six unused mobile phones.

Collectors, paid by the weight of the collected equipment, are also encouraged to seek out the bigger devices for recycling. These are usually cheaper and less complex to process than ICT devices.

At this time, we lack specialised studies of the collecting of ICT waste in France to know more about how to improve it.

Unlike the household sector, the professional sector does not fare well in terms of recycling because of an absence of an effective and binding plan. According to the information given by the Ministry of Ecology, e-waste collected in the professional sector represents only 12,900 tonnes of the 198,000 tonnes sold into the market in 2008 (or 6%). This year, 82% of this collected e-waste was ICT waste,[16] and it is usually assumed that the estimated tonnage of discarded ICT waste in the professional sector is higher than all the e-waste generated in the household sector. Nevertheless, this situation should change following the overhaul of this sector's regulations in 2010.

Flowering of initiatives with a variety of intentions

E-waste collection initiatives have been growing in numbers. For instance, the mobilisation of the social enterprise sector is on the rise. These are businesses that are concerned with the potential of social inclusion and employment opportunities in recovery and reuse of second-hand ICTs. Some 200 collection points in 2009 gathered approximately 800 tonnes of waste per month.

Alongside the social enterprise sector, a myriad of small initiatives have been launched, many of them by civil society. These aim at reducing the digital divide by allowing access to second-hand equipment for the poor, often by exporting this equipment to countries in the South.

The Internet Usage Delegation (DUI) has launched a label called Ordi 2.0 (short for "ordinateur", the French word for computer) with the cooperation of the World Digital Solidarity Agency, a few local authorities and telecommunication and computing manufacturers.[17] The Ordi 2.0 programme claims to offer a national label of quality for e-waste collection schemes and the operators of reused ICTs. Actually, the criteria of this label are very low. Just registering and providing a list of activities in this field at the end of the year is enough to use the label.

7 A DETIC report stipulates 13.5% and the OECD 15%.

8 Greenpeace International (2008) *Toxic Tech: Not In Our Backyard.*

9 The figure of 25 million is cited in CGEDD and CGTI (2008) *ICT and sustainable development.*

10 For approximately 1.45 million tonnes (550,000 units) of material on the market each year.

11 Here we repeat the figures from the Ministry of Ecology press release quoted earlier, which are confirmed by ADEME and the other studies cited.

12 cniid.org/index.php?option=com_content&view=article&id=108&catid=3&itemid=20

13 Ministry of Ecology, Energy, Sustainable Development and the Sea (2010) op. cit.

14 CGEDD and CGTI (2008) *ICT and sustainable development*, p. 30; ADEME (2009) Performance indicators for the household electric and electronic equipment waste (WEEE) sector, October.

15 greenit.fr/article/materiel/telephone/telecoms-73-de-la-facture-electrique-francaise

16 Ministry of Ecology, Energy, Sustainable Development and the Sea (2010) op. cit.

17 In particular, through the association Renaissance Numérique, initiated by the white paper "Reconditioning: Long life for computers, long life for net surfers". The majority of the members of Renaissance Numérique are managers of telecommunications and computing manufacturers.

Nevertheless, this initiative motivates a lot of non-profit actors in the ICT sector, like local internet access points and local free and open source software associations, as it allows them to find new income sources both through the sale of equipment and from their participation in the programme. These organisations welcome these new financial resources as their public grants are decreasing. The committee of the Ordi 2.0 programme is now considering the possibility of using CO_2 market funds (EUR 100-150 per machine) to finance the recycling of computers.

Companies such as Electricité de France (EdF) and supermarket chains such as Auchan have put in place mobile phone collection points. These initiatives are still too new to be able to assess them, but they do reflect a change.

More and more industries are addressing this problem. They are benefiting from the funds collected through the eco-contribution accumulated for several years – through the eco-agencies in which they are sometimes shareholders. Their initiatives permit them to improve their image at a low cost, while ensuring that the government does not impose targets that are too binding. The voluntary charter of the telecommunications sector of the French Federation of Telecommunications[18] illustrates this strategy. This is a list of commitments that allows these actors to show a wide range of actions for sustainable development, which actually correspond to activities already up and running, and to hide the weakness of their commitments "which shall be defined by each operator"[19] in the sensitive area of recycling mobile phones.

New trends

In the ICT world, there is talk of "Green IT 2.0" and "greening with ICTs" – that is, the idea that using new technologies contributes to resolving environmental issues. The General Council for Industry, Energy and Technologies (CGIET)[20] admits that the results of "greening with ICTs" initiatives are rarely quantified and assessable, and this is confirmed by Organisation for Economic Co-operation and Development (OECD) studies.[21] These ideas are strongly supported by ICT industry actors, with little opposition.

Environmental associations lack capacity. One example is France Nature Environment, one of the organisations in the forefront of this issue, which has no more than one full-time worker for all waste sectors. ICT appropriation activists usually ignore the e-waste issue and trust the regulatory system. The involvement of Enda Diapol, an international solidarity organisation with an office in France, seems to be an exception.

Facing all these obstacles, environmental organisations congratulate themselves for having secured the "eco-cost", including eco-design criteria in their rates, and the completion of studies on the life cycle of equipment (entrusted to the ADEME) paid for by the eco-agencies. In ICT waste, the eco-design criteria will favour the development of a universal adaptor.[22] But continuation and improvement of such initiatives depends to a large degree on their capacity to expand awareness of the consequences of the use of ICTs amongst civil society. So, one of the challenges faced by the international solidarity and environmental organisations seems to be to overthrow the involuntary alliance between activists for the appropriation of ICTs and e-waste producers, in particular those involved in Ordi 2.0, in favour of more effective public policies.

Action steps

For French environmental organisations, one of the action steps is to put in place a campaign or a programme of popular education, which will promote the lengthening of the life span of devices to at least five years, advocate for removing the artificial distinction between household and professional waste when the devices and their use are similar (mobile phones, personal computers, etc.), and ensure that authorities set an example by integrating environmental and social considerations into invitations to tender and acquisitions of ICTs.[23]

This campaign could also reinforce the capacity of the social economy actors to place greater importance on criteria of environmental and human justice rather than equipment renewal and digital consumerism. Such a programme could be financed by money generated by the "eco-cost" system. ■

18 Charte d'engagement volontaire du secteur des télécoms pour le développement durable, 7 June 2010.

19 Ibid.

20 Presentation by CCI Metz, 31 March 2009, Conseil Général de l'Industrie, de l'énergie et des technologies (CGIET).

21 OECD (2009) *Towards Green ICT Strategies: Assessing Policies and Programmes on ICT and the Environment.*

22 Implemented on 1 July 2010.

23 Based on an e-waste proposal by Enda Diapol.

INDIA

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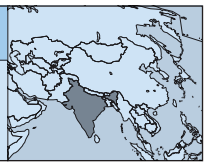

Introduction

Among all the manufacturing sectors, the electronics industry is the fastest growing. High demand and the short life span of technology result in ever increasing waste in the industrialised world.[1] The production of electronic waste (e-waste) on a global scale is estimated to be 20-25 million tonnes per year, with major roles being played by Europe, the United States and Australia. China, Eastern Europe and Latin America are expected to become major producers of e-waste in the next ten years.[2]

The use of laptops, PCs, mobile phones and other electronic and entertainment devices is also increasing rapidly in India. Some 52 million active users out of 1.2 billion people in the country access the internet, and there are 15 million mobile users on average each month, according to a report by the Internet and Mobile Association of India (IAMAI) and Indian Market Research Bureau (IMRB). The report also found that 72% of young people access the internet on a regular basis in India.[3] The Indian electronics industry has shown an increase in production, internal consumption and export.[4] The number of PCs per capita in India grew by 604% from 1993 to 2000, in contrast to a world average of 181% during the same period.[5]

The dark side of these statistics is an increase in e-waste in the last two decades. Among various Indian states the highest contributors to e-waste are Maharashtra, Andhra Pradesh, Tamil Nadu, Uttar Pradesh, West Bengal, Delhi, Karnataka, Gujarat, Madhya Pradesh and Punjab. However, city-wise, the largest e-waste generators are Mumbai, Delhi, Bangalore, Chennai, Kolkata, Ahmadabad, Hyderabad, Pune, Surat and Nagpur. In India the processing of e-waste is handled by the informal sector. The processing is very elementary and poses a grave threat to the environment and public health.[6] The waste is simply dismantled and valuables are kept for reuse, while what remains ends up on landfills, is openly burnt, or ends up in backyard recycling.[7] Within the national boundaries e-waste is generated by government, the public and the private sector. However, a secondary market and illegal scrap import also play a major role.[8]

Increasingly, India is becoming a dumping ground for e-waste. India generates around 0.3 million tonnes of e-waste annually, an amount that is predicted to grow exponentially to 1.6 million tonnes by 2012, according to the National Waste Electrical and Electronic Equipment (WEEE) Taskforce.[9]

India is also the sixth largest and the second fastest-growing producer of greenhouse gases (GHGs).[10] Due to climate change, the country is threatened with rising sea levels, droughts, torrential rain, flash floods, cyclones and forest fires, amongst other climate-related risks. These are resulting in serious impacts on ecosystems such as coastal mangrove and wetland systems, as well as impacts on human life, including an increase in the flood risk for coastal populations and threats to food security and human health. Two thirds of agriculture in India depends on rainwater. Though not actually easy to measure, due to irregular rainfall influenced by climate change and environmental hazards, farmlands are also facing drought.[11]

All of the above problems have created enormous additional pressure on India's industrialisation, socioeconomic development and poverty reduction efforts. Information and communications technologies (ICTs) have a high potential to increase energy efficiency and reduce GHG emissions.

Policy and legislative context

Policies and laws regarding environmental protection and sustainability have been introduced in India. The National Environment Policy of India was announced on 18 May 2006[12] as an umbrella policy for a range of environmental problems. It is the outcome of existing policies: the Environment Protection Act (1986), National Forest Policy (1988), National Conservation Strategy and Policy Statement on Environment and Development (1992), Policy Statement on Abatement

1 Wath, S. B, Dutt, P. S. and Chakrabarti, T. (2010) E-waste scenario in India, its management and implications, *Environmental Monitoring and Assessment*, SpringerLink, 12 February.

2 Robinson, B. H. (2009) E-waste: An assessment of global production and environmental impacts, *Science of the Total Environment*, 408, p. 183–191.

3 trak.in/tags/business/2010/04/07/internet-usage-india-report-2010/?utm_source=feedburner&utm_medium=twitter&utm_campaign=Feed%3A+trakin+%28India+Business+Blog+!%29

4 Dimitrakakis, E., Gidarakos, E., Basu, S., Rajeshwari, K.V., Johri, R., Bilitewski, B. and Schirmer, M. (2006) Creation of optimum knowledge bank on e-waste management in India, *ISWA Annual Conference*. www.iswa2006.org/papersalpha.htm

5 Sinha-Ketriwal, D., Kraeuchi, P. and Schwaninger, M. (2005) A comparison of electronic waste recycling in Switzerland and in India, *Environmental Impact Assessment Review*, 25, p. 492–504.

6 Sinha, S. and Mahesh, P. (2007) *Into the Future: Managing e-waste for protecting lives and livelihoods*. www.toxicslink.org/pub-view.php?pubnum=171

7 Dixit, N. (2007) E-waste: A disaster in the making, *CHANGE – The Goorej House Magazine*, 7 (2).

8 Veena, K. (2004) *E-waste in India, system failure imminent: Take action now.* www.toxicslink.org/pub-view.php?pubnum=40

9 Puducherry Pollution Control Committee (2008) e-Waste, *Quarterly News Letter of the ENVIS Centre*, January-March. dste.puducherry.gov.in/envisnew/tenthnewsjan-mar-2008.pdf

10 Environmental Legislation in India, January 2008. www.scribd.com/doc/30588775/Environmental-Legislation-of-India

11 www.scidev.net/en/climate-change-and-energy/climate-change-in-india/features/development-versus-climate-change-in-india.html

12 www.envfor.nic.in/nep/nep2006e.pdf

of Pollution (1992), National Agriculture Policy (2000), National Population Policy (2000), and National Water Policy (2002), amongst them. The National Environment Policy works as a guide to action on several fronts, such as regulatory reform, programmes and projects for environmental conservation, and the review and enactment of legislation by central, state and local governments. Although ICTs are not included in the policy, India set up the National Natural Resources Management System (NNRMS)[13] in 1983 for managing and mapping natural resources and environment.

The Ministry of Environment and Forests has drafted e-waste rules (dealing with the management and handling of e-waste) that were posted for comment on its website this year.[14] The Hazardous Waste Management and Handling Rules were regulated in 1989 and amended in 2000 and 2003. They are focused on the import of hazardous waste from any part of the world into India. Electronic waste was not, however, emphasised in existing regulation.[15]

Prime Minister Manmohan Singh released India's first National Action Plan on Climate Change (NAPCC) on 30 June 2008 under the Prime Minister's Council on Climate Change (PMCCC).[16] India also signed the United Nations Framework Convention on Climate Change (UNFCCC) in June 1992, and ratified it in November 1993. In 1994 India began preparing its First National Communication to the UNFCCC. This communication highlighted an inventory of GHG sources and sinks, potential vulnerability to climate change, adaptation measures and other steps being taken in the country to address climate change.[17]

The Ministry of Environment and Forests came up with the Guidelines for the Environmentally Sound Management of E-waste on 12 March 2008. These specify that India has no specific environmental laws or guidelines for e-waste and none of the existing environmental laws have any direct reference to e-waste or refer to its handling as hazardous in nature. However, several provisions of these laws may apply to various aspects of e-waste. Since e-waste falls under the category of "hazardous" waste, it is covered under the purview of the Hazardous Waste Management Rules (2003).

ICTs and climate change strategy

ICTs can function as sustainable means for mitigation of global GHG emissions and climate change threats. They have a critical role to play in combating climate change through the reduction of GHG emissions in India, which is the world's fourth largest economy and sixth largest GHG emitter. The country accounts for about 5% of global emissions; its emissions increased 65% between 1990 and 2005 and are projected to grow another 70% by 2020.[18]

Climate change is a part of the National Environmental Policy. The use and application of new technology is emphasised in the policy, such as energy efficiency technology, remote sensing, natural resource management, local information management and dissemination, disaster management, etc. Through the development of more energy-efficient devices, applications and networks that are alternatives to today's waste sources such as transport and travel, as well as the environmentally sound disposal of ICTs (e.g. low-emissions recycling), ICTs can be an enabling technology to stabilise and reduce emissions in all sectors.

While serving as a guide to action, the National Environment Policy also seeks to stimulate partnerships of different stakeholders (i.e. public agencies, local communities, academic and scientific institutions, the investment community, and international development partners) so as to harness their respective resources and strengths for environmental management.

India has launched several initiatives related to climate change.[19] These include the Indian Network for Climate Change Assessment (INCCA); the Himalayan Glaciers Monitoring Programme (HGMP); the Indian Satellite to Monitor Greenhouse Gases; India's Forest and Tree Cover as a Carbon Sink; National Policy on Biofuels, approved by cabinet to promote cultivation, production and use of biofuels for transport and in other applications; Energy Efficiency Standards for Appliances; Capacity Building in Forestry Scheme for forest personnel; and Intensification of Forest Management to improve forest management and infrastructure and prevent fires.

E-waste: The informal sector challenge

E-waste has become an acute problem in the country. It is estimated that India produced 0.3 million tonnes of e-waste in 2007, and it is growing. An additional 0.5 million tonnes are illegally imported into the country. The informal sector processes a large amount of e-waste in India through recycling and backyard scrap trading.[20]

Despite the problem, the legislation for e-waste is not fully in place. A task force has been constituted by the Ministry of Environment and Forests for the finalisation of guidelines on e-waste. There are also several laws in India that directly or indirectly deal with hazardous waste, such as the National Environment Tribunal Act (1995) and some notifications under the Environmental Protection Act (EPA, 1986).

Under the EPA, the ministry has created several rules to tackle the problem of hazardous waste management. It has drafted e-waste management rules where detailed liabilities and obligations of all stakeholders have been clearly spelt out. The draft rules lay emphasis on the responsibility of the producers, namely manufacturers and vendors, including financial responsibility, extending beyond the sale of

13 envfor.nic.in/envis/nnrms.html

14 moef.nic.in/index.php

15 www.e-waste.in/weee_policy

16 www.pewclimate.org/international/country-policies/india-climate-plan-summary/06-2008

17 envfor.nic.in/divisions/ic/wssd/doc2/ch2.html

18 www.pewclimate.org/docUploads/India-FactSheet-09-08.pdf

19 moef.nic.in/downloads/public-information/24_Recent_Initiatives_CC.pdf

20 www.pewclimate.org/node/6204

equipment and setting up of take-back systems for effective management and handling of e-waste.[21]

However, the informal sector – where 90% of the country's e-waste recycling is carried out – is ignored in the draft. The informal sector should be part of the new regulations. They should be involved in the collection, segregation, dismantling and refurbishing of e-waste. Recycling should be done only by approved units with pollution-control technologies.[22] The rules emphasise that e-waste can be handled only by companies registered with the Central Pollution Control Board. The government assumes it will be able to regulate the informal sector through its proposed rules – but the informal sector will do the business illegally.[23]

There is a demand to design new approaches and systems for e-waste collection, recycling and use. Such approaches will reduce the environmental impact by increasing reuse of equipment and parts, increasing the recyclability of materials found in e-waste, and developing a society that learns to balance rapid technological evolution with responsible product management.[24]

One option to deal with e-waste is to reduce the volume. Design and manufacturing has to be done in a way that the product is built for reuse, repair and is fit for upgrading. The focus has to be on production of less toxic, easily recoverable and recyclable materials that can be taken back for reprocessing, refurbishment, remanufacturing, disassembly and reuse.[25]

Most IT brands have already taken proactive measures for controlling and managing e-waste resulting from their products, with leading brands setting up their own take-back and collection systems.[26] Moreover, most IT products being offered on the market today are Restriction of Hazardous Substances (RoHS) compliant.

An e-waste system should be set up in conjunction with the informal sector. This must be in accordance with the National Environmental Policy and address sustainable development concerns. Already the policy encourages legal recognition and strengthening of the informal sector's system for collection and recycling of various materials.

The process of establishing an e-waste recycling and treatment facility has to be in line with the existing guidelines for establishing and operating a recycling and treatment and disposal facility for hazardous wastes. However, key issues like upgrading the present operating model in the informal sector call for the urgent establishment of a waste management channel. This will go a long way to engage the informal sector players into the mainstream of e-waste management and ensure environmental norms are adhered to.

The Indo-German-Swiss initiative for e-waste

The Indo-German-Swiss Partnership has been designed to serve as an information resource on the issues, problems and opportunities created by e-waste. It focuses on the present scenario in India, as well as on developing a common collaborative platform for stakeholders. The partners work in close collaboration with manufacturers, users, recyclers, and NGOs to develop a sustainable e-waste management system in India.[27]

New trends, new efforts

The government of India is insisting that it will shift from fossil fuels to renewable energy sources, including promoting solar energy. New satellite towns which are being built are designed in an eco-friendly manner. Eco-communities, resorts and housing complexes can also be found.

India is using ICT tools for different environmental projects to protect the environment. For example, it is planning to establish a centre for climate change research to provide data for modelling and monitoring climate change in the country. The centre will network with other national and international scientific institutes and universities that measure GHGs and monitor glaciers, temperature change and rainfall patterns. There are plans for a range of new satellites to contribute to climate change research, including the Indian National Satellite, INSAT-3D, and the Megha-Tropiques satellite, part of an Indo-French collaboration.[28]

The Planning Commission of India has recently set up an expert group to prepare a strategy on a low-carbon economy in India. The group will have to work out an holistic approach that takes on board concerns of all stakeholders – industry, transportation, power, labour, micro and small industry and agriculture – well in time before we embark on our Twelfth Five-Year Plan from April, 2012.[29]

A number of leaders in both the private and public sector are actively promoting a cleaner environment. These leaders can make a significant change in a company or in a certain locality. Social activists and environmentalists are also conducting awareness programmes and street campaigns, and holding meetings to save and keep clean the environment. Despite these positive signs there are also many alarming and strong signals of the graveness of environmental problems.

Action steps

The National Action Plan on Climate Change (NAPCC) has set up eight missions. These are the Solar Mission, Energy Efficiency, Sustainable Habitat, Sustaining the Himalayan Ecosystem, Green India, Sustainable Agriculture, and Strategic Knowledge for Climate Change.[30]

21 www.expresscomputeronline.com/20100517/news06.shtml

22 beta.thehindu.com/news/cities/Delhi/article433742.ece

23 Ibid.

24 Kahhata, R. et al. (2008) *Exploring e-waste management systems in the United States*, Arizona State University.

25 Ramachandra, T. V. and Saira, V. K. (2004) Environmentally sound options for waste management, *Envis Journal of Human Settlements*, March.

26 www.informationweek.in/Green_IT/10-04-29/MAIT_lauds_government_for_making_e-waste_rules_draft_public.aspx

27 www.e-waste.in

28 www.scidev.net/en/news/india-to-set-up-climate-change-research-centre.html

29 moef.nic.in/downloads/public-information/PM_DSDS.pdf

30 pmindia.nic.in/Pg01-52.pdf

Apart from the above missions of the NAPCC, the government is also putting in place advocacy efforts around energy security. This includes an awareness campaign, educational training, a rapid assessment of the disposal and recycling activities in cities, training programmes for skills, and technology upgrading of the sector. Special focus areas should also include NGOs. Local communities will have to be sensitised and prepared to work with government agencies. Public awareness, education and training will be most critical tools that should involve all sections of the public in the implementation process.

ICTs should be part of the policy and debate around climate change and implementation efforts where technology can bridge the gap between policy makers and implementers. Information is already available with stakeholders such as the as Department of Information Technology initiating citizen-centric Common Service Centres (CSCs). The knowledge platform needs to build the capacity of grassroots bodies/NGOs and village populations in variability assessment and on adaptation to climate change.

The current awareness levels regarding the existence and dangers of e-waste are extremely low in India. Government should immediately take action so that consumers and manufacturers become aware of e-waste and its impact.

Issues of e-waste management depend on the capacities of local government, the role of the operator of recycling services, the attitudes of citizens, and the role played by manufacturers and bulk consumers, all of whom need to shape and develop community participation. Raising the bar of civic sense and awareness among city residents is a major step needed. Collaborative campaigns to sensitise users and consumers to buy only necessary products that utilise emerging technologies (i.e. lead-free, halogen-free, recycled plastics) and from manufacturers or retailers that will "take back" their products are to be encouraged. Ensuring eco-labelling of products as a mandatory measure is a must. ■

IRAN

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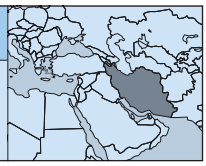


Introduction

In order to reach sustainable development there needs to be a compromise between environment and development. A report by the International Union for Conservation of Nature (IUCN) suggests that sustainability is not just about natural resources, but that it has a close link with political, social and economical stability.

This very reason was behind the United Nations Conference on Environment and Development, also known as the Rio Summit, in 1992. The result was Agenda 21, which was passed on 14 June 1992. The conference was a turning point in sustainable development. Since then, the issue of sustainability has become a global concern affecting all aspects of life such as poverty, inequality, education and health, the rights of women and children, freedom for different nations, politics, economics and international collaboration, and has been introduced as a way of achieving a better life.

In sustainable development, the human being is the centre of attention: people, in harmony with nature, are entitled to a healthy and prosperous life. Development is concerned not only with the rights of the present generation, but should equally cover future generations. The strategy of sustainable development convinced people that their futures are tied together.

In order to achieve sustainable development it is essential to observe human rights and to protect natural resources and the environment. Without human rights, sustainable development cannot happen. It should be noted that human rights are not only confined to freedoms, such as freedom of speech and prohibiting torture, but also cover some basic rights such as water, health, food, eliminating poverty, education, as well as freedom of information and access to the internet.

As mentioned, the aim of sustainable development is to cover all aspects of life and this cannot be achieved without social development. Social development targets aims such as cultural identities, social alliances, organisational development, citizen participation, and empowering human beings, especially women and youth.

The fundamental question is how the above aims can be achieved.

Policy and legislative context

The Islamic Republic of Iran has signed five important international documents including Agenda 21, the United Nations (UN) Millennium Declaration, the World Summit on the Information Society (WSIS) Declaration of Principles, and the WSIS Action Plan and Tunis Commitment.

The above documents create a framework of new concepts in understanding development and prosperity and insist on a wide spectrum of commitments in the fields of human rights, good governance and democracy. In accordance with these documents, each country agrees to fight poverty and to pave the way for and accelerate a dynamic economy. They also pledge to change consumption patterns, stabilising the world's population at an acceptable level, improve health, provide shelter, integrate environment and development, protect the atmosphere, protect jungles, and limit desertification, amongst other things.

In the social field, empowering women, youth and children, the participation of indigenous people in processes, the participation of NGOs, paying attention to labourers and recognising their unions are all important.

In the field of information and communications technologies (ICTs), with relation to WSIS (phases one and two), the following commitments are considered:

- An emphasis on being global, inseparable, mutually dependent, as well as on human rights and fundamental freedoms, democracy, sustainable development and good governance.
- Equal and free access for all.
- Widening access to global knowledge in relation to health and hygiene.
- Using ICTs to combat poverty and support indigenous products.
- Reducing the digital and gender gap by increasing the participation of women, and protecting children.
- ICT capacity building for all, especially for the youth and older women (highlighting permanent systems for e-learning and education).
- Digitalising historical and heritage data.
- An emphasis on governmental collaboration with NGOs and the private sector (i.e. on multi-stakeholder partnerships).
- The growth of small and medium-sized enterprises (SMEs).

Iran has passed four development programmes and one twenty-year vision strategy which have seen some progress and some failures in their implementation.

The third development programme emphasises decreasing governmental influence, the possibilities of the participation of the private sector, social security and social justice, subsidising essential foods for poor people,

improving science and technology, and creating an environmental policy to ensure the stability of natural resources. It also includes plans that involve supporting environmental NGOs and legalising financial support for environmental organisations, and things like reducing pollution through optimising the fuel systems of vehicles.

In the fourth development programme, action is focused on a number of issues, including paying attention to the knowledge-based economy in terms of the global economy, the protection of the environment, territorial spatial arrangement, training, reducing air pollution, and increasing health and security.

Unfortunately the government has not published progress reports on the third and fourth programmes, but according to official papers by the government watchdog (*Divan-e Mohasebat*) only 80 action steps out of 290 have been implemented on time.

According to the research centre from the Islamic Consultative Assembly of Iran, which reviewed the progress of the fourth development programme based on economic reports for the years 2005, 2006 and 2007, as many as 514 actions were not implemented.

An official international benchmark such as the Human Development Index (HDI) provided by the United Nations Development Programme (UNDP) shows that Iran is dropping in its position, and was ranked 88th out of 182 countries for 2009.

In comparison with the Persian Gulf countries, Iran has a slower rate of progress and holds the lowest ranking with reference to the life quality index.[1] We have to note that with respect to Iran's twenty-year vision, the country should have achieved first place amongst the Middle Eastern countries.

ICTs and the environment

As mentioned, environmental development is not separable from other aspects of development and for this reason the downfall in protection of the environment can also be seen.

Air pollution

Tehran is one of the most polluted cities in the world. Reports suggest that this year the pollution is 38 times more than the acceptable standard. As many as 5,000 people die from this each year. According to authorities, 70% of the pollution is caused by vehicles. New cars manufactured in Iran generate the same amount of pollution as 30-year-old vehicles, the reason being that the industry is a monopoly in the hands of those close to the government. One of the reasons for the high volume in vehicle presence on the roads is organisational bureaucracy. This can be reduced with the help and use of ICTs, with the knock-on reduction in air pollution. City traffic is one of the major concerns in Iran, and causes a waste in time and energy, air pollution, and psychological illnesses as result of stress, all of which can be solved by ICT development.

City management

As we know, managing the city involves controlling the city's affairs and pursuing benchmarks aimed at raising the standard of life in all aspects. This includes social, economic and cultural aspects, taking into account the effects and presence of all official and non-official related factors with the aim of reaching overall and stable development. In city management, managing town design, town planning, city economics, waste, utilities, transport and education have an important place. The best way for managing these issues in this present time is through the use of ICTs: that is, by working towards e-government and smart cities.

In the past years, considering the above solution has been at the centre of academic reviews. In the government of former president Mohammad Khatami a project evolved called TAKFA, which aimed to advance the use of ICTs in managing government. The change of government in Iran, and the coming to power of Mahmoud Ahmadinejad, meant that the allocated budget for this project changed – instead money was spent on means to suppress opposition and in creating more internet sites linked to the government.

Drought and mismanagement of water resources

Drought is a phenomenon which is unpredictable. The desert belt surrounding Iran is spreading. This complicated climate has serious social impacts, such as the migration of rural people to the cities, causing a rise in unemployment and homelessness, as well as an increase in drug addiction. Implementing ICTs and making use of environmental NGOs can help to combat drought and limit its social implications.

New trends

Even though there are serious obstacles in the field of sustainable development in Iran, there are some positive signs. These include a rise in academic levels, the use of ICTs, and the push for democracy and human rights, including environmental issues and calling for free internet access.

The state is one of the main actors currently preventing the better use of ICTs to combat environmental problems, such as climate change. For instance, one of the serious issues in Iran with regard to the use of ICTs is the blocking of TV transmitters with noise in order to prevent people from receiving satellite communications. This also causes dangerous health hazards for the Iranian people.

The use of different methods such as virtual private networks (VPN) and proxies to combat filtering information is now common, and the reality is that the youth and people interested in using ICTs have been successful in their struggle. The political uncertainty in the country and harsh suppression of civil society have resulted in less attention being given to environmental issues and climate change.

1 hdr.undp.org/en

Instead, an organised civil society, and relatively disorganised social networks with a common aim, have been developed. The common approach of these networks is to combat censorship and to fight for democracy with non-violent means.

Action steps

Sustainable development in Iran

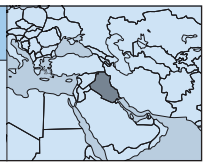
Sustainable development is included in the third and fourth development programmes and the twenty-year vision strategy, but there is a lack of commitment, especially after 2005. Therefore there should be special attention and focus by the government on its international agreements.

Digital divide

Even though the use of dial-up has passed its expiry date, it is a common way of accessing the internet in Iran. Filtering has prevented accessing free information by intellectuals, especially the youth and women, and has widened the digital divide in the country. As all governments agreed to reduce the digital divide, there should be a demand on the government to bridge the divide by providing fast and cheap internet. A connected society is one that can respond better to the imperatives of sustainability. ■

IRAQ

Alaa Aldin Jawad Kadhem Al-Radhi



Introduction

Iraq is facing the full force of climate change. This includes severe drought and water shortages over the past years, which have produced negative consequences in the forms of devastating dust storms, a loss of water to lakes and reservoirs, and the disappearance of the Iraqi marshes. In the complete absence of any climate change policy – never mind information and communications technologies (ICTs) and climate change policy – as a result of the country's instability, and intermittent international aid, there is an urgent call for the Iraqi government to set this issue as a priority agenda for the next parliament after the recent March 2010 elections. This should ideally also result in an "ICTs and climate change" strategic plan, with the collaborative help of local multi-stakeholders and international community aid, which addresses the current deteriorating Iraqi climate change indicators. Iraq should also adopt global best practices, mitigation measures and solutions. This cannot be done by the Iraqi government or local stakeholders alone. The government needs to consult international strategic partners (World Bank, UN agencies, etc.) to develop short- and long-term strategies.

Policy and legislative context

Unfortunately, Iraq currently has neither a climate change policy nor an ICT policy. Instead, the last governmental cabinet (2005-2010) was marked by a sectarian environment, a high level of bias and corruption, and a lack of vision. As a result, government programmes and projects have had very little impact.

The ministries that should be responsible for ICTs and climate change are:

- The Ministry of ICT,[1] which was supposed to draft a National ICT Policy for approval by the Iraqi Parliament.[2] This has not been done.
- The Ministry of Environment[3] and Ministry of Water Resources,[4] which were collaboratively supposed to have addressed the severe climate change challenges faced by Iraq in the form of a nationwide strategic policy. However, there is no climate-change related legislation, and the issue has not been on the ministries' agendas.

The last Iraqi parliament, which ended its duties in March 2010, formed a Health and Environment Committee that should address climate change issues in conjunction with relevant sectors. However, it has never put the climate change issue on its agenda.[5]

The challenge of awareness and priorities

Since 1980, Iraq has suffered cumulative deteriorating circumstances due to three major wars, international sanctions, post-2003 civil violence and very poor governmental performance. These have affected the overall humanitarian situation, as well as challenges such as climate change. When accompanied by the post-2003 poor progress in the implementation of government programmes, as well as widespread corruption, the status regarding ICTs and climate change can be summarised as follows:

- "Sustainability" is a missing term in Iraq specifically and in the Arab region generally.
- An ignorance amongst policy makers when it comes to climate change challenges. For initiatives to be effective in the Iraqi culture, they need top-down policies where the government should have the upper hand. However, the government is not aware of this, and the ignorance of policy makers persists.
- An incompetence amongst governmental leaders who should advise and address ICTs and climate change needs and set action steps for going forward.
- An absence of Iraqi officials at international climate change knowledge sharing and other events. This is due to ignorance and a failure to cope with the processes of entering the global arena again.
- An increase in "uncertainty", "desperation" and "lack of hope" amongst Iraqi citizens. This is clearly seen in the scepticism that any governmental programme will succeed, due to rampant corruption and other deficiencies.
- A huge public awareness gap. Without raising the awareness of Iraqi citizens, they will not understand or appreciate the seriousness of climate change.
- Huge ICT skills shortages and a lack of capacity-building programmes. Needless to say, ICT knowledge should come first for those who must deal with ICTs and climate change issues.
- Most academic institutions have no ICTs and climate change and greening ICT course offerings. This is due to a lack of Iraqi academic staff specialised in this area,

1 www.moc.gov.iq

2 www.parliament.iq

3 www.moen.gov.iq

4 www.mowr.gov.iq/english

5 www.parliament.iq/Iraqi_Council_of_Representatives.php?name=articles_ajsdyawqwqdjasdba46s7a98das6dasda7das4da6sd8asdsawewqeqw465e4qwe q4wq6e4qw8eqwe4qw6eqwe4sadkj&file=listalltopics&op=newindex&catid=16

as well as a lack of international academic collaboration and funding.

- A complete lack of accurate indicators and datasets. Without these figures, it will be hard to gauge where Iraq stands and to develop the necessary action plans.
- Low internet penetration. Internet access availability is still very poor for Iraqis. The penetration rate is about 1% according to the International Telecommunication Union (ITU), as of September 2008.[6] There is a complete dominance of one state institution, the State Company for Internet Services (SCIS),[7] which is the internet service provider (ISP). However, it has slow ADSL connections, no broadband plans, and outdated telecommunications infrastructure. Only rich people use VSAT (very small aperture terminal) satellite internet service, often sharing subscriptions because it is not affordable, and is also dependent on diesel electricity generators. Internet availability is critical to get ICT and climate change learning platforms off the ground, including information awareness projects.

The World Bank, the main contracted consultant advisor to the Iraqi government, has no thematic works on climate change issues in their strategic work for Iraq.[8] However, the United Nations Development Programme (UNDP) recently started to advocate around the issue, as part of UNDP efforts to achieve the Iraqi Millennium Development Goals (MDGs) (especially MDG 1, eradicating extreme poverty, and MDG 7, ensuring environmental sustainability). The UNDP started working with Iraqi authorities, including the Prime Minister's Advisory Office and the respective ministries for the environment, water resources and the marshlands.[9] Its main focus is water management, and it aims to support the introduction of related policies and strategies. It has launched advocacy campaigns in some local Iraqi governorate authorities.[10]

There are some local Iraqi NGO and civil society initiatives that address climate change as a core issue in their missions. However, most of these lack real expertise of how their missions can be technically and operationally adopted locally. Most of them are in desperate need of international funding, expertise and guidance for real nationwide collaborative works. They face many serious challenges: security barriers, corruption, the bureaucracy of international agencies when it comes to partnership models, a lack of civil society work culture and total ignorance on both the public and government sides.

The only seemingly viable local activist NGO is Together Echo.[11] TogetherEcho's mission is environmental and human rights protection. In 2005 it started establishing environmental libraries in schools, running awareness campaigns, issuing publications and posters, seeding trees, and conducting local environmental conferences and outreach initiatives. However, due to security issues it moved to the safest area of Iraq, the Kurdistan region. It also faces funding difficulties: its website has not been updated since 2008 and its programmes have gone silent. TogetherEcho offers a good starting point on how to deal with ICTs and climate change and greening ICT issues.

In early 2010, a diverse group of Iraqi activists and NGOs launched a nationwide initiative: the Iraqi Initiative for Environmental Sustainability. The group consists of academics, ex-pat Iraqis, international aid and donor agency representatives, and various local NGOs. The initiative's major objective is to develop Iraqi social awareness of how to face responsibly the risks threatening the environment. What is new in this initiative is that it has international advisory council members who may help the initiative to set up effective programmes and projects that tackle Iraqi climate change issues. It is hoped that this initiative will play a pioneering role in addressing ICTs and climate change issues via the knowledge transferred by its international advisory council members.

There is a marked absence of the private sector in ICT community-based knowledge that focuses on humanitarian themes, such as climate change. True public-private partnerships do not exist at the national level. A lack of governmental intervention, policies, patronage and trust sustains the mono-vision of the private sector as a stand-alone sector working for its own financial interests without caring for the community's environmental challenges. Despite the repeated government line that public-private partnerships are essential, it has not really played a strategic role in encouraging these partnerships. Due to high corruption levels, government leaders attract the business community for illegitimate short-term profits only.

After 2003, based on the idea of transforming Iraq into a modern state, a ministry called the Ministry of Civil Society Organisations was formed in order to encourage the flourishing of civil society NGOs. This ministry completely failed to achieve its mandate. Later it was changed to a small "directorate" or department within the Council of Ministers Secretariat.[12] Again, this department has no solid collaborative and patronage vision with local NGOs, and has actually stopped registering local NGOs for a year now. Despite the huge Iraqi oil revenues (more than USD 300 billion during 2006-2009), neither the ministry nor the directorate has ever funded or supported a single local NGO programme.

6 www.internetworldstats.com/middle.htm

7 www.scis.gov.iq

8 web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/MENAEXT/IRAQEXTN/0,,menuPK:313111~pagePK:141159~piPK:141110~theSitePK:313105,00.html

9 www.iq.undp.org/UploadedFiles/Sections/62e51eab-bd5a-402f-a442-396e5bbbff91.pdf

10 www.iq.undp.org/UploadedFiles/HomePage/24307e13-1c12-49e6-a976-fde1f61bddc3.pdf

11 togetherecho.org

12 www.ngoao.gov.iq

New trends

Iraq recently held a new round of elections for the next four-year period. Some of the elected winners raised the environment as an issue in their election campaigns. It is widely hoped that the new government will be a true partnership between disparate bodies that takes care of the country's big challenges, among them climate change. Accordingly, new ICTs and climate change and greening ICT policies and legislation are expected. Also anticipated are true public-private partnerships with the business community, locally and internationally, as well as government and civil society engagements.

The government's increased collaboration with the international aid community, namely the UN bodies, is vital to address the country's catastrophic problems. On 11 May 2010, the UN and Iraqi government signed an historic agreement[13] to boost development and restore services and economic growth. This is the first United Nations Development Assistance Framework (UNDAF) for Iraq for the period 2011-2014, and establishes a new strategic partnership between the funds, programmes and agencies of the UN, and the Iraqi government. The UNDAF reflects the priorities of the Five-Year National Development Plan that considers effective human capital as a main pillar for building a new Iraq. One of the UNDAF priorities in this agreement is environmental management[14] with the following sub-items:

- Promotion of sustainable development
- Control of the environmental situation
- Environmental capacity development
- Environmental awareness and regional and international cooperation.

UN agencies have good expertise in using ICT tools for climate change mitigation and greening. The good relationship between the Iraqi government and the UN opens positive horizons for a win-win situation regarding using ICTs for Iraqi climate change mitigation.

Action steps

An urgent call for the next Iraqi government to take serious action on the issue of ICTs and climate change and greening ICTs is necessary. This should be done via:

- Adopting ICT and climate change legislation to enforce top-down policies and strategic actions.
- Establishing indicators to evaluate and assess Iraq's current status regarding climate change, and to plot the way forward.
- Setting up a strategic entity that incubates business, civil society and academic communities effectively.
- Modifying school (primary, intermediate and secondary) curricula to include "climate change", "ICTs" and "greening" topics.
- Harmonising with global best practices.
- Building Iraqi research and technical capacity through engaging with Iraqi academics and researchers in global research and development (R&D)-related contexts. For example, the EU has well-established collaborative relationships and research on ICTs and climate change and greening ICTs in their Seventh Framework Programme (FP7).[15]
- Establishing nationwide media and awareness campaigns to alert and educate the public.
- Providing internet access widely by promoting competition amongst ISPs. ■

13 www.uniraq.org/newsroom/getarticle.asp?ArticleID=1324

14 www.iauiraq.org/reports/UNDAF_May%2017_english.pdf

15 cordis.europa.eu/fp7/environment/home_en.html

JAMAICA

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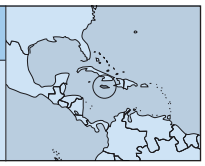

Introduction

In the Caribbean, climate change is posing new and worrying environmental and social challenges. Unusual weather patterns, altered hurricane frequency and intensity, rising sea levels transforming beach fronts and residential shorelines: these are just some of the visible indications of climate change in the region.

Even as questions arise about the anthropogenic basis of these changes, the documented position of the Intergovernmental Panel on Climate Change (IPCC) cannot be ignored. The IPCC noted in 2007 that "most of the observed increase in global average temperatures since the mid-20th century is likely due to the observed increase in anthropogenic greenhouse gas concentrations."[1]

Within the specialised academic field of information and communications technology (ICT) policy analysis, as well as in practical public policy spheres globally, there are ongoing efforts to devise ICT best practices and applications for combating or adapting to climate change. This report addresses the existence or adequacy of ICT programmes and policies to combat climate change and manage electronic waste (e-waste) in one of the Caribbean's larger island economies: Jamaica.

Policy and legislative context

The Clean Air Act (1964) and the Ozone Act (2008) are the two main pieces of legislation that could be broadly considered as mitigating aspects of climate change in Jamaica. The Clean Air Act speaks to four main substances: smoke, fumes, gases and dust. However, this piece of legislation seems more directed towards protecting the public's health under historical conditions, with little reference to new concerns relating to climate change. In 2002, the Air Quality Regulations managed by Jamaica's Natural Resources Conservation Authority came into effect through the constitutional powers of the minister given under the Natural Resources Conservation Authority Act. The Air Quality Regulations were instituted on account of concerns about the impact of climate change on public health. They improved on the 1964 Act by listing among the harmful air pollutants, the greenhouse gases carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride. The Ozone Act also speaks broadly to conditions on the importation of refrigerant equipment with dangerous chlorofluorocarbons. There is not a sufficient link, however, between these two pieces of legislation and initiatives to promote the development of ICTs and the new cyber economy in the country.

In terms of policy, Jamaica's most recent ICT policy (2009) identifies the link between ICT and the environment in two particular ways. The first concerns the proper disposal of ICT waste, and the second relates to the threat of electromagnetic radiation. Under the section dealing with ICT waste disposal, the policy document notes the imperative of establishing standards especially in relation to the importation of ICT equipment. It also includes a discussion of the need for recycling and/or reusing ICT equipment.

The National Energy Policy 2009-2030, which speaks directly to the link between energy usage and climate change, was recently developed by the Ministry of Energy and Mining. The energy policy acknowledges that Jamaica contributes little to global carbon emissions, but stands to face disproportionate costs because of its location and status as a small island developing state. The energy policy sets out three strategies to be employed for climate change mitigation and adaptation. The first is a carbon trade/auction, the second a carbon trading policy, and the third a process of systematic energy conservation and usage efficiency. The latter was to be attained through the transfer of energy-efficient technologies including ICTs and the promotion of renewable energy sources. Other supplementary policies were also identified by Jamaican policy makers that together help to play a role in the country's adaptation and mitigation strategies. These include the Forest Policy and the National Forest Management and Conservation Plan, the National Land Policy, the Watersheds Policy, the National Biodiversity Strategy and Action Plan, and the National Hazard Mitigation Policy.

These diverse provisions are clearly important and reflect the existence in the country of a strong and growing environmental lobby and a willingness of legislators and the public to take action towards the protection of the environment. However, this needs to be further translated into closer linkage to the nascent ICT sector. A significant gap remains, for example, in relation to the managing and disposing of ICT waste. It is of note that the National Solid Waste Management Act which established the National Solid Waste Management Authority (NSWMA) does make provisions for the disposal of hazardous waste, under which ICT waste could be classified. There also appears to be some uncertainty as to the existence of a national e-waste policy. A draft Policy and Policy Framework for Hazardous Waste Management was developed for Jamaica in 2003, which explicitly articulated the appropriate policy

1 IPCC (2007) Summary for Policymakers, in Solomon, S. et al. (eds.) *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change.* www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-spm.pdf

approach to e-waste disposal.[2] However, in 2008, there was a National Policy and Strategy for the Management of Hazardous Wastes in Jamaica, which does not make any specific provision on e-waste.[3] Such discontinuities make unclear which policy document, if any, is currently guiding ICT waste disposal in Jamaica.

ICTs, climate change and environmental sustainability

As a small island developing state, Jamaica bears disproportionate costs associated with climate change, compared with her mainland developed country counterparts. Persistent sea level rises associated with global warming are already creating coastal inundation, with huge implications for the flagship tourism industry as well as for critical infrastructures that are located on the coastlines. Aberrant rainfall patterns such as those experienced in the 2009 to 2010 droughts have had significant negative effects on the country's agricultural, domestic and other interrelated sectors. The absence of any significant rainfall levels in this period when there were also few significant hurricanes affecting the region contrasts with the preceding 2008 period which saw an active hurricane season and significant rainfall. During the drought, severe water shortages disrupted schools, communities and businesses. The management of trucked water supplies could have been aided by better use of ICTs, including mobile phone and media advisories of trucking schedules. National policies should address ways in which ICTs can similarly assist in monitoring and managing scarce essential supplies, not just for Jamaica, but also for the entire Caribbean.

It has been over a decade since Jamaica acceded to and ratified the United Nations Framework Convention on Climate Change (UNFCCC) on 6 January 1995. In keeping with the conditions of the accession, Jamaica developed its first National Communications Policy on climate change, which was submitted to the UNFCCC in 2000, and its second draft National Communications Policy was completed in 2009. Despite these significant policy initiatives, little has been achieved by way of appropriate legislative changes towards public education for the country. This inactivity in public education and communication policy planning is perhaps indicative of a lack of awareness among key political actors of the imperative of fostering public sensitivity to climate change in Jamaica, possibly using ICTs.

This operational gap persists despite the provision in the National Communications Plan of 2000 that "there should first be promoted a greater awareness and understanding among the relevant agencies and institutions of the importance of the issue, and of the need to mainstream vulnerability, mitigation and adaptation strategies in the broader national sustainable development plan."[4] This kind of sensitisation about climate change should be a major issue in Jamaica as the country currently grapples with so many simultaneous development challenges. There is a risk that in the face of contending demands, climate change will not receive the policy attention it needs, both at the level of government ministries and also at the community level. It is in this respect that a public policy champion is required to lead in popularising adaptation and mitigation strategies for climate change using ICTs.[5]

A national policy champion on the impact and use of ICTs in climate change would also see to the foregrounding of the subject in the implementation of the country's national development plan, called Vision 2030. The plan articulates two national policy objectives: (i) the development of measures to adapt to climate change and (ii) contributing to the effort to reduce the global rate of climate change. A total of ten government ministries and agencies have been identified with responsibilities to achieve these objectives, but none is given an explicit role for leading and coordinating the initiative. One candidate for this role is the National Meteorological Service, Jamaica, since it already acts as the focal point for all national communications with the UNFCCC and on all other climate change matters. This could be achieved by broadening or extending the parameters of the climate branch within the National Meteorological Service, a unit not unaccustomed to the delivery of daily public information outputs on prevailing climatic conditions.

This branch currently has responsibility for:

> [M]aintaining a current database of the climate of Jamaica and for the utilization of this data in informing productive sectors of the country. It consists of a Data Acquisition Section that sets up and maintains an island wide network of rainfall and climatological stations; a Data Processing Section that gathers, archives and analyses the climatological data with a view to monitoring and assessing the climate of the island; and an Applied Meteorology Section that processes the needs of clients, which include crop water requirements, design criteria for hydrologists and engineers, and climatological information for resolving weather related legal and insurance issues.[6]

Under this framework, significant institutional cooperation and collaboration would be needed between the meteorological service in Jamaica and the Central Information Technology Office (CITO), to examine and develop ICT applications for environmental sustainability and climate change adaptation.

2 Government of Jamaica (2003) *Policy and Policy Framework for Hazardous Waste Management in Jamaica.*

3 Government of Jamaica (2008) *National Policy and Strategy for the Management of Hazardous Wastes in Jamaica.*

4 National Meteorological Service Jamaica (2000) *Initial National Communication of Jamaica.* www.metservice.gov.jm/Climate%20Change/Initial%20National%20Comunication%20of%20Jamaica.pdf

5 Torres, C. and Tirol, M. S. (2010) *Advancing Adaptation through Communication for Development*, Food and Agriculture Organization of the United Nations, Rome.

6 www.metservice.gov.jm/aboutus.asp

There is also the need for organised implementation of mitigating strategies for e-waste as discussed earlier. With the total number of mobile subscribers outstripping the population, and with the average per-person time span for mobile phone change being 18 to 24 months, it is clear that a huge stock of disused mobile phones is accumulating annually in Jamaica.[7] From correspondence with the National Solid Waste Management Agency (NSWMA), the agency responsible for implementing policy on waste disposal, the following conclusions were reached on e-waste disposal:

- The use of landfills and other existing disposal sites operated in Jamaica are not the appropriate waste management solutions for ICT waste. Disassembling and diversion of the various fractions for appropriate recycling, recovery or treatment options is ideally required. However, those industries and resources are not local and so the exporting of these waste materials may well be the best option for a small island developing state such as Jamaica.
- The NSWMA had stored e-waste in the past. That was however an interim arrangement which proved unsustainable, as the agency was not able to accommodate all the e-waste being generated, resulting in a request to provider companies to retain stocks in their possession.
- Jamaica is a Basel Convention signatory and as such is entitled to participate in initiatives such as the Mobile Phone Partnership Initiative (MPPI) and the Partnership for Action on Computing Equipment (PACE). These initiatives have the potential for application of the extended producer responsibility (EPR) framework for ICTs and the subsequent development and implementation of environmentally sound management of ICTs locally.
- Jamaica presently has transboundary regulations that implement the Basel Convention and that will allow for the export of materials containing hazardous components to other Basel signatory countries for environmentally sound management.
- There are economic opportunities to be gleaned from the environmentally sound management of ICT waste, but most significantly, failure to manage the waste appropriately while the use of ICTs continues to grow exponentially has the potential for significant negative impact on environmental sustainability and health.

Despite these policy prescriptions, there is still no implementation plan for e-waste disposal. The country's leading environmental authority, the National Environment Protection Agency (NEPA), recently indicated that a policy paper is being developed and would soon be ready for industry consultation before submission for parliamentary approval.

The Bureau of Standards, as the primary standards body in Jamaica, is a participating member of the ISO TC 207/SC 7,[8] which signals the Bureau's awareness of the significance of carbon emissions standards and management for ICT and other sectors in Jamaica.

New trends

An important new trend currently being financed by the United Nations Development Programme (UNDP)-Global Environment Facility (GEF) and the Jamaican government is a community-based approach to adaptation to climate change. Jamaica is among ten countries selected globally to participate in this project, which is expected to be mainstreamed in other countries. The project is designed to be closely aligned to the sustainable development priorities or objectives of selected communities across the island. However, it is significant and worrying that no explicit ICT components have been included in the Jamaican project.

Regional supra-national cooperation on climate change is another important trend. Given the unique context of Jamaica and the wider Caribbean, these islands have seen it fit to pool their resources toward leveraging their collective wealth in pursuit of climate change mitigation and adaptation strategies through the establishment of a Caribbean Community Climate Change Centre (CCCCC). The Centre represents a high-level advisory body to CARICOM (the Caribbean Community), of which Jamaica is a part, as well as being the repository for climate change data. Although the Centre was established only five years ago, it has now come to the fore, particularly in the context of the recent Copenhagen summit that intensified analysis of climate change and the imperative of its abatement. The CCCCC therefore forms an important regional resource that could help to stimulate harmonised national policy making on climate change and ICT policies.

Digital switchover

The impending International Telecommunication Union (ITU)-mandated switchover from analogue equipment to a policy of using digital technologies in the global broadcasting environment is likely to generate a large volume of discarded ICT hardware. While some countries have already embarked on analogue switch-off, their manufacturers are still making radio and television sets employing the older technologies. Important challenges for Jamaica and the Caribbean include how to handle the increased disposal of hardware over the next decade and how to avoid being subjected to the danger of dumping by more advanced countries or unscrupulous equipment manufacturers. The existence of an Anti-Dumping Commission and the requisite legislation will hopefully help to reduce the likelihood of this imposition. Already, the agency leading the switchover, the Broadcasting

7 Dunn, H. (2009) Reducing the Carbon Footprint and Other Negative Environmental Consequences of the Global Telecommunications and ICT Sector, paper presented at the Caribbean Conference on Information and Communications Technology (CCICT), University of the West Indies, Kingston, Jamaica, 16-17 March.

8 ISO TC 207/SC 7 is the International Organization for Standardization Technical Committee on Greenhouse Gas Management and Related Activities. This committee is charged with the responsibility of devising standards on carbon emissions and their management for a wide variety of products.

Commission of Jamaica, has alerted retailers and the general public about the need to purchase digital television equipment, thereby avoiding new challenges in the disposal of ICT waste.

Action steps

In the context of this report, there are certain key action steps that the Jamaican authorities may wish to consider:

- The emphasis of climate change and its implications as a higher priority by government, the business community and civil society.
- The identification of an existing agency to serve as the climate change policy champion that could coordinate the country's climate change strategy and promote it among political and business leaders, as well as to civil society more broadly.
- The need for updated policy guidelines that identify explicit means by which ICTs can be deployed in climate change adaptation and/or mitigation at all levels of society.
- The need for legislation on the safe disposal of e-waste such as disused mobile phones, computer hardware, broadcasting industry detritus and old consumer products.
- Development of a coherent national climate change policy in place of the splintered and uncoordinated current provisions. ■

JAPAN

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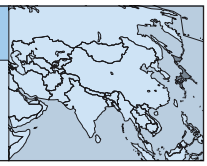

Introduction

Right after being elected as Japan's new prime minister in September 2009, Yukio Hatoyama pledged to cut the country's greenhouse gas (GHG) emissions by 25% from 1990 levels by 2020. This pledge was made at the United Nations (UN) climate change summit in New York, where Hatoyama was calling for effective and fair international mechanisms to provide support to developing nations as part of efforts to tackle global warming with all major actors participating. Though Hatoyama stepped down from the premiership in June 2010, his successor Naoto Kan and the ruling Democratic Party have stuck to this commitment, making "green innovation" policy one of the five key strategies for economic development.

This pledge had a mixed reception in Japan, however. Most environment-conscious citizens welcomed it, while many industry leaders expressed their concerns that the 25% reduction might impose burdensome regulation and restrictions on their economic activities and severely hinder economic growth.

Given the accelerating take-up of information and communications technology (ICT) products and the fact that the power consumption of ICT products is increasing rapidly, the ICT industry has serious obligations to contribute to the environment. General awareness of these obligations does exist in Japan among ICT industry leaders, as well as policy makers and some civil society activists.

The role of government

In Japan, there are two ministries working on environmental issues to do with the ICT industry: the Ministry of Internal Affairs and Communications (MIC) and the Ministry of Economy, Trade and Industry (METI). The former is in charge of the telecommunications industry and the latter in charge of the computer and electronics industry, as well as general manufacturing and energy industries.

MIC initiatives

In 2007, MIC convened a Study Group on ICT Policy for Addressing the Issue of Climate Change and made its forecasts on the effects of green ICTs in Japan from a mid-term perspective. According to its report published in April 2008, the power consumption of the communications and broadcasting industry will reach 73 billion kilowatt-hours (kWh) by 2012, generating 30 million tonnes of CO_2 emissions. On the other hand, the increasing popularity of e-commerce, dematerialisation and the reduced need for people to travel as enabled by ICTs will reduce the CO_2 emissions in society as a whole by 68 million tonnes by the same year. As such, MIC concluded that the overall effects of ICTs on CO_2 emission reductions in society seem set to be more than double the amount of CO_2 emissions caused by ICTs themselves.

Subsequently, MIC co-hosted the International Symposium on ICTs and Climate Change in Kyoto in April 2008 with the International Telecommunication Union (ITU). The ITU, which established its Focus Group on ICTs and Climate Change also in 2008, is now making climate change a key priority. This includes strategies to work on the creation of a standard methodology for calculating the carbon footprint; harnessing the power of ICTs to actively reduce the carbon footprint; monitoring climate change through the use of remote sensing; and providing key climate data via radio-based applications.[1]

MIC also developed the ICT Innovation Promotion Project for Global Warming Measures (PREDICT) to award research and development proposals that will contribute to the significant reduction of energy consumption within two to three years by applying innovative technologies. To date, nine programmes have been awarded funding.[2]

METI initiatives

METI convened a study group on green ICTs and estimated the effects of energy conservation of IT equipment itself (such as office computers or the internet) as well as those to be achieved by solutions using IT equipment, not only in Japan but also throughout the world. It estimated that by introducing energy-efficient technology in IT equipment, power consumption could be reduced by 40%, or around 100 billion kWh in Japan and two trillion kWh worldwide. Based on these assumptions, METI is promoting innovation aimed at producing more energy-efficient ICT products and services.

Among several specific measures that METI and MIC are deploying, "Eco-Points" has become widely appreciated by consumers. This measure is a generous incentive programme that provides cash-equivalent points for the purchase of eco-friendly home appliances such as TV sets, air conditioners and refrigerators that meet the criteria for energy saving. Depending on the accredited energy efficiency of the product, a certain number of "points" are given to the purchaser who can later claim cash-equivalent coupons, food, crafts, or many other items of their choice.

1 www.itu.int/themes/climate

2 www.soumu.go.jp/main_sosiki/joho_tsusin/eng/Releases/Telecommunications/100326_a.html

More than 17 million applications from individuals and corporations were submitted from July 2009 until June 2010. The equivalent of JPY 245.5 billion (USD 3 billion) has been granted to the applicants. Despite its popularity, this programme, together with a similar incentive programme for purchasing energy-efficient cars, will be terminated this year due to a severe budget deficit.

The role of industry

To move towards a low-carbon society, industry as a whole should act. However, the ICT industry can uniquely provide key infrastructure to help reduce the energy consumption of other industries and the whole of society. Though not sufficient yet to achieve the promised 25% reduction by 2020 in Japan, there are a number of activities that the ICT industry can carry out to address climate change in Japan. Below are some examples of these activities.

Replacement of existing services

The most basic but direct effects can be achieved through dematerialisation. Typical examples include the introduction of e-billing and e-payments.

An internet service provider in Japan, NEC Biglobe, for example, reported that it has achieved a 98.5% reduction in its CO_2 emissions by replacing paper-based direct mailings with email. Not only does this appeal to users in terms of greater convenience, but it can also offer extra benefits such as discounts on fees or the redemption of points as part of an incentive system. Many similar programmes are found among telecommunications service providers, as well as other service providers in the financial, insurance and retail industry, as the move cuts down on company expenses significantly.

Advanced control and automation

ICT networks have the ability to make intelligent judgments based on data on a real-time basis. Much more precise control is possible with fewer errors compared to control and management based on human judgment. The fact that accurate, round-the-clock control of large volumes of data is possible makes a huge contribution to the conservation of resources.

For example, it is now fairly common to see the use of infrared sensors to turn public washroom lighting on as people enter and then off when they leave. Some companies in the food service industry use networks in their kitchens to monitor the amount of electricity that is being consumed, and control their cooking appliances, air conditioning and lighting in an integrated manner so as to minimise their power consumption. Savings on the order of 10% can be achieved for cooking appliances alone by operating them only when they are needed. Sharp has been developing range sensor technology that can dynamically measure the distance between a PC and its user: whenever the user walks away the PC can switch over to power-saving mode.

Establishment of the Green IT Promotion Council

The Green IT Promotion Council was jointly proposed and established by seven industry associations in February 2008. The seven associations include the Japan Electronics and Information Technology Industries Association (JEITA), the Japan Information Technology Services Industry Association (JISA), the Communications and Information Network Association of Japan (CIAJ), and the Japan Users Association of Information Systems (JUAS). These industry groups have joined together in pursuit of a single common goal of contributing to addressing global environmental issues. As of May 2010, 307 member companies and associations had joined the Council.

The activities of the Council include technological development to create a road map for energy-saving technologies through to 2025, and measurement and analysis to measure or estimate the energy-saving effects of ICT equipment itself and the energy-saving effects enabled by the use of ICT.

In August 2008, a sub-working group (SWG) was established to focus on energy savings in data centres. This SWG works in cooperation with The Green Grid in the United States, exchanging technical information on energy conservation in data centres.

Action steps

To create a low-carbon society, we propose that government, industry and citizens take the following steps:

Industry: Improve efficiency beyond industry silos

A single entity can achieve functions that promise effects in the short term. However, functions that are more important and generate effects in the medium term often require collaboration among multiple actors. In pursuit of optimisation throughout the supply chain, efforts must be made to enable many companies, regardless of whether they are upstream or downstream in the supply chain, to participate in activities to fulfil such functions by overcoming differing interests. Through such efforts, an ecosystem that enables the entire supply chain to achieve energy conservation and resource savings can be created.

A large-scale company that has the ability to take the initiative and that is well known to consumers can take the lead in building an industry-wide supply chain mechanism. This may be the quickest and easiest way to improve efficiency.

In a comparably small-scale supply chain that mostly consists of small- and medium-sized companies or that covers a limited area, using shared service through application service providers (ASPs) or "software as a service" (SaaS), more widely known as "cloud computing", could be highly effective.

In considering the means of reducing energy consumption and addressing environmental problems, an effective shortcut is to look at the steps taken by other companies in the same industry, as their experience is likely to be very similar. One possibly good example of such exchange of best practices is the sharing of data centres. There are several

data centres in Japan that offer services targeting common operations within the same industry. Compared to developing individual systems and setting up facilities to operate separately, major savings can be expected in development cost and operational expenses. However, any attempt to promote the establishment of such a mechanism to be shared by competitors within a given industry requires understanding among all concerned, so that such a mechanism is mutually beneficial and does not affect the competitiveness of any one company.

Government to take the lead

There are several key policy areas where the Japanese government should take the lead.

Increase support for investments in energy-saving projects and use of energy-efficient appliances

To accelerate a cycle of development, introduction and improvement of energy-efficient technologies and services, government support is essential in areas such as tax incentives and subsidies for innovative programmes.

Widening the scope to Asia

Another area that will see slow progress if left up to the private sector alone is the adoption and spread of environmental values in international trade and currency dealings. In Asia, Japan was the first country that ratified the Kyoto Protocol. Based on its experience in controlling the carbon footprint, Japan should take the lead in these endeavours for the region. It is our obligation to achieve successful effects by making use of ICT networks to apply measures for controlling climate change, and to share such effects with other countries in Asia.

Citizens as consumers, users and advocates

There are different "kinds" of citizens when facing the climate change challenges from an ICT perspective. There are those consumers who purchase commodities, appliances and services from industry players. Then there are users who are active in using ICT equipment and services. Last but not least, the citizen's role as advocate is, of course, quite important.

As consumers, citizens could exercise their purchasing power by selecting more eco-friendly products that are energy efficient. Consumers are expected to properly recognise the approaches that companies take in pursuit of a low-carbon society. Companies must provide accurate information to help consumers make meaningful decisions in selecting the products. If we compare the amount of CO_2 emissions by sector, households still constitute a significant portion. Therefore, it is necessary to cultivate a mindset among consumers that best suits a low-carbon lifestyle.

As the first step, integration and joint use of ICTs can be applied to reduce any overlap of resources within a community, which is likely to generate certain effects in reducing CO_2 emissions. Japan has already seen the start of car-sharing services. Through the popularisation of similar services, the resistance towards the sharing of resources diminishes, and greater progress will be made toward the creation of a low-carbon society.

Some of the traditional lifestyles in Japan are now being re-examined. In his book *Just Enough: Lessons in Living Green from Traditional Japan,* Azby Brown, born in the United States and now living in Japan and working as the director of the Future Design Institute in Tokyo, argues that people in the Edo period (1603-1868) overcame many of the same problems confronting present-day society – issues of energy, water, materials, food and population – in unique ways.

Brown highlights, for example, "the idea of heating only a limited area where people are, trying to heat the people, not the space," citing the *hibachi* and *kotasu*, traditional Japanese heating devices using charcoal and providing heat for one's hands or legs.

Exploring "traditional ideas" in Japan may offer some useful suggestions for limiting energy consumption and for the innovation of ICT products and services. Of course, it is too optimistic to conclude that old ideas will help solve the problem; but there may be room to shed a different light on this highly complicated and difficult set of challenges. ■

JORDAN

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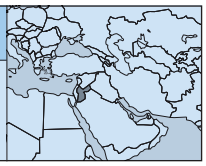

Introduction

Scientists and civil society were among the first to promote environmental awareness in Jordan. The Royal Society for Conservation of Nature (RSCN) was founded in 1963 as the first NGO dealing with the matter. In 1988, the Jordan Environment Society (JES) led the efforts to get the protection of the environment in Jordan onto the national agenda. These efforts as well as a scarcity of natural resources were the driving forces in passing the first Environmental Protection Act (EPA) in 2003 and establishing the Ministry of Environment (MoE) as a separate ministry in Jordan. The MoE, along with various environmental societies, have played a vital role in protecting the environment and preventing pollution in the country.

But challenges remain. The ministry estimates that environmental degradation costs Jordan 4% off its gross national product.[1] An environmental think tank report,[2] released on 24 November 2009 by the Lebanon-based Arab Forum for Environment and Development (AFED), criticised the absence of data on climate change in most Arab countries. Other experts agreed. "I hope that the United Arab Emirates' first remote sensing satellite (DubaiSat-1) will help gather the information and data needed to help Arab researchers studying climate change," said engineer Khalil Konsul, president of the Jordanian Astronomical Society. Moreover, "ICTs (information and communications technologies) and climate change", "green ICTs" and "e-waste" (electronic waste) are new expressions in the Middle East, including Jordan – at least at the grassroots level.

Policy and legislative context

One year following the conclusion of the Earth Summit that was held in Brazil in 1992, Jordan established the first incarnation of the MoE. Principle 10 of the Rio Declaration stipulates that:

> Environmental issues are best handled with participation of all concerned citizens, at the relevant level. At the national level, each individual shall have appropriate access to information concerning the environment that is held by public authorities, including information on hazardous materials and activities in their communities, and the opportunity to participate in decision-making processes. States shall facilitate and encourage public awareness and participation by making information widely available.

Following years of neglect, denial and lack of data, Jordan realised, through a concerted effort backed by global momentum, that climate change is a clear and imminent danger to the environment and development in Jordan.[3] The Kingdom is expected to witness a 1-2°C increase in temperatures by 2030-2050. This will result in diminishing aquifers and surface water bodies, the reduction of vegetation cover, and the transformation of semi-arid lands, some 80% of the country's total area, into arid deserts.[4]

Jordan is a signatory state to many international environmental treaties. King Abdullah of Jordan stressed in a speech that was delivered by Prince Hamzah at the recent UN Climate Change Conference in Copenhagen that "Jordan is a committed partner in the international efforts to confront climate change." The King cited some of Jordan's goals in this regard, such as efforts to increase renewable energy's contribution to the Kingdom's energy mix to 10% by 2020. Jordan joined the Kyoto Protocol's Clean Development Mechanism (CDM) and has started to reap the benefits. It has approved five programmes as part of the CDM to contribute to the reduction of around 3.5 million tonnes of CO_2 annually and to generate EUR 100 million over the next five years.[5] King Abdullah also called for greater reduction in gas emissions, building on the targets set in the Kyoto Protocol.[6]

The MoE in cooperation with the United Nations Development Programme (UNDP) is currently developing Jordan's Second National Communication on Climate Change. The MoE has also launched a USD 4.3 million programme to develop the Kingdom's adaptation to climate change and sustain its Millennium Development Goal (MDG) achievements. The programme will assist Jordan in addressing strategic issues, including health and water, by ensuring a sustainable and improved water supply in light of a water shortage blamed on climate change. So far, climate change has caused a 30% reduction in the Kingdom's surface water resources. The shrinking Dead Sea is one powerful example of the impact of climate change in the country. The three-year programme will be implemented by the World Health Organisation (WHO), UNESCO, UNDP and Food and Agriculture Organization (FAO).[7]

As far as e-waste goes, Jordan has not developed an e-waste management programme. There is also no authentic statistical data available on the quantity of this waste.

1 Ministry of Environment (2010) *Status of Environment in Jordan 2010*, Government of Jordan, Amman, p. 190.

2 www.arabenvironment.net/archive/2009/12/986436.html

3 www.arabenvironment.net/archive/2009/12/993098.html

4 www.mdgfund.org/story/programtodevelopJordanadaptation

5 www.arabenvironment.net/archive/2009/12/993098.html

6 www.petra.gov.jo 18 December 2009.

7 www.mdgfund.org/story/programtodevelopJordanadaptation

However, the MoE is currently developing programmes on how to dispose of electrical and electronic waste.[8]

Dealing with e-waste

The EPA prohibits the introduction of any hazardous wastes into Jordan. Any person who violates this article shall be punished by a fine of not less than USD 30,000 or by imprisonment for not less than three years and not more than fifteen years, or both. MoE considers refurbished computers and old batteries as hazardous wastes (the latter they store in special cell dumps south of the capital Amman). However, the import of second-hand computers is allowed, and the Royal Rangers, the country's environmental police, do not pay much attention to e-waste violators.

Although the MoE has a position on e-waste, the EPA does not specifically deal with it. The absence of regulations hampers efforts in Jordan that try to look at e-waste management, and exposes local communities to health risks caused by toxic chemicals. The issue of e-waste is not promoted adequately even amongst environmentalists. There is a lack of social responsibility and environmental awareness on this issue, and statistics are not available on how much e-waste is present in the Kingdom.

How to get rid of old computers? I asked engineer Yazan Abdallat,[9] IT manager at *Alarab Alyawm*, the daily newspaper that is a big consumer of computers. He told me that they sell them to small computer companies which use them for spare parts, and that these shops resell the remaining parts as plastic or aluminium for recycling purposes. Some said they throw the remaining parts in the nearest trash container. Abdallat suggests that big consumers of computers like banks must keep track of their computers and be careful how they dispose of them because of sensitive information they might have on their hard drives. MoE can use serial numbers to track where these devices will end up. Some Jordanian companies import used computers from the US and they reuse some parts of them to make one good computer.

"Old mobile batteries are polluters," Abdallat says. To demonstrate his point he conducted a small experiment. He opened an old mobile battery and put it in a glass basin with a fish. It was shocking to see that the fish died within fifteen minutes.

Shopkeepers who replace mobile batteries do not have any idea about the risks of old batteries. Many of them told me that they do not have any regulation on battery disposal. Some of them use old mobiles as spare parts. Unused parts are disposed randomly with other wastes, which can cause serious damage to the environment and human health.

E-waste is mostly treated in one or more of the following manners:

- Storage: In most cases, old electronics are stored in the cellars of houses. This is not the best solution since delaying the disposal of the e-waste reduces the chances of reusing it effectively.
- Landfills and burning waste: When mixed with household waste, e-waste is most likely to always end up in one of the twenty dumps in Jordan.

Many NGOs have taken several initiatives to protect the environment. Land and Human to Advocate Progress (LHAP) initiated a project to raise public awareness on e-waste in cooperation with the MoE, the Chamber of Commerce and some companies selling electrical appliances. The project includes an environmental competition that aims to raise public awareness on e-waste. The competition prizes include participating in a conference on e-waste in Lebanon, a TV set, refrigerator and multi-purpose rechargeable batteries. LHAP Director Ziyad Alawneh said that the project reached 200 schools in the Kingdom, and targeted 7,500 students and teachers.[10]

Law schools at Jordanian universities do not pay much attention to the importance of teaching environmental law. Global environmental law expert Bob Percival at University of Maryland School of Law[11] was invited to Jordan in late 2009 to assist in developing an environmental law curriculum. In order to help jump-start the teaching of environmental law, it has been decided that an environmental law problem will be the subject for the annual Jordanian National Law School Moot Court competition. The competition has become extremely popular among the Jordanian law schools, and competition is fierce.

New trends and needs

On the legislative level, Jordan needs to implement existing laws and introduce new legislation that would tackle these new problems. Hamad Uthman, a Jordanian environmental journalist, believes that Jordan can pass new policies in two categories: first, polluter pays and second, pollution prevention pays.[12] Uthman suggests taxation measures in implementing these principles. Eco-taxes on mobile operators would be one example of the polluter-pays principle.

Uthman also suggests tax exemptions as an incentive for computer companies who collect old PCs and refurbish and upgrade them for educational and charitable institutions in rural areas.

The sun rises in Jordan 365 days a year, which means it can introduce solar energy to produce energy for electronic products. Jordan has a solar potential of more than

8 www.alarabalyawm.net 21 April 2010.

9 Interview 17 May 2010.

10 www.alarabalyawm.net 13 May 2010.

11 globalenvironmentallaw.blogspot.com/2009/12/jordan-trip-copenhagen-conference-by.html

12 Interview 9 May 2010.

2,000 solar kilowatts/hour per square metre per year – one of the highest in the world. The country recently launched a USD 400-million project to generate electricity from solar power in the southern city of Ma'an.[13] The project, "Shams Ma'an" is expected to produce 100 megawatts of electricity annually by 2012. The project is considered a big step to lessen Jordan's dependence on foreign fossil fuel, as it imported 96% of its energy needs last year.

Jordan produces only 7% of total energy from renewable resources. It seeks to raise renewable energy resources' contribution to the overall energy mix by 10% by 2020.

Using energy generated by solar power cells installed on citizens' rooftops can reduce their electricity bill. In this way citizens have the motivation to get involved in a national effort, and the government can step in by providing long-term loans to people interested in the idea.[14]

The new building of the Dutch embassy in Jordan, which was opened late May, is an eco-friendly building.[15] The building is the first to receive a prestigious international certificate for green homes, and is the first sustainable building of all Dutch embassies in the world.

Action steps

- Passing legislation that forces manufacturers to include Arabic manuals with any electronic device and mentioning its environmental hazards and how to dispose of it safely.
- Asking big computer companies to take back used PCs for recycling.
- Encouraging environmental NGOs to act as collection centres for old PCs and IT accessories and to collect used PCs for recycling.
- Banning the entry of e-waste into Jordan.
- Introducing eco-taxes on mobile operators.
- Incorporating climate change and e-waste into human rights issues.
- Introducing e-waste hazards in IT curricula.
- Establishing alternative energy and renewable technology research centres in one or more of eighteen universities in the Kingdom.
- Encouraging people to use solar energy. ■

13 www.petranews.gov.jo/nepras/2010/May/19/13000.htm

14 www.jordanwatch.net/arabic/archive/2008/2/475036.html

15 www.addustour.com 20 May 2010.

KAZAKHSTAN

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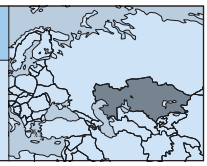

Introduction

Integration into the world economy has its positive and negative aspects. Kazakhstan has had its share of both since it became the last republic to leave the Soviet Union almost twenty years ago. Modern information and communications technologies (ICTs) are certainly one of the benefits of such integration. While not a primary market for many ICT vendors due to the small population, Kazakhstan enjoys most of what the latest technology has to offer. New IT gadgets make their appearance in the country right after they are released abroad. Local businesses cannot function without computers as even tax reports are submitted electronically. The government is spending millions annually to equip schools with the latest learning technology. The inflow of IT equipment into the country has been steadily growing. However, computers and other electronic equipment become old and outdated very fast. Rapid economic growth allows them to be replaced quite quickly but creates another serious problem that Kazakhstan is facing, but has yet to tackle: the problem of electronic waste (e-waste).

Policy and legislative context

Kazakhstan has a set of policies related to waste in general, which includes e-waste. All issues related to waste collection, transportation, handling, storage and disposal in the country are included in state policies related to environmental safety.

The major policy related to waste in Kazakhstan is called the Ecological [Environmental] Safety Concept of the Republic of Kazakhstan for 2004-2015.[1] The Concept was adopted in 2003 and sets the major approaches, principles and planned actions related to the environment until 2015. Direct outcomes of the Concept are three state programmes related to the environment: the State Programme on Environmental Protection for 2005-2007,[2] State Programme on Environmental Protection for 2008-2010[3] and Ecology of Kazakhstan State Programme for 2010-2020.[4] Each programme provides an overview and analysis of the current situation with regards to all aspects of the environment, including waste, and proposes an action plan to improve it. As such, the programme for 2005-2007 recognised the need "to prepare recommendations on recycling and reuse of solid waste" and one of the action items for the programme for 2008-2010 is the development of technological processes for recycling solid waste.

The Concept and all three state programmes have led to a number of legal acts being developed, most notably the Ecological Code of the Republic of Kazakhstan. The code was adopted in 2007, with the latest amendments made in March 2010.[5] Among other items, the code governs all aspects of waste, waste management and recycling. Specifically, the code stipulates that the "owners" of waste have to handle the waste safely, following environmental and sanitary regulations. The code also provides that the local government bodies (provincial and city level) are responsible for the organisation of a "rational and ecologically harmless system of collection of community waste." The code does not provide for mandatory recycling of any waste.

Local regulations for the city of Almaty,[6] the largest city in Kazakhstan where the majority of businesses operate, provide for collection, transportation, storage, processing and disposal of waste in the city. The regulations include a section on the main principles of handling waste in the city. These include separation of waste during collection and preparation for processing. Citizens and businesses are responsible for the separation of recyclable waste, according to these principles. Waste recycling is not mandatory, but is one of the methods of waste disposal as long as it is "technologically possible and economically feasible." The regulations also state that "it is not allowed to destroy or dispose of waste that can be used as secondary material resources" – or waste that can be reused.

There are no policy papers or immediate plans to address e-waste specifically. According to the current legislation, e-waste in Kazakhstan is viewed only as one of many types of solid waste.

Current state of the e-waste problem in Kazakhstan

According to the Ecology of Kazakhstan State Programme for 2010-2020, over 95% of solid waste in Kazakhstan ends up in landfills, despite the fact that this waste contains a lot of reusable and recyclable material. Moreover, there is no separation or sorting for the bulk of this waste. Another

1 Ecological Safety Concept of the Republic of Kazakhstan for 2004-2015 (December 3, 2003)

2 State Programme on Environmental Protection for 2005-2007

3 State Programme on Environmental Protection for 2008-2010

4 Ecology of Kazakhstan State Programme for 2010-2020

5 Ecological Code of the Republic of Kazakhstan (as of 19 March 2010)

6 Rules (Regulations) for accounting, processing and disposal of production and consumption waste in the city of Almaty (as of 12 April 2010)

state programme notes that 97% of landfills in Kazakhstan do not meet sanitary and environmental safety regulations and no assessment of their impact on the environment has been made.

There were near three million PCs shipped to Kazakhstan from 2000 to 2010, according to IDC, an international IT market intelligence consultancy.[7] According to industry experts, about half of that or roughly 1.5 million PCs are currently functioning in the country. This means that the other 1.5 million PCs have become e-waste in one form or another. This does not include millions of printers, monitors and other peripheral devices that have been added to the landfills.

In the past decade, many of the old but still functioning PCs in Kazakhstan found a second use in businesses, homes and schools that cannot afford new computers. The current PC penetration is thought to be a little over 10%. This shows that the market for PCs in Kazakhstan is far from saturation and more computers will be sold in the country in the near future. However, as government increases its spending on new computers, the disposable incomes of the population rise and PC penetration increases, there will be less demand for used PCs. This is expected to further contribute to e-waste.

Market analysts suggest that computers are replaced every three to five years depending on the form factor, model and other variables. Some companies, such as banks, have regulations to destroy old hard drives, making a used computer useless and only worth throwing out. While anecdotal evidence suggests that in some organisations working parts are taken to be used as spare parts for other machines, most of the old PCs become waste and only contribute to landfills.

Despite the fact that most waste ends up in landfills, businesses can find recycling services for a lot of things, such as used tires, medical waste, light bulbs, etc. However, there are only a few small firms in all of Kazakhstan that offer recycling for IT equipment. No recycling services are directly advertised or targeted at consumers. The recycling is also limited to harvesting working components for further resale and discarding the rest.

Additionally, companies are discouraged from selling used equipment as it usually involves paying additional income taxes and creates more work for accountants. Large corporations would rather throw away used equipment than get involved in dealing with additional paperwork and taxes that arise from their non-primary business activities.

While there are a number of environmentally focused NGOs in Kazakhstan, there are no NGOs in the country that deal with the e-waste problem specifically, to the extent that the problem of e-waste seems to be non-existent in the country. This is most likely due to the fact that there are many other, more pressing issues related to pollution and the environment, such as pollution from extractive industries and automobiles.

The biggest problem with recycling and proper disposal of e-waste (or any waste for that matter) in Kazakhstan is the perception of recycling by the population at large. Although there are no readily available studies that have been conducted on the matter, it appears that the majority of the population in Kazakhstan does not consider recycling as an option. Everything from food waste to used laptop batteries are thrown into the same garbage containers and end up in landfills. People do not sort their garbage – and there is no point for them to do it anyway, as there is always only one dumpster for general waste available.

In 2007 there was a waste separation initiative in Almaty. Waste containers with three separate trash receptacles (glass, paper, general waste) were installed on street corners and in public areas. The initiative did not last very long as the people were not following the guidelines and were throwing general waste into all three receptacles. The containers were removed within a year.

The e-waste problem in Kazakhstan is growing, but very few are aware of it. The majority of the population is not educated about the environmental damage caused and the impact e-waste will have on future generations.

New trends

Although there are no signs that the government recognises the growing problem of e-waste, there are positive signs that show recognition and understanding of the problem with waste in general. All state programmes concerned with the environment mention the growing landfills and lack of recycling in the country. Moreover, these programmes propose various solutions that include tightening control and increased accountability when it comes to waste and pollution.

However, recent amendments and current efforts are mostly concerned with tightening waste regulations for the extractive industries. These are the most developed sectors of Kazakhstan's economy, and they produce a lot of pollution. Many believe that it is easier for the government to show results by approaching large corporations; so the efforts are centred on large multinationals rather than trying to "hunt down" smaller companies.

E-waste, contrarily, is produced by virtually all companies in the country and the large numbers make it much harder for the state to monitor. A broken mobile phone thrown into a trash can is much harder to spot than an oil leak.

An important development of recent years is the growing recognition by businesses, government and the population at large of worsening environmental conditions. The three state programmes are an example of the concerns on the part of the government. The construction of new paper and automotive tire recycling facilities in the

7 www.idc.com

country provide hope for recycling of other solid waste, including electronics.

Action steps

- The problem of e-waste should be recognised in Kazakhstan. This can be reflected in one of the government policy papers or by implementing regulations for the current Ecology of Kazakhstan State Programme. Additionally, it is necessary to raise awareness of the problem among the population at large through the mass media.
- There is a need for NGOs that specialise in electronic waste reduction, promote recycling and educate the public on various aspects of the e-waste problem.
- Waste separation and recycling need to be implemented across the country and made mandatory. E-waste should be clearly defined in legal acts along with the procedures for its collection, sorting and recycling.
- People need to be educated on the possibilities to reuse and recycle old electronic equipment, especially using electronic channels, such as targeted online advertisements, electronic media and other sources that target users of electronic equipment specifically.
- Both consumers and businesses need to be encouraged to reuse old equipment. Refurbishers should be subsidised. A flourishing second-hand market is a critical part of the e-waste chain. ■

KENYA

Kenya ICT Action Network (KICTANet)
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Introduction

Kenya is on the verge on an information and communications technology (ICT) revolution as it works towards becoming part of the global information society. With this, the volume of ICT equipment continues to grow rapidly. National initiatives such as digital villages that provide e-government services, including telemedicine, e-education and e-agriculture, among others, will increase the acquisition and use of computers, mobile phones and television sets, as well as applications and programmes that will provide access to many. At the same time, computers and the internet have become common in businesses in all sectors, and mobile phones in particular are an essential part of citizens' daily lives.

Against this rapid growth is the high rate of obsolescence of ICT equipment due to technological change. As equipment reaches its end of life, disposal challenges arise. Poorly disposed electronic waste (e-waste) can result in severe health and environmental hazards due to highly toxic substances, such as lead and mercury. A 2009 United Nations Environment Programme (UNEP) report, *Recycling – From E-waste to Resources*,[1] notes that Kenya faces serious environmental and health problems due to increasing hazardous waste from electronic devices. The report lists old mobile phones, photographic and music devices, desktop and laptop computers, printers, pagers, refrigerators, toys and televisions as the main sources of e-waste. There is a need to dispose of large quantities of computers and mobile phones and to arrange for their safe disposal, which includes the right to health and safety measures for workers and the public in general.

Policy and legislative context

Kenya has no national climate change policy. One of the main challenges is that policies, laws and regulations addressing climate change are fragmented, and found in various sectoral laws, and are not well coordinated. There is also no policy or regulation on e-waste, although Kenya is a signatory of both Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and the Bamako Convention on the Ban of the Import Into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes Within Africa.

At the national level we see a mix of laws and regulations addressing waste, and some recent references to e-waste, but there is no coordinating framework. The Environmental Management Co-ordination Act (EMCA, 1999) defines hazardous waste, pollutants and pollution, but it does not address specific aspects of waste (such as e-waste). The National Environmental Management Authority (NEMA), responsible for implementation of all policies and regulations relating to the environment, also has no specific regulations focusing on e-waste.

At the local level, the 1962 Public Health Act places responsibility for waste management at the local authority level.[2] But there too, there are no e-waste programmes.

In contrast, the Kenya ICT policy (2006) contains a clause on e-waste, which makes the appropriate recycling and disposal facilities for e-waste part of the requirements for renewal of communications licences.[3] The Communications Commission of Kenya (CCK)[4] has incorporated this requirement into current legislation. The Kenya Bureau of Standards runs the pre-export verification of conformity programme that aims to minimise the national risk of unsafe and substandard goods entering into the country. The Bureau is expected to conduct inspections of second-hand computers entering the country to ensure that they are utilisable.

It is clear from this that the government has recognised the challenges posed by e-waste. However, the level of preparedness from a policy and regulatory perspective is still quite low, particularly when it comes to actual waste management practices.

E-waste on the ground

Kenya's informal dumping sites are home to ICT equipment containing hazardous material and lethal toxins. The largest is in Nairobi's Dandora estate, receiving over 4,000 tonnes of garbage daily. With unregulated disposal, most waste is either left to rot in the open air or burnt as the best and only means of disposing of it. This includes any e-waste which finds its way to the dump, releasing toxic chemicals and metals into the air and ground. An e-waste baseline study conducted by the Kenya ICT Action Network (KICTANet) in 2008 notes that e-waste recycling is mainly conducted informally with no regulation in place to safeguard the health of those who dismantle the electronic equipment, nor the environment.[5]

Kenya is also one of the countries caught up in a web of global e-waste dumping, which has gone unnoticed due to the lack of legislation and regulation governing the importation of non-functional, non-reusable and obsolete electronics. The Kenya Bureau of Standards' pre-export

1 www.unep.org/PDF/PressReleases/E-Waste_publication_screen_FINALVERSION-sml.pdf

2 Government of Kenya (1962) Public Health Act.

3 Government of Kenya (2006) Kenya ICT Policy.

4 www.cck.go.ke

5 Kenya ICT Action Network (KICTANet) (2008) *E-waste Management in Kenya: A baseline study*. www.kictanet.or.ke

verification of conformity programme is proving inadequate in addressing the complexity of the problem. Given the positive economic implications of recycling e-waste in developed countries and Kenya's attempts to bridge the digital divide, second-hand ICT equipment continues to find its way to different parts of the country. At first view, such shipments are based on good intentions: refurbished equipment from developed countries is expected to be useful in the developing world. However, very rapidly changing standards and the rapid evolution of technologies mean that even the best of these shipments are not always useful, and are too often used as an excuse to dump unwanted goods. The reality is that even with the Basel Convention prohibiting hazardous waste transfer internationally, hundreds of containers filled with over-used ICT equipment and accessories continue to be shipped to Kenya because of the perceived high demand for such low-cost goods.

The Basel Action Network in its October 2005 report, *The Digital Dump: Exporting Re-use and Abuse to Africa*,[6] found that e-waste is entering African port cities such as Lagos, Mombasa, Dar es Salaam and Cairo in shiploads. Kenya continues to accept container loads of e-waste disguised as donations each month from developed countries. A UNEP report notes that this trend is likely to cause long-term and costly environmental damage.

In European countries, the "producer pays" principle of the Waste Electrical and Electronic Equipment (WEEE) Directive compels producers of electrical equipment to fund the end-of-life recycling of equipment. However, no such legislation exists in Kenya. Although the Ministry for Environment and Natural Resources (MENR) has developed a concept paper on e-waste which may result in policy, and the CCK has incorporated e-waste management into its licence conditions, there is much more that can be done to develop a policy framework for e-waste management.

Kenya's disposal options for e-waste seem to vary widely depending on the user. Once consumers have used a mobile phone or computer to its end of life, KICTANet research has shown that they store the equipment at their homes or offices, sell it as second-hand equipment, donate it to schools, or give it to neighbours or friends who could otherwise not afford such a device. According to the KICTANet study, only a few users take their old equipment for recycling or disassembling to reuse some parts. The study further notes that with an estimated 1,640 tonnes of new equipment entering the market each year and 1,210.4 tonnes disposed of on the second-hand market, the outflow to refurbishers and collectors is much lower than new purchases. This suggests that it is possible that a sizable stock is held back by consumers who have a low awareness about pollution from the informal disposal and recycling currently practiced.

Government departments and agencies are compelled by the Public Procurement and Disposal Act of 2005 to bond ICT equipment and invite competitive tenders for disposal. This is a slow and cumbersome process, resulting in government holding huge amounts of obsolete ICT equipment – and it seems to place a very low priority on the process.

There has in the past been limited industry responsibility for e-waste management. Industry players will often donate their old ICT equipment to charities or organisations, while some dump their waste in repair shops, which means repair shops have huge quantities of unusable computers, mobile phones and TV sets with no knowledge or capacity on how to handle the waste. A few industry players are beginning to build responsible practices into the way they do business, and to take responsibility for their impact on the environment. For example, Safaricom supports an e-waste management initiative by Computer for Schools Kenya (CFSK), while Hewlett-Packard supported KICTANet's e-waste study, which is currently being used to inform policy discussions. However, the number of private sector players involved in e-waste management is very limited and there is a need for them to step up their engagement, through corporate social responsibility, to ensure protection of the environment in which they operate.

With the vacuum created by a lack of policy and regulation, and a lack of proactive industry engagement, civil society organisations have tended to fill the gaps in e-waste management. Organisations like CFSK have established e-waste management initiatives to handle electronic recycling needs. The project dismantles and separates electronic waste, with reusable parts like plastics and aluminium being sold to the informal market. There is no specialised equipment available to deal with the rest of the hazardous toxic material, so CFSK is currently exporting this to countries with appropriate facilities, mainly in Europe and Asia. This lack of processing capacity also means CFSK and others are unable to extract the precious metals and other high-value waste that has become a profitable business in many developed parts of the world.

Other civil society organisations that are involved in waste management include the Kenya National Cleaner Production Centre, Kayole Environmental Management Association (KEMA), Practical Action, and World Vision International.

The KICTANet study notes that there are economic opportunities in e-waste management in the form of creating employment via informal recycling businesses. Refurbishment of old ICT equipment has also become an area of business for civil society organisations like CFSK, who refurbish computers for schools around the country. Small and medium entrepreneurs could be encouraged and supported to tap into e-waste recycling utilising sustainable business models.

A policy and regulatory framework to address e-waste management is required to regulate the collection, disposal and handling process, as well as to license key actors. Capacity and skills development initiatives should also be undertaken.

6 www.ban.org/Library/TheDigitalDump.pdf

E-waste management must be a multi-stakeholder process, which includes the participation of civil society, industry, government and local communities.

New trends

The Kenyan government has allocated land to CFSK to build a National Refurbishment and Technical Services Centre as a flagship centre for e-waste recycling, and is also supporting it to create regional centres hosted by various institutions in each of Kenya's eight provinces. Industry players like Safaricom have been supporting the initiative. Nokia and Sony Ericsson as well as local service providers have introduced policies for "taking back" end-of-life equipment, demonstrating a willingness to contribute to e-waste management. However, more private sector players need to get involved.

In June 2008, the Kenyan government introduced a 25% tax on all imported used computers, aimed at preventing dumping and reducing e-waste.

In June 2012, the target date for digital television transition, Kenya's broadcasting industry will see the end of the analogue era for television. The transition is likely to add to the e-waste problem, particularly given the replacement of network and broadcasting equipment used by the television channels and service providers. Due to cost issues, the percentage of the population expected to buy new digital televisions will probably not be high. Most will enjoy digital broadcasts using their old sets and converter boxes. However, the transition can be expected to cause some dumping of old sets within the country, as well as developed countries dumping in Kenya, and this will be a trend that could continue over time.

Kenya is also beginning to address the related issue of climate change. The Kenyan Ministry of Environment observed that one of the main challenges to developing a coherent national policy is the fragmentation of current policies, laws and regulations that address climate change in different sectors. The ministry is now working towards developing a comprehensive climate change policy that will include a National Climate Change Response Investment Framework. This will hopefully have specific provisions for dealing with e-waste as it can impact on climate change, particularly when considering production and the final stages of disposal or recycling (such as incineration, or smelting). ICT advocacy groups such as KICTANet will lobby for the inclusion of such provisions.

Action steps

Plotting the way forward for advocacy, the following is necessary:

- Create awareness among the public, including an appeal for resistance to various practices that lead to environmental damage.
- Speed up development of policy and regulation on e-waste management that take into account the consequences of dumping, extended manufacturer and user responsibility, safe disposal procedures, business opportunities, etc.
- Urge companies to embrace extended producer responsibility, minimising the life cycle impacts of their products, and encourage them to take back and recycle their products.
- Expose irresponsible electronics companies to create public pressure to help green the industry.
- Enhance capacity building in pre-processing processes such as the manual dismantling of e-waste.
- Create awareness of the economic advantages for engaging in sustainable business models for waste management.
- Include e-waste provisions in national policy on climate change. ■

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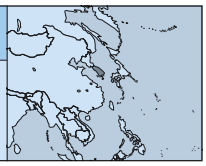


Introduction

Developments in information and communications technologies (ICTs) have reduced the life cycle of electronics such as computers and other telecommunication devices. Electronics are produced, consumed and disposed of faster than ever, which causes many environmental issues. Heavy metals and chemicals are used in manufacturing electronics which contaminate the environment. And workers who are exposed to the toxic materials suffer from fatal diseases. However, the South Korean government's approach and the business response towards these issues are still controversial at home and abroad.

On 12 March 2010, Greenpeace activists stuck huge stickers on Samsung's Benelux headquarters in Brussels saying "Samsung = broken promises". This was in protest against its use of polyvinyl chloride (PVC) and brominated flame retardants (BFRs) in all its products, despite its promises to clean up its act. Samsung was the first company to have promised not to use these materials. Local human rights and workers' health advocacy groups also blame Samsung for the many cancer cases that have been reported amongst its workers. According to Supporters for the Health and Rights of People in the Semiconductor Industry (SHARP),[1] an organisation founded in 2007 to support Samsung workers who suffer from cancers, 23 hematopoietic cancer cases (including acute leukaemia) among its workers have been reported to date and ten of them have died.[2] On 31 March 2010, another Samsung worker died of leukaemia. Her death fuelled debate over carcinogenic materials used in its production lines and working environment. Samsung acknowledges a small number of the reported cases but argues that even in those cases its work environment had nothing to do with them. But a local media outlet disclosed that an internal Samsung "environmental handbook" suggests that it used six types of carcinogenic materials including trichloroethylene (TEC), and more than 40 types of dangerous irritants.

As for recycling ICT products, environmental groups point out that South Korea does not have a proper system to collect and recycle old telecommunication devices. As of February 2009, 46 million Koreans or roughly 95% of the population used mobile phones. An average Korean switches mobile phones once every two years as new products are more frequently marketed and life cycles of these devices are reduced. As a result, fourteen million mobile phones become "old" ones every year. Among them, only three million are collected properly, meaning eleven million mobile phones are either stored in people's houses or discarded with trash. This means that only about 20% of old mobile gadgets are properly recycled.[3]

Policy and legislative context

Electronics and occupational health and safety

Notification No. 2008-26 of the Ministry of Labour lists 56 carcinogenic materials. It sets exposure limits for 39 materials but does not provide the limit for seventeen. Materials recognised as carcinogens by the ministry include radiation, soot and tar, vinyl chloride, chrome, benzene and silica.

Article 42, Section 2 of the Korean Industrial Safety and Health Act says the minister may, if deemed necessary to diagnose occupational disease and identify the causes, conduct an occupational disease investigation on the correlations between workers' diseases and hazardous elements at the workplace.

Extended producer responsibility (EPR)

In 1992, the government introduced the deposit-refund system under which producers deposit a certain amount of money in a recycling fund and get a refund after collecting their old products. But the approach did not produce the desired outcome. As a result an extended producer responsibility (EPR) system was introduced to complement the deposit-refund system. EPR imposes recycling quotas on the manufacturer. When a company fails to meet the standards, the government imposes a fine that is greater than the cost of implementing a proper recycling system. Producers have a responsibility for recycling their products and packaging materials and the cost is reflected in the consumer price. This principle has been applied to refrigerators, washing machines, TVs, air conditioners and computers including laptops since 2003, and was expanded to include audio equipment and mobile phones in 2005, and printers, copiers and fax machines in 2006.

Act for Resource Recycling of Electrical/ Electronic Products and Automobiles

In January 2008, the Act for Resource Recycling of Electrical/Electronic Products and Automobiles was enacted to force producers to reduce the use of hazardous materials and to ensure that their products are eco-friendly through proper disposal and recycling. The system covers electronics and automobiles comprehensively. Article 20 of the Act

1 cafe.daum.net/samsunglabor

2 Park Ilwhan (2010) *Samsung electronics and leukemia*, Supporters for the Health and Rights of People in the Semiconductor Industry (SHARP).

3 Institute of Environment and Health, Gachon University of Medicine and Science (2005) *Research on the status of disposal and recycling of e-waste.*

requires manufacturers to collect and dispose of packaging materials as well as old electronics and old vehicles when they sell new ones, except when consumers do not want to give old ones back.

Urban Mining

The Seoul metropolitan government launched the Urban Mining project in July 2009. It is about collecting gold, silver and palladium in old electronics and old mobile phones. Experts expect the project will help the country's trade balance by roughly USD 2.5 billion when the recycling rate is up by 20%, and reduce as many as 1.5 million tonnes of CO_2 emissions when metal materials are recycled and supplied through urban mining.

Production and environment

Many people believe the electronics industry is a clean industry. In contrast, many workers are reported to have been affected by hazardous materials while producing electronics. But few Korean researchers have studied workers who are potentially exposed to carcinogenic materials in South Korea. As a result, the company's argument is generally accepted when workers raise questions about health problems related to harmful materials they have used. That means the workers' health issues are neglected until a new study finds some concrete cases for them.

Some research on toxic materials used in the ICT product manufacturing process is being conducted. The management of hazardous materials is usually not open to public scrutiny. It is even harder to track hazardous material management in much smaller companies than Samsung, because the companies and their workers are usually out of media and public attention.

Semiconductor manufacturing and working environment

A Samsung semiconductor factory worker, Yumi Hwang, died of leukaemia on 5 March 2007. The incident triggered a debate over Samsung's responsibility for leukaemia cases among its workers. SHARP says 47 cancer cases among Samsung workers were reported as of 18 May 2010. But Samsung has denied its responsibility for the fatal diseases.

On 24 November 2009, the Korean Workers' Compensation and Welfare Service (COMWEL), a government agency which is responsible for workers' damage compensation insurance, disregarded the workers' claim to request compensation, saying that no carcinogen was found in the manufacturing process in the epidemiological investigation and, as a result, the cancers are personal issues. The workers and the bereaved families of the Samsung workers filed administrative litigations demanding to revoke COMWEL's decision on 11 January 2010.

The gist of the litigation is that the epidemiological investigation is not convincing. There was no transparent and verifiable process in the investigation, which can lead some results to be distorted and left out. It is also difficult for the complainants to verify the results in the case when there are usually several years between exposure to the harmful materials and the onset of diseases. Article 107, Section 2 of the enforcement regulations of the Korean Industrial Safety and Health Act says an epidemiological investigation may be done in cases when employers, representatives of workers, health managers or doctors demand it to find out how a disease was contracted; when COMWEL demands it to determine whether a disease is related to work; when the Korea Occupational Safety and Health Agency (KOSHA), a government agency responsible for occupational health issues, demands it to prevent diseases; and when a head of the Ministry of Labour offices demands it to identify correlations between harmful factors and workers' health. But SHARP points out that the system ignores workers' rights to know and to participate in the process, and these rights should be given to workers. The law says a representative of workers such as a trade union staff person can attend the investigation but the complainant cannot be a part of it. Without trade union representation, workers or advocacy groups do not have any route to raise questions about the investigation. SHARP demands that carcinogens and working environment issues be thoroughly identified to prevent other fatal cases.[4]

Limits of EPR

The government imposes recycling quotas on companies, although the volume of old electronics collected and their distribution routes are still not clear, environmental groups say. The Ministry of Environment annually announces recycling quotas in consideration of factors such as a company's volume of marketed products, the volume of packaging materials, and the volume of its own products the company collects. Despite this, quotas are typically set considering the volume of marketed products. Electronics have different life spans. This means that determining quotas mainly depending on the volume of marketed devices is not the right way to go. Many companies do not send reusable old materials they collect to second-hand markets because they need to meet the recycling quota (by just dissembling old goods). Some producers and their associations contract out the collecting and recycling process to recycling companies by subsidising the companies and then buying the old technology again to meet the quotas. A policy such as imposing quotas without concrete measures to promote recycling has many loopholes.

E-waste collecting

Effective management of electronic waste (e-waste) requires identifying the volumes accurately as well as controlling toxic materials properly. In Korea, however, we still do not know the exact figure of e-waste volumes generated.

4 Kongyu Jung-Ok (2009) *The limits and problems of epidemiological investigation*, Supporters for the Health and Rights of People in the Semiconductor Industry (SHARP)/Green Consumers Network. www.gcn.or.kr

Old mobile phones are mostly collected through dealers which nevertheless do not have a legal responsibility to collect them – this responsibility rests on the producers. This lack of a legal responsibility means the collection of mobile phones is not effective, and public awareness about recycling mobile phones is low. The collecting rates also decreased after a system of compensation for old devices was scrapped. The system had allowed companies to give consumers some money in exchange for taking their old phones.

The Green Consumers Network in Korea has run a campaign to reduce e-waste since 2004. It has tried to promote public awareness on the need for proper disposal and recycling of e-waste by designating a "zero e-waste" day.

The Korea Association of Electronics Environment, an electronics business association, was founded to manage a collecting and recycling system. It divided the collection zones in South Korea according to five provinces: the central province, Chungcheong, Youngnam, Honam and Cheju. But this system has its problems. Unlike old electronics collected by producers, old electronics collected through the local centres do not have useful materials because municipalities first take them out before they are delivered to the producers. Environmental problems such as freon gas emissions are reported as well.

Exporting e-waste

Forty percent of old electronic appliances are collected domestically. More than 30% of old mobile phones containing metals such as gold and silver are exported to China. Some old large electronic appliances are disassembled in local facilities managed by municipalities, and private companies also export them to China. Small electronic devices are exported to China in inappropriate ways even though many of them are not reusable. Apparently they are exported to China as second-hand goods because waste is not allowed to be exported. Exporting these waste-like electronics can cause serious environmental problems when the destination countries do not have proper disposal facilities.

Limits of urban mining

The Ministry of Environment says the potential of urban mining in South Korea is about half of that of more developed countries. In terms of scarce metals, the country's capacity to extract and reprocess materials is just 20% of more developed countries. Only twenty recycling companies (or 5.5% of recycling companies) can reprocess scarce metals.

Collection rates of old electronics increased after EPR was introduced in 2003, but still remains low compared to vehicles. The collecting of old vehicles was 75.6% in 2008, but rare materials in vehicles are still rarely recycled because of a lack of processing technologies. A lack of awareness of urban mining is also blamed for the poor record in collecting e-waste. The Korea Zero Waste Movement Network[5] surveyed 238 Seoul residents and found only 42% of them were aware of changes in ways of collecting small electronics.

New trends

- The government announced a master plan for waste recycling for the next ten years in response to worldwide energy issues and depleting natural resources. The master plan is also expected to contribute to so-called "green growth". Under the master plan the government will invest about USD 1.6 billion to promote recycling of scrapped resources. It has also introduced a new collection system for small electronic devices such as MP3s, portable multimedia players and other small metal materials such as metal tools, by collecting them separately (as of September 2010). The government is planning to overhaul its recycling system and EPR is going to be applied to more products.
- The Ministry of Environment is planning to strengthen local recycling capabilities with local disposal facilities and private recycling companies. In this way it expects to generate benefits economically and environmentally.

Action steps

Social groups working for workers' health and human rights in the semiconductor industry argue that the government and business should overhaul their policy in the following ways:

- The semiconductor business should clear up toxic materials in the manufacturing process and provide workers with occupational safety education programmes and safety equipment.
- Workers who have been allegedly affected by hazardous materials should be allowed to participate in an epidemiological investigation.
- Improvements are required in the Industrial Accident Compensation Insurance system so that workers who suffer work-related diseases such as cancer benefit before an investigation reaches a conclusion. Investigations take too long to define a correlation between their work setting and the onset of disease.

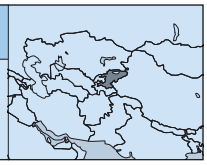
As for e-waste, environmental groups argue that the government and business should overhaul their policies in the direction of the following:

- Government should track and manage e-waste. To this end, statistics on waste should be reported regularly and transparently. Local governments should find ways to require private recycling companies, including exporters, to submit reports on quantities recycled or shipped.
- Cooperation between government, local communities and business should be reinforced.
- More support by the government and municipalities for second-hand technology retailers is required to promote recycling. ■

5 The Korea Zero Waste Movement Network is an association of over 180 NGOs including environmental, gender and consumer organisations, and conducts various environmental campaigns.

KYRGYZSTAN

Promotank HQA
Tangulu Diushakhmatova and Nargiza Chaikozova
www.marketing.kg



Introduction

Renewable water resources are a strategic natural resource of the Kyrgyz Republic, which has regional importance for its neighbouring countries (Kazakhstan, Tajikistan, Turkmenistan and Uzbekistan). The headwaters of many of the region's main rivers, such as the Syr Darya, are located in the country. However, water resources are the most vulnerable to global warming effects, since the rise in temperature has a huge impact on the formation of lakes and leads to the melting of glaciers in Kyrgyzstan. In the future this will result in water shortages and other challenges in the region. According to the estimation of experts, by the end of the century climate change might lead to temperature increases in the country averaging 4°C to 6°C. As for the number of glaciers, they will decrease to 142, compared with 8,200 in the middle of the last century. Moreover, experts estimate that by 2100 the surface flow of rivers will be two times reduced in size.[1] As a result, the problem of climate change greatly influences the social and economic well-being of not only Kyrgyzstan, but also the Central Asian countries. The issue of global warming needs concerted attention and workable solutions, among them the application of information and communications technologies (ICTs).

Policy and legislative context

Since 1996 the Kyrgyz government has enacted several laws, regulations, and resolutions on environmental protection and climate change issues. In doing so it has created quite a good juridical basis for environmental sustainability and rational utilisation of natural resources. However, these laws do not put much emphasis on innovative ICTs and climate change.

In 2005 the National Committee on Climate Change Impacts was created to support the clean development of the country. In 2007 a law on governmental regulation and policy on greenhouse gas emissions and absorption[2] was enacted. This determines the basis for governmental regulation, and the rights and responsibilities of the state and local government bodies, individuals, and legal entities with regard to the emission and absorption of greenhouse gases.

The environmental and energy chapters of the Country Development Strategy 2009-2011 deal with issues concerning adaptation, mitigation and strengthening the country's potential regarding climate change. Moreover, as a member of the United Nations (UN), Kyrgyzstan ratified the UN Framework Convention on Climate Change (UNFCCC) in 2000 and the Kyoto Protocol in 2003.[3]

Using ICTs for the sustainable development of the environment

The impact of global warming is already evident in the Kyrgyz Republic, including water shortages, an increase in the number of natural disasters (landslides, mudflows and floods), and degradation of ecosystems. The number of natural disaster emergencies is on the rise, from 185 in 2006, to 209 in 2007, to 179 in the first half of 2008 alone.[4] These are closely related to climate change. The situation is even worse considering the fact that 94% of all the electrical energy in the Republic is generated by hydropower plants. This leads to an electric power deficit and huge losses to the whole economy. Given this, ICTs hold the potential to be one of the workable solutions to improve the situation.

Table 1 clearly shows the rapid growth of internet access in the country – a trend which could be used to good effect in protecting the environment.

Table 1. **The development of internet use in Kyrgyzstan 2000-2009**

YEAR	NUMBER OF INTERNET USERS	TOTAL POPULATION
2000	51,600	5,377,484
2005	280,000	5,377,484
2007	298,100	5,436,608
2009	850,000	5,431,747

Source: **www.internet worldstats.com/asia/kg.htm**

The UN Development Programme (UNDP) was the first organisation in Kyrgyzstan to provide one of the best practice examples for ICT assistance in the sphere of sustainable development. Through its project "How to Build Open Information Societies",[5] for the first time in Kyrgyzstan, the internet was used to provide information for an environmental protection course, organised by the local government in Osh. Many young public access point (PAP) users searched for online environmental information for school projects.

1 Turdukulova, T. (2010) *Climate Change.* www.ekois.net/wp/?p=4456#more-4456

2 UNDP Kyrgyzstan (2010) *Climate Change and Kyrgyzstan*, UNDP/GEF. climatechange.kg

3 unfccc.int/playground/items/5524.php

4 Government of Kyrgyzstan (2010) *Country Development Strategy 2009-2011.* www.kgembassy.org.tr/development.html

5 Mikosz, D. (2004) UNDP as a Catalyst for Change in Kyrgyzstan, in *How to Build Open Information Societies: A Collection of Best Practices and Know-How*, UNDP. unpan1.un.org/intradoc/groups/public/documents/UNTC/UNPAN018488.pdf

The PAP also helped reduce travel requirements for many rural users. Rather than making environmentally costly trips, information could be received online and in their community. This experience opened up opportunities in using the internet in the Republic, and today online local, regional, and international conferences and training are held in real time.

In 1994, mobile access started to become available, and today there are more than four million users (based on the number of active SIM cards). The rapid growth in this sector has both negative and positive impacts for climate change and its consequences. On the one hand, the microwave radio frequencies negatively affect climate change by using power and radiating heat. But, on the other hand, the mobile connections can be used as a tool to warn people of any pending natural disasters. In May 2010 the Ministry of Emergency Situations and mobile operator Sky Mobile (under the brand Beeline) started a project aimed at informing people about possible natural disasters through SMS delivery.[6] Since the start of the project 500,000 users of Beeline in Osh and Jalal-Abad oblasts (provinces) have already been notified about increased water levels in rivers and mudflow danger. There is also a special service call centre where people can get information free of charge concerning potential natural disasters.

There are a considerable number of environmental development projects initiated by international organisations, environment-oriented NGOs, and the Kyrgyz government. All of them are working on building different climate change responses and setting the country strategy for sustainable environmental development. Good examples of these projects are those supported by the UN and the Global Environment Facility (GEF).

"Enabling Activities for Preparation of the Kyrgyz Republic's First National Communication to the UNFCCC"[7] was aimed at fulfilling the requirements of the UNFCCC and the Kyoto Protocol and preparing the country report on climate change. The project started in 2000 and was successfully completed in 2004. During this period the first national communication on climate change was prepared, which helped increase public awareness through mass media channels such as the press and TV (six videos have been prepared and shown on the main television channels and several debates and four round table discussions have been conducted), establish legal frameworks, as well as build human and intellectual potential for further addressing environmental problems. Moreover, the project helped to identify the technological needs for decreasing the level of emissions of greenhouse gases in several sectors, including power, forestry and construction. A close study and analysis of the barriers for the successful introduction of new technologies have also been conducted. These measures created a good information and technical basis for furthering sustainable development.

The continuation of this project was the "Enabling Activities for Preparation of the Kyrgyz Republic's Second National Communication to the UNFCCC",[8] which shows the pressing need for policy formulation on the adaptation of various sectors of the economy to a changing climate. The project also investigated all spheres of activities causing negative impacts on global warming, and developed several scenarios for ways of controlling climate change. Moreover, it identified which sectors need technical assistance (including ICTs). These were energy, transport, forestry, domestic and agricultural waste, and construction.

Many of the proposals developed to combat climate change have already been implemented, or are in the process of being realised through various funding sources. For example, on 27 May 2010 the UNDP gave the Ministry of Emergency Situations of the Kyrgyz Republic USD 220,000 worth of satellite communication equipment.[9] This will enable it to transfer digital video information directly from the place of emergency in real time. It will also allow quick decisions to be made via video conferencing between the local Crisis Situation Control Centres and Control Centres headquarters (set up with support from the World Bank in the cities of Bishkek and Osh). The use of ICTs makes the work of specialists much easier by providing concrete and reliable information and an accurate picture of any situation, decreasing the time and effort needed for data analyses. As a result, decision making by the headquarters and local Control Centres is improved.

Another example of ICT best practices is the hydro-meteorological service of the Kyrgyz Republic. Regular climate observations are performed by the hydro-meteorological service which is the main information centre for analysing and predicting climate in all regions of the country under the Ministry of Emergency Situations. Because of this, the hydro-meteorological service needs to be properly equipped with ICTs. Under the "Enabling Activities for Preparation of the Kyrgyz Republic's Second National Communication to the UNFCCC" project the following activities were amongst those carried out:

- Maintenance of the monitoring stations included in the global climate monitoring system (two meteorological stations of the Kyrgyz Republic are included in the system).
- Technical and technological development of the hydro-meteorological observation network.
- Data processing and management of technologies development.

The overall impact of ICT in the development of the above activities is crucial and ICT is considered as being the main driving force in the realisation of the projects we have described above.

6 Ministry of Emergency Situations www.mchs.in.kg

7 climatechange.kg/files/part1_NC.pdf

8 unfccc.int/resource/docs/natc/kyrnc2e.pdf

9 Ministry of Emergency Situations www.mchs.in.kg

Innovations and new trends

Innovations are the engine of progress in all spheres of human activity, and prevention of global warming is no exception. In recent years in Kyrgyzstan several workable solutions have been introduced, and there are plans for the development of innovations on climate change prevention. For instance, the Country Development Strategy 2009-2011[10] places considerable emphasis on legislation and policy regarding climate change prevention, and improving the quality of the environment is the fourth prioritised development area. The strategy is focused on state policy and legislative improvement, harmonisation and the fulfilment of national nature protection laws and regulations in line with international environmental conventions.

In the sphere of saving energy, a GEF/UNDP project on "Improving Energy Efficiency in Buildings"[11] is underway. The main purpose of the project is to reduce energy consumption and greenhouse gas emissions in the construction sector by 30-40% through the introduction of new norms, regulations and standards. During the project a monitoring system for energy consumption and CO_2 emission levels will be implemented – ICTs will be used as the main monitoring instrument.

Kyrgyzstan will also participate in a regional UNDP project on "Development of a Central Asia strategy on adaptation to climate change".[12] The joint efforts and cooperation of neighbouring countries will greatly contribute to regional sustainable development. The project will emphasise intersectoral collaboration, the involvement of the business sector for project investment, and the constructive coordination of the donors.

Action steps

Considering all the actions described above on sustainable environmental development we came to the following conclusions and recommendations:

- An official website on the issue of global warming in Kyrgyzstan should be set up where all the information and latest trends in this sphere should be presented, including:
  - Projects initiated by environmental NGOs, the Kyrgyz government and international organisations
  - Legislation and environmental policy regarding climate change issues
  - Application of ICTs for environmental sustainability
  - The latest national, regional, and global news on climate change and ICT practices, such as using computers and telecommunications to maximise positive environmental benefits.
- Practical implementation and strict control of the existing legislation. The legislative background of the Republic is considerably well constructed, but not always properly carried out because of the low public awareness regarding these laws. In this case, ICTs should be used to disseminate information and increase public involvement and awareness by informing the population via:
  - Mobile phones (SMS, MMS)
  - Radio (short audio clips, thematic programmes)
  - Television (social video clips, thematic programmes)
  - Internet (forums, banners, websites).
- Stricter regulations for industry on greenhouse gas emissions to reduce the negative impact on the environment (ICTs could be used in these emissions reductions, and industry could be compelled to implement a solution).
- Enhanced regional cooperation and integration. The challenges posed by climate change can be solved more constructively and lead to changes for a better future at a regional level. ICT tools can be used in this process (such as video conferencing and country-level online information projects). ■

10 Government of Kyrgyzstan (2010) *Country Development Strategy 2009-2011*. www.kgembassy.org.tr/development.html

11 UNDP Kyrgyzstan (2010) *Climate Change and Kyrgyzstan*, UNDP/GEF. climatechange.kg.

12 Ibid.

MEXICO

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Introduction

The urgent need to deal with climate change challenges from various perspectives inevitably leads us to look at information and communications technologies (ICTs) from an environmental standpoint. Review of the carbon footprint caused by ICTs, employing these useful tools in climate change adaptation and mitigation, as well as consideration of the serious pollution affecting the health of workers in the production and recycling of hardware and other electronic items, should create processes where national environmental and digital agendas can be juxtaposed. Mexico is still a long way away from comparing the two. They are very separate processes without any crossover.

Policy context

Mexico has yet to consolidate its digital agenda. While there are records of several attempts in both the current and previous administrations, government agencies still need to define strategic plans to deal with opportunities in this sector related to health, education, labour, social development and the environment. The most recent attempt, in early 2010, was known as the National Strategy to Promote Information and Knowledge-based Societies,[1] containing three "coordinating" points. The first refers to broadening access by mobilising 200,000 to 300,000 students through the use of 20,000 "camps" in marginal areas. The second consists of facilitating access based on the e-Mexico Platform; and the third seeks to universalise connectivity through the creation of social programming networks to promote an information superhighway. Various departments and federal agencies participate in this strategy.

Moreover, during the current legislative session the Special Commission on Digital Access[2] was created, which seeks to "promote an inclusive and equitable information and knowledge-based society in the country and to promote within their areas of expertise any viable projects that can reduce the digital divide." Both initiatives are potentially important for the country. However, they do not consider ICTs as strategic components in the plans for climate change adaptation and mitigation.

The country's climate change plans are defined in different points in the environmental agenda. Responsibility for designing public policies and cross-cutting strategies of mitigation and adaptation at a national level lies with the Interdepartmental Climate Change Commission (CICC), created in 2005. As a result of several joint efforts, the National Climate Change Strategy (ENACC) and the National Climate Change Programme (PECC) were developed, which seek to establish short- and medium-term objectives for mitigation and adaptation, as well as commitments with measurable outcomes that are relevant to sectors such as agriculture, tourism and water management – but not for the ICT sector.

Mexico has signed various agreements related to the production, use and management of ICTs. For example, it has endorsed the 1992 Basel Convention on cross-border shipments of hazardous wastes and their disposal, and the 1989 Montreal Protocol on substances that deplete the ozone layer. It has also signed and ratified the 1992 United Nations Framework Convention on Climate Change and the Kyoto Protocol of 1997.

Mexico as a greenhouse gas producer

Mexico contributes 1.5% of all greenhouse gases (GHG) worldwide.[3] It is the second largest GHG producer in Latin America and the Caribbean, exceeded only by Brazil. It emits 715 million tonnes of CO_2 annually, mostly derived from deforestation and the electrical energy sector.

Mexican officials have already publicly stated the need to voluntarily reduce emissions by 50% by the year 2050 based on 2000 levels: "Mexico would be willing to promote global emissions limits… if ways of guaranteeing that those limits, essential to halting climate change, are discussed, and do not translate into freezes on economic growth or improvement in quality of life for inhabitants of developing countries."[4]

Beyond the shadow of a doubt, emissions reduction measures are indispensable. It is imperative to look at current manufacturing and consumption processes, which produce alarming amounts of GHGs. Several studies tell of the need for drastic action to reduce their effects. For example, Andrés Barreda[5] points this out when he talks about waste in Mexico City, including electronic waste (e-waste). "The first estimates made with official data, which are provisional and not very solid, indicate that GHGs generated by final disposal of urban solid waste in the Metropolitan Valle de México Area (MVMA) totalled 6.783 billion tonnes

1 Secretaría de Comunicaciones y Transportes (SCT) (2010) *Agenda Digital eMéxico, 2010-2012: Estrategia nacional para el impulso de la sociedad de la información y de conocimiento.*

2 LXI Legislatura (2010) *De la comisión especial de acceso digital, proyecto de plan de trabajo correspondiente al primer año de ejercicio de la LXI Legislatura.*

3 Martínez, J. (2010) México, sin preparación ante cambio climático, *El Universal*, 20 May. www.eluniversal.com.mx/notas/682060.html

4 Poder Ejecutivo Federal (2009) *Programa Especial de Cambio Climático 2009-2012*, Comisión Intersecretarial de Cambio Climático.

5 Barreda, A. (2009) *Evaluación de los impactos de los residuos sólidos bajo cambio climático en la Ciudad de México*, Centro Virtual de Cambio Climático de la Ciudad de México, Instituto de Ciencia y Tecnología del Distrito Federal y Centro de Ciencias de la Atmósfera de la UNAM, Mexico City.

of CO_2 equivalent in 2008. Considering the temperature rises predicted for the MVMA due to global climate change and the heat island effect, along with the solid waste generation rate and management practices staying the same, by the year 2050 we may be emitting 42.42 billion tonnes of CO_2 equivalent, 625% more than in 2008. Still, the numerous inconsistencies reported in reaching these estimates suggest that the situation could end up being much worse."[6]

In addition to examining the forms of production, consumption and disposal that mark our society, it is crucial to acknowledge what numerous studies show:[7] the potential of ICTs as instruments to modify usage of fossil fuels and their consequent effect on GHG production. However, the Mexican plans contained in the 2009-2012 Special Programme on Climate Change (PECC) make no mention of ICTs as possible tools in confronting the challenges of climate change. Because of this we lose sight of a potential means to reduce emissions and facilitate their further reduction.

According to the PECC, the ICT sector is in a vulnerable position: "The communications sector will be affected by climate variability, in the form of infrastructure damage, as well as by interruptions in transmissions and communications. In order to reduce their vulnerability we will arrange… to implement prevention programmes with climate change adaptation goals in telecommunications services and their infrastructure."[8] Concretely, the goal is to carry out an information campaign on the issue of climate change within the communications sector and to incorporate basic information on preventative actions and contingency plans.

In addition, it should be noted that an electronic system for recording GHG emissions is included within the PECC information and communication tasks, which would give visibility to reduction efforts.

What about pollutants and e-waste?

Like most countries with expanding markets, the country has experienced an elevated consumption of ICT devices. Added to personalised consumption of electronic products, there is a trend towards the automation of public spaces and services.

Mexican society, like the global society, has undergone a change in its form of consumption. Previously, electronic devices were usually repaired: their greater durability meant less energy expenditure in fossil fuels, for instance, and produced less pollution. With today's typical shelf life for electrical appliances, the consumption rate for electronic devices is higher, giving way to greater pollution and more e-waste.

Guadalajara, Jalisco is the main producer of software, electronics and digital components in Mexico.[9] Telecom and computer equipment from Guadalajara accounted in 2005 for about a quarter of Mexico's electronics exports.[10] There are a dozen major original equipment manufacturers, including IBM, HP and Siemens, and several contract equipment manufacturers, such as Solectron, Flextronics and Jabil Circuit. The electronics and ICT sectors have earned Guadalajara the nickname of the "Silicon Valley of Mexico".

There is ample evidence that electronics industry workers are suffering health effects[11] from exposure to toxic compounds such as chromium (used in metal covers), which is carcinogenic; cadmium (used in rechargeable batteries, contacts and cathode ray tube monitor connections), which affects the kidneys and bones; mercury (used in the lighting system of flat screen monitors), which damages the brain and nervous system; lead (contained in cathode ray tube monitors and in soldering), which causes loss of intellectual capacity and harms the nervous, circulatory and reproductive systems; and brominated flame retardants (used in circuit cards and plastic covers), which are neurotoxins and can hinder learning and memory.

E-waste is a problem for the nation, although it has not yet been recognised as such by society or official management plans in the national agenda, despite a few isolated actions undertaken by local governments, companies and NGOs.

We are unsure of the actual inventory on quantities of e-waste generated annually in the country. The Recall[12] company, specialising in mobile phone recycling, believes that slightly more than four million devices per month are discarded in Mexico.[13] A 2007 report from the National Ecology Institute estimated that between 150,000 and 250,000 tonnes of e-waste were produced in 2006, representing 1.5 to 1.6 kg/year per capita.[14] However, a more recent regional study on e-waste in Latin America stated that "a report concerning Mexico estimated 28,000 tonnes of IT waste for 2006."[15]

We are aware of the lack of infrastructure for appropriate and safe handling of e-waste. In terms of regulations, only the General Law on Waste Management exists, dating back to 2003, and includes a special procedure for technological waste.[16] This law has yet to be implemented. In addition, the country does not have binding legislation concerning

6 Ibid.

7 Pamlin, D. (2008) *The potential global CO_2 reductions from ICT use: Identifying and assessing the opportunities to reduce the first billion tonnes of CO_2*, WWF Sweden; Pamlin, D. (2008) *Outline for the first global IT strategy for CO_2 reductions: A billion tonnes of CO_2 reductions and beyond through transformative change*, WWF International.

8 Poder Ejecutivo Federal (2009) *Programa Especial de Cambio Climático 2009-2012*, Comisión Intersecretarial de Cambio Climático.

9 Vérut, C. (2007) *Mexican Information Technologies Industry*, MOITI Mexico Office, Mexico City.

10 www.allbusiness.com/professional-scientific/computer-systems-design/850022-1.html

11 For examples see lib.bioinfo.pl/auid:4058337

12 www.recallinternacional.com

13 www.ecobar.net/2009/11/la-basura-tecnologica-reciclada-evita-costos-y-contaminacion-internacional

14 Román, G. J. (2007) *Diagnóstico sobre la Generación de Basura Electrónica en México*, INE/IPN, Mexico City.

15 Silva, U. (2009) *Gestión de residuos Electrónicos en América Latina*, Ediciones SUR/Plataforma RELAC SUR/IDRC, Santiago.

16 www.adnmundo.com/contenidos/ambiente/celulares_basura_electronica_280806.html

extended producer responsibility (EPR). Responsibility for refuse, therefore, falls to the municipalities. As a result, electrical devices supposedly arrive at the regular landfills. However, there is an informal trade in dismantling, recycling and final disposal activities.[17] Participants include small businesses or individuals, some of whom secure sales contracts with large companies and sell e-waste to them.

In terms of e-waste recycling, there are various small business and local government initiatives which attempt to promote it and create profits from handling e-waste. An example would be Reciclotón, which carries out recycling campaigns organised by the Commission for Integrated Solid Waste Management in Mexico City.[18] Among the private companies involved in this recycling are 2M Tech México,[19] RDMSA, Proambi and Incycle, in addition to the subsidiaries of multinational companies who hold recycling campaigns for mobile phone and computer devices, such as Motorola, HP, Dell and Nokia (which even received an award from the Mexican government for having recovered 96,700 mobile phones, seven tonnes of batteries, and 200,000 IT accessories).[20]

Yet, despite this awareness, there are still a number of questions that need to be answered on a national level. What happens to all this equipment? Under what conditions for the workers and nearby residents are the parts dismantled? Who does it? What happens to the toxic components of electrical devices such as chromium, cadmium, mercury, lead or brominated flame retardants?

Action steps

We believe it is necessary to integrate environmental and digital public policies that promote more sustainable models of ICT production and consumption. The development of national clean manufacturing programmes for ICT products is urgent.

More research and academic assessments on the possible ways of reducing the carbon footprint of ICTs are in order. A joint effort by the academic, public, private and civil society sectors to obtain reports, evaluations and proposals about the impact of ICT on GHG emissions would be necessary.

It is essential to create programmes for consumers and producers that can help to analyse the current means of production and consumption and help to promote sustainable models of ICT use, which include reuse and recycling of equipment, but also innovation and the optimisation of ICT use to contribute to lowering the GHG emissions of other sectors.

Current data on e-waste indicates the need to draft national plans and regulations on the handling of e-waste that reduce its negative effect on the environment and on people. These plans must also take recycling, reuse and safe final disposal into account. ■

17 Román (2007) op. cit.

18 asambleagdf.gob.mx

19 ew.2mtech.com.mx/default.asp

20 saladeprensa.semarnat.gob.mx/index.php?option=com_content&view=article&id=937:se-suman-empresas-de-telecomunicaciones-a-la-adopcion-de-esquemas-sustentables-&catid=50:comunicados&Itemid=114

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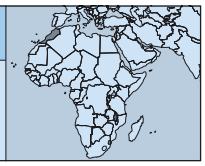

Introduction

The last two decades have marked a significant increase in the use of information and communications technologies (ICTs) in Morocco. In 2009, mobile telephone subscribers reached 25.3 million and internet users 13 million.[1] Consequently, the sale of devices like mobiles and computers has flourished to accommodate the spike in demand in the local market.

A national strategy called e-Morocco was launched by the government in partnership with both public and private stakeholders represented in a strategic committee on ICTs. This strategy not only aims at promoting the use of new technologies for a better positioning of Morocco in the international market, but also aims to improve the market structure and develop a practical regulatory framework through institutional programmes and action plans. In this context, the government in particular has given special attention to the issue of electronic waste (e-waste) and has delegated this task to the State Secretary for the Ministry of Energy, Mines, Water and Environment.[2]

Policy and legislative context

There is no specific legislation in Morocco to regulate e-waste; however, Law 28-00[3] is related to waste management and disposal and can be used to develop the necessary legal mechanisms for the better governance of e-waste.

Since e-waste has a dangerous impact on the environment and public health in general, and particularly in uncontrolled dumps, Law 28-00 is relevant as it prohibits the mixing of hazardous waste with other types of waste. Moreover, it establishes rules for the organisation of existing dumps and calls for their replacement with sanitary landfills, defining three different landfill categories. This categorisation defines the type of waste the landfills are authorised to receive.[4]

The Moroccan legal system also comprises a numerous set of laws relevant to e-waste management, namely Law 10-95 on water, Law 13-03 on air pollution, Law 12-03 on environmental impact studies, and Law 11-03 on the protection of the environment. The Investment Charter (1995)[5] is also applicable.

Morocco has also adopted the concept of sustainable development and ratified various international agreements specific to environment protection, namely the Montreal Protocol in 1992; the Vienna Convention and the amendments in London and Copenhagen in 1995; the UN Framework Convention on Climate Change (UNFCCC) in 1995, followed by the Kyoto Protocol in 2002; the Basel Convention on transboundary movements of hazardous wastes in 1995; the Stockholm Convention on persistent organic pollutants (POPs) in 2001; and the protocol on the prevention of the Mediterranean Sea's pollution in 1999. Finally, Morocco cooperates actively with the European Union in the domains of soil and water quality, the consequences of industrial development, and the control and prevention of marine pollution.[6]

E-waste in Morocco: Early days, yet strong awareness

A recent report of the United Nations Environment Programme (UNEP) entitled *Recycling: From E-Waste to Resources* states that sales of electronic products in regions such as Africa and Latin America are set to rise sharply in the next ten years. Unless the necessary steps are taken to adequately collect and recycle materials, many developing countries risk facing hazardous e-waste mountains with serious consequences for the environment and public health.[7]

In 2007, Morocco launched an e-waste project led by the Moroccan Centre for Cleaner Production (MCCP) with the objective of conducting a diagnosis of the country's e-waste status.[8] A national strategy committee was set up which included concerned stakeholders that are directly linked to e-waste to assess the current situation. The task of the committee was to define the necessary elements for drafting a road map to allow the implementation of a proper e-waste management system. By 2008, Morocco was the only Arab country that had concluded an e-waste assessment study to define the current e-waste management situation.

The study concluded that households account for 73% of e-waste generated, which is the largest share compared to companies and government with 26% and 1% respectively.[9] The study also found that 54% of e-waste is

1 www.maroc.ma/NR/exeres/6EB10135-4808-4DC1-A854-5CD310882D0F.htm
2 ewasteguide.info/Laissaoui_2008_CMPP
3 www.lexadin.nl/wlg/legis/nofr/oeur/lxwemar.htm
4 ewasteguide.info/files/Laissaoui_2008_WasteCon.pdf
5 www.lexadin.nl/wlg/legis/nofr/oeur/lxwemar.htm
6 ewasteguide.info/Laissaoui_2008_CMPP
7 www.unep.org/PDF/.../E-Waste_publication_screen_FINALVERSION-sml.pdf
8 www.dsf-fsn.org/en/documents/newsletter/Newsletter_14b_en.pdf
9 ewasteguide.info/Laissaoui_2008_CMPP

concentrated in five of the most important regions in terms of population density and economic activity: Casablanca, Souss, Marakech, Tangier/Tetouan and Rabat. Morocco is said to throw away 13,500 metric tonnes of PCs and 15,100 metric tonnes of TV e-waste in a year.[10]

The collection and recycling of 90% of waste in Morocco is mainly performed by the informal sector, which is not specifically interested in collecting e-waste due to the lack of interested buyers.[11] Waste collectors employed by municipalities or private firms segregate recyclable waste to be sold to wholesale intermediaries. Similarly, independent collectors or waste pickers sort through dumped waste and sell it per kilo to the informal "manager" of the dump on-site.

Mediouna landfill in Casablanca is one of the largest dumps in Morocco, covering 76 hectares and attracting around 500 waste pickers. According to the assessment study, this landfill has only received one recycling request from an industrial pollution control company. An agreement was signed in 2008 to create a new public sanitary landfill with the objective of rehabilitating the current dump and closing the landfill permanently.[12] The project also addresses the reuse of waste, for both electricity production and the recovery of recyclable materials.

Wholesale intermediaries take part in auctions held by companies in the region and some public authorities. However, they are not specialised in e-waste. Some companies specialising in collecting waste sell electrical waste directly to recyclers without processing, while others dismantle it first by removing plastic from desktop computers and printers. The metal parts are sold as scrap and the electrical cables are burned in the open air to recover the copper.[13]

The formal sector of e-waste management in Morocco is in its early stages of development. Several initiatives have been recently launched by associations or non-profit organisations which voluntarily collect computer equipment from companies, repair it and distribute it to other associations and organisations, and rural schools.

Many computer agents offer their customers the option of trading in their used computers after two to five years of use. There is also a new wave of companies specialised in collecting computer waste from companies, dismantling it and selling it either locally or to the international market.

Computer repairers are also an indirect stakeholder in e-waste management since some of them entrust their scrap waste to industrial pollution control companies. However, only a few retailers give their e-waste to processing companies due to the high cost and limited money offered for their waste.

In Morocco, there is no industry for the recovery of the precious and special metals contained in e-waste, with the exception of the Guemassa hydrometallurgy complex, which specialises in a few metals, including copper, lead, zinc and cobalt.[14]

New trends

Besides the work being done by the State Secretary for the Ministry of Energy, Mines, Water and Environment, an allied initiative is being led by the Department of Environment. It aims to draft a decree for the adoption and implementation of a National Hazardous Waste Master Plan. A detailed feasibility study for launching a National Centre of Hazardous Waste Treatment (CNEDS) is currently taking place within the framework of cooperation between the Kingdom of Morocco and the Land of North Rhine-Westphalia in Germany.[15] This centre will provide the necessary solutions to dispose of e-waste components that cannot be reused.

It is worth mentioning that some cultural initiatives are taking place that use electronic waste in order to create works of art. In May 2008, the headquarters of the General Confederation of Moroccan Enterprises (CGEM) hosted an exhibition by the artist Mohammed Tayert entitled Traces and Totems, with 56 paintings and statues, ten of which were made using e-waste.[16]

Action steps

The fact that there is no official e-waste management system or specific legislation in Morocco leads to the conclusion that the current situation needs more efforts to set up an organised legal and technical framework to guarantee better management of e-waste. It should be noted that the situation in Morocco is not yet alarming since the government and the private sector have shown awareness of the issue at an early stage. However, there is a pressing need to adopt specific regulations to establish the necessary e-waste management mechanisms in order to serve the environmental sustainability of the country.

At the same time, both the government and the private sector have set up ambitious strategies for the development of ICTs. Both parties also have active environmental protection initiatives, namely, the government's Environmentally Sustainable Industrial Development Plan, which aims at preventing environmental degradation, and the private sector's Social Responsibility Charter of the CGEM. Yet, in order to translate these commitments into action, the existing conventions and strategies need to be amended to reinforce an effective management plan for e-waste.

10 www.itp.net/579372-cause-for-concern-as-e-waste-mounts-in-developing-nations

11 ewasteguide.info/files/Laissaoui_2008_WasteCon.pdf

12 Ibid.

13 Ibid.

14 ewasteguide.info/files/Laissaoui_2008_WasteCon.pdf

15 www.minenv.gov.ma/index.asp?param=12_publications/documentations.htm

16 ewasteguide.info/files/Laissaoui_2008_WasteCon.pdf

Thanks to the assessment study on e-waste management, Morocco was defined as having great potential to introduce state-of-the-art e-waste recycling technologies because the informal e-waste sector is relatively small.[17]

The following recommendations are vital to advance e-waste management plans in the Moroccan context:

- Launching campaigns to raise awareness about the negative impact of e-waste.
- Initiating quantitative and qualitative follow-up studies to measure e-waste status.
- Leading capacity-building programmes and training courses on e-waste management.
- Establishing the necessary legal and regulatory frameworks.
- Developing strategic plans to define the business opportunities of having an effective e-waste management system in place.
- Encouraging multi-stakeholder partnerships between all the parties involved: technology corporations, environmental associations, the health sector, government legal bodies, etc.
- Securing the necessary financial support for recycling operations that are struggling to become profitable. ■

17 www.un.org/apps/news/story.asp?NewsID=33845&Cr=waste&Cr1

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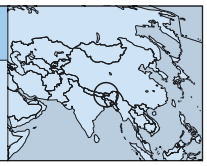

Introduction

Recently, at the 18th Session of the United Nations Commission on Sustainable Development held in New York on 5 March 2010, an official member of Nepal's delegation from the National Planning Commission, in an interactive session on waste management, said: "The management of waste has become further challenging with the increase in hazardous waste as the situation becomes more complicated when it is intermixed with other waste. Today, we have been confronting the continuing and worsening effects of e-waste [electronic waste] as well. Therefore, it has been more critical to effectively implement the Basel Convention [on the Control of Transboundary Movements of Hazardous Wastes and their Disposal]."[1]

Contrary to the rhetoric in the New York session, the story back home in Nepal is not in line with the spirit expressed by the Nepali official. Though a signatory to the Basel Convention as far back as 1996, the implementation of it in Nepal is yet to see the light. The story of its implementation is not any different from other stories that narrate the problems with policies and their failed implementation.[2]

Along with the e-waste, the burgeoning climate change problem in Nepal, as being one of the most vulnerable mountainous countries, is adding more challenges to environmental sustainability. In such a critical situation Nepal needs to explore all the possibilities – including the application of information and communications technologies (ICTs) – available to counteract the environmental sustainability issues.

Working on policies

Though Nepal signed the Basel Convention more than a decade ago, there is still no sign of e-waste policy in the country. As far as climate change is concerned, the draft of the national climate change policy was made public in late 2009 for comment. It was developed by the government with the assistance of the World Wide Fund for Nature (WWF) Nepal in 2009. But the policy is yet to be promulgated and translated into legislation.

However, the draft national climate change policy does not mention anything substantively about ICTs in combating climate change, except using ICTs like remote sensing technologies in climate change observatories for data collection. The other climate change initiative in Nepal, the National Adaptation Programme of Action (NAPA), a joint venture of the Ministry of Environment, United Nations Development Programme (UNDP) and some other donor agencies, has a plan to establish a National Climate Change Knowledge Management Platform. In the report of a recent NAPA brainstorming workshop earlier this year it is mentioned that the knowledge management platform will develop a national web-based climate and development portal.[3]

Nepal has formulated a Solid Waste Management Bill 2008. This bill provides the directives for managing and categorising solid waste types, and collecting information and data on solid waste in Nepal. However, it is specifically silent about e-waste management, although it deals with hazardous waste such as chemical waste from hospitals.

Easier said than done

Nepal is highly vulnerable to the potential negative impacts of climate change. Consistent rises in annual mean temperature, less frequent but more intensive rainfall events, increasing frequency and intensity of floods, changes in the monsoon, a growing threat from glacial lake outburst floods (GLOF), longer dry spells and droughts, and increasingly stronger storms have already been experienced in the past decade. These hazards are not only causing damage and loss of human lives and property, they also undermine development progress in Nepal and put the achievement of the Millennium Development Goals (MDGs) at risk. Poor people in Nepal are disproportionately affected, as their livelihoods often depend on climate-sensitive natural resources, and their capacities to cope with extreme climate events are especially weak.[4]

On the other hand, ICTs in the form of email and the world wide web started becoming accessible to the public in Nepal in the late 1990s. Nepal enacted the IT Policy 2000 with the assistance of the International Development Research Centre (IDRC) in 2000. The vision of the Nepal IT Policy is "[to] put Nepal on the global map of information technology within the next five years." Its objectives are to make information technology accessible to the general public and increase employment using technology; build a knowledge-based society; and establish knowledge-based industries.[5] Though the policy was silent about applying ICTs for environmental protection or sustainable development in Nepal, it was appropriate for the context ten years ago. The context of ICT applications now has changed and Nepal's ICT policy should be amended to be environmentally friendly and useful.

1 www.un.org/esa/dsd/resources/res_pdfs/csd-18/05may/waste/Nepal.pdf

2 www.basel.int/ratif/convention.htm

3 www.napanepal.gov.np and assets.panda.org/downloads/climate_chage_policy2066.pdf

4 www.napanepal.gov.np

5 nitc.gov.np/Admin/downloads/upload_doc/itpolicy2057.pdf

Currently, Nepal is still one of the countries with the least penetration of new media ICTs like computers, internet and hand-held devices. It is estimated that internet penetration in Nepal is still less than 2% of the total population of about 29 million. Hand-held devices like mobile phones fare relatively better. But when it comes to other ICTs like radios, more than 80% of the population has access.

Given the contrast of Nepal being highly vulnerable to climate change and having low ICT penetration at this point in time (except for radio), is there a role ICTs can play in combating climate change in the country? What about in the future? To what extent should Nepal be using ICTs for combating climate change? What are the possibilities for the effective use of ICTs in combating climate change? Or, given that ICTs have their own carbon footprint as an energy-consuming and e-waste-generating industry, and Nepal is sandwiched between two emerging economies, the emission and e-waste giants of India and China, is there an urgent need for policy response?

As already discussed, there is a dearth of information and data on e-waste in Nepal. According to data available, it is estimated that 58 municipalities in Nepal produce about 1,369 tonnes of solid waste per day or 500,000 tonnes per year. On average, about 70% of the waste generated in Nepali municipalities consists of organic matter, while 20% consists of recyclable inorganic materials such as paper, plastic and metal, and about 10% is inert material. Of this, the percentage of e-waste is not known.[6]

According to the officials of the Environment Standard Department of the Ministry of Environment, which is concerned with managing e-waste in Nepal, standards for e-waste management and inventory are being prepared. Asked why there has not been a policy response or action given the signing of the Basel Convention by Nepal in 1996, the authorities explained that due to a lack of human resources and expertise the much needed work has not been undertaken.[7]

Though there is no official data or research on e-waste issues in Nepal, it cannot be concluded that there is no generation of e-waste in Nepal and that it does not present a threat to add to the woes of climate change. Like any country in the world, and despite coming off a low base, access to ICTs is increasing day by day in Nepal. According to Internet World Stats, as of September 2009 there were 499,000 internet users, which means 1.7% of the Nepali population has access to the internet.[8] Two years ago the number of internet users in Nepal was only 249,400. This means that internet penetration doubled in just two years. Similarly, according to International Telecommunication Union (ITU) data, the teledensity in Nepal as of 2008 was around 12.49 per 100 (2.99 for fixed lines and 9.46 for mobile phones). This data just the year before, in 2007, was 6.49 (2.46 for fixed lines and 4.03 for mobile phones).[9]

So what can one surmise from the rapid growth of ICT consumption in Nepal? Going by the current rate, in ten years time it can be projected that more than two million Nepali people will be using computers and the internet. And more than 25 people per 100 or 7.5 million Nepali people will be using mobile phones by 2020.

According to information available, a typical personal computer has three to five years of good use before it needs to be replaced or upgraded or completely discarded. The disposal of mobile phone waste is more rapid than computers, as new and cheaper models flood the market every month, and users who can afford it tend to change their mobiles every six to twelve months. So one can imagine how much e-waste will be generated just by the computers and mobile phones in Nepal in a decade or so.

Having said that, according to the SMART 2020 Report, globally ICTs could deliver approximately 7.8 gigatonnes of CO_2 emission savings in 2020. This represents 15% of emissions in 2020 based on a business-as-usual estimation. It represents a significant proportion of the reductions that scientists and economists recommended in 1990 that needed to be achieved by 2020 to avoid dangerous climate change. On the other hand, in terms of economic or cost savings, ICT-enabled energy efficiency translates into approximately USD 946.5 billion in savings.[10]

Poor countries like Nepal need to grow economically. And there is a need for building roads, houses, hospitals, schools and other infrastructure. But, at the same time, the impacts of climate change in Nepal like brown clouds, GLOFs and climate famine are already being observed. In such a situation Nepal cannot afford to be complacent and should act quickly. There is an urgent need for Nepal to formulate e-waste and climate change policies and, given the SMART 2020 report, make an effort to integrate ICT-enabled low-carbon economic growth in economic growth policies and plans.

Nepal signed the Basel Convention in 1996, and it has been more than a decade now and the country still does not have an e-waste policy. Of course, it is easier said than done. But Nepal cannot afford to squander another decade just making complacent excuses.

New trends, some hope

Earlier this year (in January) the Computer Association of Nepal (CAN) organised its annual ICT Conference called "Next IT Economy: A Future Talk". It had a session on "The Role of ICTs in Climate Change" and I was asked to present a paper. This was a commendable effort on the part of CAN to recognise the role of ICTs in climate change.

I presented a paper based on the SMART 2020 report titled "Enabling the Low-Carbon Economy in the Information Age in Nepal". The other paper presented in the session was on how ICTs like remote sensing and satellite technologies are being used in the mountains of Nepal to monitor weather

6 www.wateraid.org/documents/plugin_documents/solid_waste_management_in_nepal.pdf

7 Based on the author's personal conversation with ministry officials.

8 www.internetworldstats.com

9 www.digital-review.org

10 www.smart2020.org

patterns and glacial activities. A participant from the floor who was representing the Ministry of Agriculture raised a question on how ICTs can be used for collecting data on the impact of climate change on agriculture in Nepal. There were various answers, opinions and comments. But what was important was that somebody representing the government was thinking along the line of applying ICTs in combating the impact of climate change on agriculture in Nepal.

If this was any indication of a new trend, then there is some hope that various stakeholders, the private sector, civil society and the government in Nepal have in their thoughts the role of ICTs in climate change. This suggests that in future policies related to sustainable development, the role of ICTs will be considered and integrated.

Action steps

As the population of Nepal grows, and ICTs become more integral to daily life, there is a growing threat of e-waste as well as the carbon footprint of ICTs themselves. At the same time there is an opportunity that future leaders in Nepal can use ICTs to better people's lives and the environment. The guardians of the future have a responsibility to act as fast as possible to make it safe and sustainable for the country's children. We can delay and wait for policies, but climate change has already happened and will not wait for Nepal.

To achieve sustainable development in Nepal, the following steps forward are inevitable:

- Nepal must quickly act on adapting the Basel Convention to the national context and come up with national policies and legislation.
- The Ministry of Environment should quickly establish a division on e-waste and start baseline work such as surveys to generate data on e-waste and to help establish monitoring systems.
- The draft climate change policy should be finalised and enacted as soon as possible and should clearly indicate how ICTs can be integrated, as well as including regulations on e-waste.
- The Nepal IT Policy should be revised or amended to include the role of ICTs in sustainable development and climate change.
- The civil society and private sectors should also act on the issues of e-waste and climate change in Nepal. ■

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Introduction

In the Netherlands, both information and communications technologies (ICTs) and global warming have strong implications. Dutch researchers have played a big part in the development of ICT historically. The compact disc was developed in part by engineers from the Dutch company Phillips, and Wi-Fi, the global standard for wireless internet, was developed in the Dutch town of Nieuwgein.[1] The industry is now a major contributor to the country's economic development.

The Dutch government has actively supported the implementation of ICTs in both the private and public sector. As a consequence the Netherlands is a world leader in terms of ICT use,[2] innovation and commercial applications.

On the other hand, the widespread use of ICTs has created problems such as a rise in electricity demands and electronic waste (e-waste). This blooming industry also contributes increasingly to the country's carbon footprint. Rising sea levels and river management are among the biggest challenges when it comes to global warming for the Netherlands. A quarter of the country lies below sea level, where most of the people live and work; therefore the effects can be drastic, with strong social and economic consequences.

Policy and legislative context

The Netherlands, as an EU country, falls under specific laws of the EU for disposal, treatment and recycling of electronic waste. Moreover, there are national laws, adapted from EU directives and implemented at the national level.

The most relevant EU directives are 2002/95/EC and 2002/96/EC,[3] which concern the use of hazardous materials and flow of e-waste. The laws in the Netherlands are adapted to fulfil the requirements. Producers are responsible for limited use of toxic materials (2002/95/EC) and distributors and municipalities are responsible for the collection and processing of used electronics.

The Ministry for Housing, Spatial Planning and Environment (VROM) is responsible for ruling, controlling and providing incentives for compliance with policies related to e-waste. There are more than 600 municipal collection points for e-waste in the Netherlands, providing two options for the citizens: to return their electronics to specialised stores or to hand them over to their city administrations for processing.

VROM is a partner in the development of solutions regarding sustainability and eco-friendly markets. The ministry has the environment as one of its main issues. It has regulations in several areas, such as emissions, sustainability and waste. Most of this legislation concerns companies.

A noteworthy step that the government has taken is to implement a sustainable procurement policy, which started in 2010.[4] The novelty here is that the government is not using legislation, but its position as a (very large) customer to encourage the suppliers of products and services to become more sustainable. Among the product groups that have been defined in this policy are hardware and networks/infrastructure, and telephone services and equipment.[5] Some municipalities are exploring whether they can even go beyond the requirements set at the national level.

The three sides of the ICT industry

The three sides of ICT related to climate change can be summarised as follows: enabling the green economy (innovation), greening of ICTs and greening using ICTs.[6]

ICTs as a catalyst for innovation

ICTs have been called the "innovation axis" due to their potential to enable innovation for other economic sectors, by increasing productivity and creating new types of services.

The Dutch government actively promotes the use of ICTs in several ways, facilitating access to broadband internet and e-government services.[7] The Dutch Digital Delta (D3) policy (1999) introduced the pillars of regulation governing the use of ICTs in the public sector, which were considered essential to support the future position of the Netherlands as a world leader in ICTs. The dematerialisation that is the result of e-government communications has been progressively implemented, starting with online communication in municipalities. A big step towards e-government was the 1999 D3 policy document, which addressed electronic tax declarations.[8]

The Netherlands is one of the countries with the world's highest ICT Development Index (IDI) rating. This index developed by the International Telecommunication Union (ITU) measures the level of ICT access, use and skills in a certain

1 Agency for International Business and Cooperation (EVD) (2008) Dutch ICT turning existing technologies into innovative products and services, *Made in Holland*, p. 6. www.hollandtrade.com/made-in-holland/pdf/2008_05_Dutch_ICT_EN.pdf

2 www.itu.int/net/itunews/issues/2010/03/26.aspx

3 ec.europa.eu/environment/waste/weee/pdf/faq_weee.pdf

4 www.senternovem.nl/sustainableprocurement/what_is_it_about/index.asp

5 www.senternovem.nl/sustainableprocurement/criteria/index.asp

6 www.108-ict-is-een-probleem-en-een-oplossing.html

7 Statistics Netherlands (2009) *The Digital Economy 2009: Summary and conclusions*, p. 3.

8 Van der Hof, S. (2007) The Status of eGovernment in the Netherlands, *Electronic Journal of Comparative Law*, 11 (1), p. 4. www.ejcl.org/111/article111-13.pdf

country.[9] The number of subscriptions to digital cable and terrestrial television and use of mobile services are growing rapidly; there are currently 1.2 mobile subscriptions per inhabitant. The glass fibre network has been actively expanded along with the volume of internet traffic, facilitating access to high-speed internet connections. In fact, the largest and fastest internet hub in the world is the Amsterdam Internet Exchange.[10] Therefore the country is a key actor in the digital era. These facts have brought many advantages. The Netherlands is a preferred location for many international enterprises that want to develop business in Europe; a good ICT infrastructure and a highly skilled workforce have attracted more than 5,000 foreign companies, most of them major ICT corporations like Acer Computer, IBM, BenQ, Google, Oracle or Sun Microsystems.[11]

The Netherlands spends EUR 30 billion annually on ICTs, amounting to 5% of the national GDP. The steady growth of the industry, even in the economic downturn, has been a key element for economic recovery.[12] Today ICTs represent 70% of the country's innovative activities[13] and 10% of the value generated in the country.[14] Dutch ICT exports nearly doubled between 1998 and 2008,[15] being the world's fourth-largest exporter in the field.[16]

ICTs have provided easier access to services like health care. In 2006 a national switch point (LSP) was built with a reference index of routing, identification, authentication, authorisation and logging. Using this, healthcare providers can request data from hospitals, pharmacies and doctors. However, this application is controversial due to the kind of data stored, which includes personal information with intrinsic market value for private insurance and health companies. This example shows that the simple application of new technologies for managing data in order to increase efficiency and accessibility is not necessarily good or free of problems. The public might demand additional security measures or even ban its use all together.

ICTs and their contribution to the carbon footprint and energy use

Apart from the positive effect on the Dutch economy, the industry also has an impact on the environment.

The main contribution to the carbon footprint comes from the increasing number of ICT users. The Netherlands is among the countries with the highest level of ICT penetration. In addition to the high number of users, each user has many different devices. Moreover, these devices require more power due to their extended capabilities. 3G mobile phones, which are becoming common, consume more power than older ones. A few decades ago one radio, TV set and fixed telephone per household were enough for access to updated information and private communication; nowadays each person in the Netherlands produces between four and eight kilograms of e-waste per year, out of almost 50,000 tonnes that are put on the market annually.[17]

E-government initiatives have meant evident savings for the environment in terms of paper consumption and efficiency; however, they have also required investments to facilitate electronic access for people who did not have digital skills (and in doing so stimulating demand for ICTs), as well as increasing the use of data centres,[18] which require energy and result in emissions.

ICTs as a way to reduce the carbon footprint

A recent report[19] identified the main areas where ICTs could contribute to reducing CO_2 emissions: first, dematerialisation, then four sectors that can become smart, namely motor systems, logistics, buildings and grids. The forecast is that, worldwide, ICTs can reduce five times the volume of CO_2 that they generate, or up to 7.8 gigatonnes CO_2 (15% of total emissions by 2020 or USD 1 trillion in energy costs savings).

The Netherlands is an economy based on services rather than manufacturing. Services typically require less energy and pollute less. Countries with a strong services sector therefore usually have a lower energy intensity.[20]

In 2008 the Dutch State Secretary for Economic Affairs and the ICT Office signed a multiple-year contract in which the ICT companies commit themselves to improve their energy efficiency by 2% a year, on average. This would mean a 30% reduction by the year 2020, compared to 2005.

The Netherlands is considering the use of ICTs for reducing the impact of road transportation. There is a plan – currently on hold due to political struggle – to introduce a scheme which will use GPS technology in order to charge those most frequent users of road networks who create congestion. The programme will be cost neutral but will create more equity in transportation taxes and is expected to reduce up to 60% of travel time during congested periods.[21]

Dematerialisation is another way of reducing a carbon footprint using ICTs. E-government has already resulted in the elimination of many printed documents. Telework is another way of reducing the carbon footprint since it saves transportation emissions. The definition of telework varies

9 International Telecommunication Union (ITU) (2009) *Information Society Statistical Profiles 2009: Europe v1.01*, p. 41-43. www.itu.int/dms_pub/itu-d/opb/ind/D-IND-RPM.EUR-2009-R1-PDF-E.pdf

10 The Netherlands Foreign Investment Agency (NFIA) www.nfia-india.com/vertical_report_ICT.html

11 Agency for International Business and Cooperation (EVD) (2008) op. cit., p. 4.

12 www.witsa.org/news/newsletter_Q110/img/ICTOffice_DutchICTsector2008_2009.pdf

13 Agency for International Business and Cooperation (EVD) (2008) op. cit., p. 9.

14 OECD Country Statistics Profiles 2009. stats.oecd.org/Index.aspx?DataSetCode=CSP2009

15 Statistics Netherlands (2009) op. cit., p. 3.

16 Agency for International Business and Cooperation (EVD) (2008) op. cit., p. 6.

17 epp.eurostat.ec.europa.eu/portal/page/portal/waste/data/wastestreams/weee

18 Van der Hof (2007) op. cit.

19 The Climate Group (2008) *SMART 2020: Enabling the low carbon economy in the information age*. www.smart2020.org/_assets/files/02_Smart2020Report.pdf

20 OECD (2010) *ICTS for Development: Improving Policy Coherence*, OECD, Washington, p. 150.

21 Sustainable Development Commission (2010) *Smarter Moves: How information communications technology can promote sustainable mobility*, p. 50. www.sd-commission.org.uk/publications.php?id=1050

among countries; the Central Statistical Office (CBS) defines a teleworker as "someone who works outside the premises of his/her employer on a regular basis and has access to the ICTs of a company." Using this definition, 8% of workers carried out telework in the Netherlands in 2004. A Smart Work Centre (SWC), launched in September 2008, provides a flexible working space using ICTs in close proximity to a residential community. The aim of the project is to reduce transportation demands and increase productivity.[22]

Having in mind the possibilities created by Smart Cities, Amsterdam partnered with Accenture in order to create the EU's first "intelligent city". The city will use a smart electric grid, smart metres, smart-building technologies, electric vehicles and recharging stations. The goal is a 40% CO_2 reduction in 2025 compared to 1990 and the use of local renewable resources to produce 20% of its own energy needs.

Most of the solutions that ICTs can provide in order to reduce emissions related to administration tasks both in the public and private sector will need bigger and more powerful data centres. As a result, there is a need for more energy-efficient systems, including innovative cooling methods. One positive example is the Dutch company EvoSwitch, which has reduced energy consumption by 20% and operates on a climate-neutral basis.[23]

Dealing with e-waste

As a result of the application of ICTs in many sectors e–waste has become a major problem. The Dutch ICT sector has recognised these problems, and due to the link between ICTs and global warming, it is shifting to more environmentally friendly practices. This effort is supported by ICT Environment (*ICT-Milieu*),[24] a foundation that represents more than 300 companies in the ICT sector. It helps ICT manufacturers and importers to recycle used ICT equipment in a responsible manner. Through this programme 100 million kilograms of ICT waste have been processed, and 97% of all electronic waste collected is recycled.[25]

Nevertheless, a large proportion of e-waste has been shipped to other parts of the world – officially as second-hand goods for reuse. Dutch inspections by VROM proved that 50% to 90% of the material exported was in fact broken, and was therefore e-waste.[26] As a result of the inspections, this percentage has decreased.

The e-waste sector in the Netherlands is considered advanced, and a reference for other countries in Europe. Two main organisations are important in the sector: ICT-Office (an association of more than 500 companies in the sector), and the Dutch Association for the Disposal of Metal and Electrical Products (NVMP), which follows the development of e-waste in the sector.

Exploration in this sector is mostly thanks to the fact that it is seen as an opportunity. According to the general manager of ICT-Office, the Dutch ICT sector implements green innovation in products because it results in an increase in profits. Government incentives for retailers (which receive money back for items collected) also play a role.[27]

New trends

Positive and negative impacts from ICTs on the environment are common in all countries. Nevertheless, in the Netherlands new companies are creating business opportunities.

Besides the private sector, civil society stakeholders are developing initiatives that are directly related to the impact that ICTs have on the environment. The Dutch project Our Mobile Generation (OMG)[28] aims to inspire mobile phone users to come up with sustainable solutions or ideas that will lead to a more sustainable telecom industry and lifestyle. To reach that objective, OMG has set out different challenges which will be achieved by a community of students, young professionals and volunteers through a co-creation process.

In early 2010 the IT for Sustainability Meshwork[29] was initiated. Through an online platform, ICT experts share their knowledge to challenge the IT industry and help to contribute to sustainability in society.

At the 17th World Congress on Information Technology (Amsterdam, May 2010)[30] many of the problems mentioned in this report were discussed, creating a space for new proposals, including the smarter use of electricity grids, transportation/logistics and hybrid or electric cars.

Action steps

The debate regarding the ICT industry and climate change has two sides. First of all, ICTs are capable of providing many solutions to other industries in order to reduce their carbon footprint; but the ICT industry's carbon footprint itself will also increase, which offsets part of this positive development.

The Dutch government has actively implemented ICTs in the country and it has integrated them with public services. At the same time it has developed legislation regarding the impact they have on the environment, such as e-waste. Continued attention is required, however, and other stakeholders (companies, municipalities, etc.) should be encouraged to comply with or preferably go beyond the legal requirements. They must be challenged to discover the opportunities and apply their historical skills to turn threats into opportunities – in a cooperative fashion – so that, like the battle with the sea, we will prevail here once again. ■

22 www.smart2020.org/case-studies/smart-work-center

23 www.evoswitch.com

24 www.ictoffice.nl/?ch=MIL

25 Agency for International Business and Cooperation (EVD) (2008) op. cit., p. 9-10.

26 SwedWatch (2009) *Out of control: E-waste trade flows from the EU to developing countries*, p. 27-28.

27 www.nvmp.nl/nederlands/detaillisten/detaillistenvergoeding-2010.html

28 www.ourmobilegeneration.org

29 it4sustainability.global.gaiaspace.org/global

30 www.wcit2010.com

NIGERIA

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John Dada and Bidi Bala
www.fantsuam.org

Introduction

Nigeria's land mass and population make it a major stakeholder in the region when it comes to electronic waste (e-waste). It has been suggested that the country is emerging as one of the top dumping grounds for toxic, chemical and e-waste from the developed world.[1] An examination of the e-waste situation in Nigeria has a good chance of identifying critical policy gaps that can be addressed and/or promoted. Such a study of Nigeria's e-waste landscape must necessarily take into account its social, economic, political and demographic realities. This report takes the first steps in that direction.

It is a good omen that Nigeria was among the Africa representatives who were invited to the WasteCon 2008 conference in Durban, South Africa.[2] It was at that conference that a framework document was fashioned which encouraged every country to develop its own roadmap on how to handle the growing e-waste problem.

For the purposes of this report, e-waste is defined as obsolete electrical and electronic devices[3] – unserviceable products such as televisions, computers, computer monitors, keyboards, mobile phones and radios.

Policy and legislative context

The Nigerian National Policy on the Environment (1998) does not make any explicit mention of e-waste. However, the federal government recognises the need for an integrated national waste management strategy, and the Federal Ministry of Environment has proposed a bill that will be known as the National Environmental Management Act. It deals with air quality; atmospheric protection; protection and management of sensitive ecosystems; conservation of biological diversity; protection of hilly and mountainous areas; erosion and coastal management; and forest management. Sections 4(L) Part II and 16(1)(j) Part III deal with waste management. Additional national initiatives include the development of a draft National Healthcare Waste Management Plan in March 2007.

However, apart from a few isolated efforts, there is a paucity of nationwide measures aimed at e-waste management, and Nigeria still lacks the legislation and enforcement capacity as well as the infrastructure to handle e-waste in an environmentally sound manner. The Basel Action Network (BAN) estimated that about 400,000 used computers were being imported into Nigeria every month, out of which 25% to 75% were junk. It is estimated that the poor management of Nigeria's environment is costing the nation roughly USD 5 billion annually.[4] In 2008 the European Union (EU) selected Nigeria as one of fourteen African countries that can develop the capacity to manage e-waste.

E-waste status

In developed economies, garbage collection is often the responsibility of the local municipalities and townships. This has not been the case in Nigeria. It is in recognition of these needs that the Federal Ministry of Environment commissioned feasibility studies in fifteen cities for the construction of integrated waste management facilities. The cities selected were Aba, Abeokuta, Abuja, Benin, Ibadan, Ilorin, Jos, Kaduna, Kano, Lagos, Maiduguri, Onitsha, Port Harcourt, Uyo and Yola.

The studies recommended an integrated waste management facility approach with the following components:

- Material recovery facility
- Composting plant
- Incinerator
- Landfill cells, methane recovery system and leachate treatment facility
- Plastic recycling plant.

The designated national authority to coordinate Nigeria's carbon market is the Special Climate Change Unit. At the same time, the government's Integrated Waste Management Programme under the Clean Development Mechanism has earmarked NGN 250 million (about USD 1.6 million) in seed funding per facility. Several of these facilities have been or are in the process of being set up. Delta Environmental Logistics (DEL) in Rivers State has already established the first of these one-stop waste management facilities. Kano State has reached an advanced stage in developing a facility and has the approval to access the funds. Although these facilities do not deal explicitly with e-waste, they still remain the most visible evidence that the Nigerian government will fulfil its pledge of getting control of the escalating e-waste problem.

1 www.greendiary.com/entry/e-waste-poisoning-in-nigeria

2 ewasteguide.info/durban_declaration

3 Nnorom, I. C. and Osibanjo, O. (2008) Electronic waste (e-waste): Material flows and management practices in Nigeria, *Waste Management*, 28. www.ewaste.ch/biblio/electronic-w-1

4 www.scienceinafrica.co.za/2003/july/waste.htm

The specific challenges regarding e-waste in all states of Nigeria concern its collection and disposal. The regulatory environment for these activities is either non-existent or poorly implemented. The few civil society organisations that have some interest in waste management tend to be more focused on the massive and enduring environmental degradation caused by oil drilling and export in the Delta region of Nigeria.

Mobile telephony infrastructure has been the predominant information and communications technology (ICT) infrastructure on the Nigerian landscape. By December 2009, Nigeria had about 73 million active mobile subscribers,[5] in a country with a total population of 155 million,[6] making it the fastest growing mobile market in Africa. This in effect also means that Nigeria has the fastest growing e-waste volumes when it comes to mobile phones.

Civil society engagement in the e-waste policy, advocacy and implementation process is still sketchy and uncoordinated, especially because of the size and diversity of the Nigerian socioeconomic landscape. While organisations in sectors like health and agriculture have recognised the value of mobile phones as a cheap and effective tool for information dissemination, few have given thought to the disposal of the phones once they are old.

The most comprehensive civil society action in this regard so far is the e-waste assessment studies launched in Nigeria, Benin and Ghana by the Secretariat of the Basel Convention Regional Centre (BCRC).[7] Getting local communities and relevant civil society groups involved in the monitoring, collection and disposal of these devices can be a long-term sustainability strategy. If they are incorporated into the BCRC study, they can provide local-level focus and a reality check to complement the initiative.

The activities of the Federal Ministry of Environment are supposed to trickle down to the population through the state-based offices of the Environmental Protection Agencies. These are much smaller, poorly equipped and poorly staffed civil service units, whose grasp of the gravity of the issues they are required to supervise is rather poor. There are very few state governments, with the exception of Lagos State, that have a proactive waste management policy, good infrastructure and some form of reliable implementation. Lagos, as Nigeria's busiest sea port, is the main gateway for most of the technology that becomes e-waste in Nigeria; but the markets for these devices are in the hinterland and virtually every state in Nigeria has a growing pile of unprocessed e-waste.

New trends

There is a growing pace in the collaboration between international e-waste regulators – such as the Dutch Agency VROM-Inspectorate and the International Network for Environmental Compliance and Enforcement (INECE) – and the Nigerian National Environmental Standards and Regulations Enforcement Agency (NESREA). It was these collaborations that made it possible to intercept yet another e-waste shipment from Europe.[8]

The increasingly tough stance of the Nigerian government, and the pronouncements of its key policy agencies – the Federal Ministry of Environment, Housing and Urban Development, the NESREA, the Standards Organisation of Nigeria, the Computer Professionals Registration Council of Nigeria and the Nigeria Customs Service – indicate a proactive attitude, especially a desire to engage with civil society.[9]

There are also an increasing number of institutions and individuals who can be regarded as key players in the Nigerian e-waste policy landscape. They include:

- The minister of Environment, Housing and Urban Development
- The director of the Pollution Control Department, and the desk officer for e-waste
- The director of the Basel Convention Regional Coordinating Centre for Africa (BCRCC), Ibadan
- The Federal Ministry of Science and Technology
- The Standards Organisation of Nigeria
- The NESREA
- The National Information Technology Development Agency (NITDA)
- The Comptroller General of Customs
- NGOs
- The private sector
- Dealers in electronic materials
- The media.

Action steps

In plotting the way forward for advocacy, the following steps are needed:

- An audit of key stakeholder groups with an interest in environmental policy. They will include institutional and individual consumers, equipment manufacturers and retailers, recyclers, refurbishers, trade associations, labour unions, media, environmental and health

5 Nigeria Communications Commission (2010) *Subscriber Data at a Glance (Year 2008-January 2010).* www.ncc.gov.ng

6 United Nations (2009) *World Population Prospects: The 2008 Revision – Highlights*, United Nations Department of Economic and Social Affairs, New York. www.un.org/esa/population/publications/wpp2008/wpp2008_highlights.pdf

7 www.basel.int/centers/description/BCRCataGlance.pdf

8 Bivbere, G., Oritse, G. and Obi, I. (2010) Another Toxic Waste Vessel Arrested in Lagos, *Vanguard*, 4 June. allafrica.com/stories/201006040305.html

9 www.thisdayonline.com/nview.php?id=158781

advocacy groups, state and local governments, and federal agencies and regulators, as well as European Union, United Nations and G-8 nations representatives. The Computer and Allied Products Association of Nigeria (CAPDAN)[10] have indicated their readiness to collaborate with other stakeholders to stem the tide of e-waste.

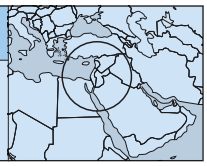
- It is necessary to establish an online repository for monitoring, giving visibility to, and tracking the activities and achievements of the Federal Ministry of Environment, Housing and Urban Development, NESREA, and the BCRCC. These agencies have indicated a willingness to engage with civil society on e-waste matters.[11]
- It is important to ensure ready access, in local languages and in local media, to research results and core documents from e-waste-related agencies.
- It is necessary for civil society to engage in advocacy efforts on e-waste, including meetings with media houses, facilitating radio and TV discussions, developing awareness-raising material, and the translation of information into local languages. ■

10 The Sun Publishing (2010) E-waste: Nigeria now a dumping site?, *The Daily Sun*, 23 March. www.sunnewsonline.com/webpages/features/suntech/2010/mar/23/suntech-23-03-2010-001.htm

11 www.thisdayonline.com/nview.php?id=158781

OCCUPIED PALESTINIAN TERRITORY

Applied Information Management (AIM)
Sam Bahour and Sonya Zayed
www.aim-palestine.com



Introduction

There is a widespread lack of awareness of electronic waste (e-waste) and an absence of an e-waste policy and legislation in Palestine. Palestinian officials and relevant institutions, which are living in a territory that is plagued by a prolonged Israeli military occupation and that is struggling with deep internal governance strife, view e-waste policies and legislation as low on their list of priorities – that is, if the issue even makes it onto their radar. Our research indicates that only a few local municipalities tasked with solid waste collection are working on e-waste. It is our impression that this research effort was the first time the topic has ever been specifically addressed in Palestine. Nevertheless, throughout Palestine, dismantling computers and taking out all the good and usable parts to reuse is common, especially in the Gaza Strip, which is under siege, and legally importing parts is nearly impossible.

Policy and legislative context

Our research took us to the main cities of Palestine: Nablus, Ramallah, El-Bireh, Hebron and Gaza. We also spoke to representatives of the West Bank-based Palestinian Authority. Not only are there no actual policies or legislation related to e-waste, but many we spoke to dismissed its importance given other priorities, and suspected low e-waste volumes. However, many businesses, ministries and municipalities do have in place policies or practices of donating their information and communications technology (ICT) equipment for refurbishment and reuse in academic institutions, both schools and universities. The absence of state policy and legislation related to e-waste can be directly attributed to the fact that Palestine is under military occupation, which leaves more important priorities. The fact that Palestine does not have full jurisdiction over its land, including many of its solid waste dumps, contributes to the lack of attention e-waste musters. It should be noted that East Jerusalem and the Gaza Strip, both also under Israeli occupation, each have their own particular political and security constraints which exasperate dealing with the e-waste issue. These areas are legally part of the occupied Palestinian territory; however, Israel retains jurisdiction either directly (via annexation of East Jerusalem) or indirectly (via blockade on the Gaza Strip).

Reuse and refurbishment, but little widespread knowledge of e-waste

There is a serious lack of knowledge on the actual topic of e-waste. The most important issue that needs to be raised in Palestine is awareness of the damage that e-waste may cause. Without such awareness, it can be expected that addressing e-waste policy, legislation and best practices will not be realised in the short and medium term.

The Palestinian Information Technology Association of Companies (PITA)[1] is a group of Palestinian private sector firms that created a professional trade association to defend the interests of the ICT sector. PITA represents over 80 ICT-specific companies working in various sub-sectors. PITA operates an IT incubator called the Palestine Information and Communication Incubator (PICTI).[2] When challenged on the importance of the issue of e-waste, Hassan Omar, PICTI's incubator manager, said that "we need to benchmark what e-waste policies exist in the region, and integrate with them."

General manager of IT Supplies and Computer Technology at the West Bank-based Ministry of Telecommunications and Information Technology (MTIT),[3] Jamil Zagharneh, said that he has never heard of e-waste and had no information about the topic. He did note some basic information about what is done with their own offices' used ICT equipment. When ICT products are no longer usable, an IT technician examines the products and writes up a report, after which they decide whether to donate them to schools or universities or, if beyond repair, discard them in the nearest public garbage dump. According to Zagharneh the ministry has no plans for introducing e-waste policy or legislation because of their other, more important priorities.

An interview was also conducted with an organisation called Joint Service Council for Solid Waste Management.[4] Reem Khalil, a member of the organisation, told us that they have never worked with any e-waste projects and was unable to direct us to any organisation that does.

Nasser al-Khateeb, director of ICT Supplies at the Supplies and Procurement Department in the Ministry of Finance,[5] advised that the Palestinian National Authority (PNA) mostly repairs their ICT equipment until it can no longer be used. In some instances, when they have a surplus of used equipment they no longer need, it is sold by a public bidding process. In other cases, they donate their used computers and printers to academic institutions. If they finally reach the point of disposing of ICTs, they go through a short and basic process: first, an IT technician examines the product and writes up a report and second, there is a meeting between the head representative of the department

1 www.pita.ps

2 www.picti.ps

3 www.pmtit.ps

4 palestine.ded.de/cipp/ded/custom/pub/content,lang,2/oid,12819/ticket,g_u_e_s_t/~/Joint_Service_Council_for_Solid_Waste_Management.html

5 www.pmof.ps/en/index.php?pagess=home

and the IT technician to decide whether to keep and fix the product, to donate it, or to remove the important parts that can be reused, and dispose of the rest by breaking it with a hammer, burning, or burying.

The municipalities of Gaza, Nablus and Hebron were not able to provide any useful information, but they did say that they have no idea what e-waste is and they have no rules or procedures on disposing of ICTs. As far as we were able to discern, e-waste is usually just disposed of as if it were normal garbage.

In the Municipality of Ramallah[6] we interviewed Jad Kondah, general manager of IT. He told us that there is no policy for e-waste and that currently they are trying to work on a general recycling programme throughout the city. He did not know exactly how and where old IT equipment is disposed of.

At the Municipality of Al-Bireh[7] Dr. Eyad Daraghmeh is in charge of solid waste. Daraghmeh said that he has tried working on projects to help recycle ICTs on several occasions, but because he was a municipality staff person he needed approval from other government officials. However, he never received it. Daraghmeh preferred not to go into specifics about the recycling projects he was referring to. Our understanding is that he may be currently pursuing them through different channels. He also noted that, to date, the only ICT products that are directly disposed of by the municipality are computer monitors and obsolete printers. Other ICT equipment is either repaired or put into a storeroom. These storerooms typically contain an array of obsolete computers, printers, photocopy machines and fax machines that the municipality departments no longer want or that cannot be otherwise used.

Although a structured approach to e-waste does not exist, the awareness of recycling and donating ICT products to civil society is clearly prevalent. For example, in addition to the above-mentioned practices, there is a project at Birzeit University in Palestine called the Linux Terminal Server Project (LTSP).[8] This is part of a worldwide project that started in Canada. The project collects old computers and uses the parts to build servers and workstations. This project was successfully implemented at the Birzeit computer lab and also in one public school in the city of Birzeit.

New trends

We did find a disturbing general trend that should be addressed in the context of e-waste as well: Israeli solid waste is trucked into the occupied Palestinian territory and dumped in illegal dumping sites.[9] Given that Israel is a much more modern and developed economy, with ICT production facilities in operation, this trend poses an immediate danger, especially given the lack of awareness and regulation on the Palestinian side.

Action steps

- Immediately stop the use of illegal dumping sites.
- Educate people in Palestine about the seriousness of e-waste.
- Promote the separation of e-waste from general solid waste in Palestine.
- Promote organisational efforts to address e-waste in the various cities of Palestine.
- Develop a national policy and legislation that deals with e-waste in Palestine.
- Create public awareness about the new policy and legislation through educational institutions, governmental institutions, and the private sector.
- Build capacity at the municipality level to implement and be in compliance with the new legislation. ■

6 www.ramallah-city.org/english.aspx

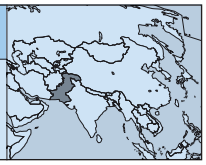
7 www.al-bireh.org

8 plip.eifl.net/eifl-foss/ltsp

9 www.haaretz.com/print-edition/opinion/green-now-1.293136

PAKISTAN

Bytes for All
Shahzad Ahmad and Maryam Rehman
pakistanictpolicy.bytesforall.net



Introduction

Using different kinds of electronic equipment today is so much a part of our daily lives, we hardly think of the way the world would be without electronics. The extreme growth rates in take-up of information and communications technologies (ICTs), minimal initial set-up costs and ever-shortening planned obsolescence rates result in large quantities of electrical and electronic equipment being added to the waste stream.

In recent years a great deal of attention is being devoted to the environmental impact of computers and other electronic equipment, as these items pose a massive problem for municipal landfills and health hazards to human life.

Pakistan, a country with a diverse landscape, hosts large deserts, gushing rivers, and a number of the highest peaks in the world. But its environment is marred with many environmental issues such as uncontrolled urbanisation, poor solid waste management, degradation of forests, scarcity of water, excessive use of pesticides for agriculture, poor environmental standards in industries, and weak governance structures. Environmental laws enacted are not enforced properly to help stop the disasters.

Being an agriculture-based country, experts consider climate change a great threat. Listing the vulnerabilities, they are concerned about crop failure and loss of livestock, which will lead to food insecurity and serious conflicts over resources. Droughts, floods, scarcity of water resources, health risks, meagre energy resources, and socioeconomic and socio-political instability can play havoc with the country's large population.

The recent monsoon floods that started in the last week of July 2010 are also thought to be influenced by climate change – increased temperatures, rapid glacial melt and unusual precipitation.

Policy and legislative context

The environmental movement in Pakistan took root in the early 1980s. The government took various steps including the enactment of the Pakistan Environmental Protection Ordinance in 1983, followed by the formation of the Pakistan Environmental Protection Council (PEPC) in 1984, an apex body for setting up environmental policies in the country. However, no major action in terms of environmental policies or practices were carried out until 1992, when the government endorsed the National Conservation Strategy (NCS) as an environmental policy at the sectoral level.

As part of Pakistan's commitment to the environment, the then prime minister of Pakistan presented the NCS at the Rio Earth Summit in 1992.[1] This also proved to be the starting point of the revolution of ICTs in the country, when the United Nations awarded a grant to Pakistan via the International Union for Conservation of Nature (IUCN) for the implementation of its much-acclaimed Sustainable Development Networking Programme (SDNP).[2] The SDNP initiative pioneered email and internet in the country for use by the masses.

Though the deterioration of the environment continued at a rapid pace, significant steps were taken towards institutional development and policy formulation to safeguard the environment in the country. Important milestones include the Pakistan Environmental Protection Act in 1997,[3] the establishment of Federal and Provincial Environmental Protection Agencies (EPAs), the approval of National Environmental Quality Standards (NEQS),[4] the initiation of the Provincial Conservation Strategies, and acceptance of local communities/NGOs as partners in environmental management.

The National Environmental Policy 2005[5] and Mid-Term Development Framework 2005-2010[6] are other important milestones. The environmental priorities established in these various government policies are summarised in Table 1.

Solid waste management in the policy documents always refers to municipal or industrial waste, while climate change is never referred to in the context of ICTs and environment sustainability. To bring these issues to the fore, there is a long way to go with specific interventions, focusing on the government in general, but the private sector in particular.

Pakistan is party to the following chemicals- and waste-related international conventions:

- Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal
- Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade
- Stockholm Convention on Persistent Organic Pollutants
- Vienna Convention for the Protection of the Ozone Layer and Montreal Protocol on Substances that Deplete the Ozone Layer.

1 Also known as the United Nations Conference on Environment and Development: www.un.org/geninfo/bp/enviro.html

2 www.sdnp.undp.org

3 www.environment.gov.pk/act-rules/envprotact1997.pdf

4 www.environment.gov.pk/smart/site/NEQS.html

5 www.environment.gov.pk/nep/policy.pdf

6 www.planningcommission.gov.pk/MTDF%20Review%202007-08/MTR.pdf

Table 1. **Environmental priorities as listed in different policies**

National Conservation Strategy (NCS) 1992-2000 *Priorities*	National Environmental Action Plan (NEAP) 2001 *Core Areas*	National Environmental Policy (NEP) 2005-2010 *Key sectoral issues*	Mid-Term Development Framework (MTDF) 2005-2010 *Key sectoral issues*

• Maintaining soils in croplands
• Increasing irrigation efficiency
• Protecting watersheds
• Supporting forestry and plantations
• Restoring rangelands and improving livestock
• Protecting wetlands
• Conserving biodiversity
• Increasing energy efficiency
• Developing and deploying renewables
• Managing urban waste
• Supporting institutions
• Integrating population and environment
• Preserving cultural heritage
	• Clean air
	• Clean water
	• Solid waste management
	• Ecosystem management
		• Water management and conservation
		• Climate change, air quality, noise pollution and waste
		• Energy efficiency, renewables
		• Agriculture, livestock
		• Forestry, plantations
		• Biodiversity, protected areas
		• Management
		• Cross-sectoral issues: environment and
		  • population
		  • gender
		  • health
		  • trade
		  • poverty
		  • local governance
			• Climate change
			• Solid/hazardous waste management
			• Fresh water, sanitation, slums and squatter settlements
			• Air pollution
			• Forestry and watershed management
			• Biodiversity, wildlife and protected areas
			• Rangeland management
			• Desertification
			• Energy conservation and renewables
			• Marine pollution
			• Multilateral environmental agreements
			• Cross-sectoral environmental concerns
			• Trade and environment
			• Human resource development
			• Environmental education and awareness
			• Research on environment

E-waste in Pakistan

When it comes to electronic waste (e-waste), Pakistan is at the receiving end of the "e-waste divide" due to widespread poverty and sharp inequality. Some may even see this as evidence of our greater ability to use and reuse material items more effectively than the wasteful West. Yet this inconsiderate attitude that results in e-waste dumping is already emerging as one of the major hazards to the health of both the environment and the people.

We already know that e-waste is as much a problem as other waste that is regularly generated by industrial societies. The health and environmental hazards associated with e-waste are mostly due to electronic goods containing significant quantities of toxic metals and chemicals. If these are left untreated and lie around in landfills or dumps, they leach into the surrounding soil, water and the atmosphere, thereby generating obvious adverse effects for human health and ecology. Many elements of the waste are hazardous, as the circuit boards, cathode ray tubes, connectors and other elements that are essential for most electronic goods almost always contain poisonous substances such as lead, tin, mercury, cadmium and barium.[7]

Old electronics are often lumped into municipal waste and then burnt, releasing toxic and carcinogenic substances into the air, which may stunt brain development, disrupt hormone functions or affect reproduction. Chemicals such as beryllium, found in computer motherboards, and cadmium, used in chip resistors and semiconductors, are poisonous and could lead to cancer. Chromium in floppy disks, lead in batteries and computer monitors, and mercury in alkaline batteries pose severe health risks.

Since recycling of e-waste often results in very high costs, developed countries have a tendency to dump their

7 Figures regarding major exporters of e-waste are available at the Electronics TakeBack Coalition website: www.electronicstakeback.com/Tools/Facts_and_Figures.pdf

e-waste into underdeveloped countries like Pakistan, often after the equipment has become obsolete. In Pakistan, e-waste dumping is encouraged by a number of legal, economic, social and political factors. Disparities in domestic legal standards between developed and developing countries have encouraged transboundary North-South movements of waste and toxic products. Pakistan faces the problem mainly on two fronts: on the one hand, it is used as the dumping ground for over 50,000 tonnes of e-waste[8] by developed countries and, on the other, it generates thousands of tons of local e-waste every year. However, many industrialised European Union countries have introduced stricter environmental standards and waste disposal legislation and have made regional arrangements concerning transboundary movements.

Pakistan is a signatory to the Basel Convention[9] and ratified it on 24 July 1994. This convention monitors the movement of toxic wastes like e-waste. However, the convention becomes flexible when the goods are to be used for the purpose they were designed for (i.e. old computers are to be used as second-hand machines). As a result, the relevant regulating agencies in Pakistan allow the import of used computers, as these will be reused.

Since much of these consignments are in practice stripped and sent for recycling, the rules of the Basel Convention are actually ignored because the machines are no longer used for productive purposes. For hazardous substances this is the only international environmental treaty signed by Pakistan's government.[10]

The prices of used computers are low compared to new ones, creating an increase in demand for old computers. However, such equipment also uses up more energy and people are unaware of both the environmental and health problems which can arise when these are disposed of, usually in a very short span of time.

Karachi is a major dumping ground for e-waste from all around the world. Although the dumping of waste is prohibited under the EPA Act of 1997,[11] no serious action is taken. Most of the scrap is dumped in the town of Surjani. In the district of Lyari, livelihoods are eked out by hundreds of workers including women and teenage children who dismantle the electronic scrap and extract valuable components such as copper. It may appear to be a convenient choice of making a living on trash, but the workers have no idea of the hazards they are exposed to. They usually burn the plastics without proper safety measures or use furnaces that have serious health consequences.

In the Shershah area, unusable parts and machines are brought to enterprising recycling initiatives, which are overwhelmingly from the informal sector, where occupational safety laws, safety measures and prerequisites such as properly ventilated working areas are rarely in place.

The workers, mostly women and children, are exposed to all sorts of toxins. The waste generated by this industry is dumped in the Lyari River, and eventually finds its way into the Arabian Sea, where it contaminates the marine ecosystem. Some of the waste is dumped in landfills, where it contaminates the soil after leaching through. Such landfill sites are also not properly administered.

So far no strategy has been devised to tackle e-waste in Pakistan, nor are there provisions to regulate e-waste disposal in the national IT Policy and Action Plan of 2000.[12] At the South Asian Association for Regional Cooperation (SAARC) level there is a ban on hazardous waste and radioactive waste in its environmental strategic development goals,[13] but unfortunately e-waste is not included in it.

Given the above background and issues, Mobilink, a leading mobile phone operator in the country, has initiated the Mobilink Handset Recycling Program,[14] in collaboration with the Pakistan Association of the Deaf (PAD) and the Disabled Welfare Association (DWA). This programme aims at sharing the benefits of mobile communication with the hearing impaired and the disabled, as well as minimising the environmental impact of e-waste through recycling.

Old and damaged mobile phones, batteries, chargers and accessories, irrespective of the model and make, are donated by simply dropping them in the recycling bins that have been specifically placed for this purpose at select Mobilink centres across Pakistan.

The company has teamed up with Ring Pakistan, a leading multinational specialising in GSM products and after-sales services, to restore functionality using high environmental and social standards. Repairable and partially repairable mobile phones and accessories are shared with PAD and DWA.

The donated mobile phones found to be unusable are disposed of in proper manner by Waste Busters,[15] an internationally recognised, fully integrated waste management organisation.

E-waste is an issue which clearly must be addressed immediately before it becomes even more of a problem. Strategies must be evolved to reduce the generation of e-waste, to prevent the legal or illegal import of such waste, and to develop feasible and safe ways of dealing with it within our own context and requirements. Otherwise the unregulated accumulation of e-waste may well lead to a public health disaster in the near future.

8 www.dawn.com/wps/wcm/connect/dawn-content-library/dawn/news/sci-tech/12-pakistan+a+dumping+ground+for+e-waste--bi-14

9 www.basel.int

10 Details on Pakistan's environmental agreements can be found in Hassan, J. (2005) *Multilateral Environmental Agreements*. www.lead.org.pk/c11-1nts/faculty%20Presentation/Jawad%20hassan.ppt

11 www.pakistan.gov.pk/divisions/environment-division/media/Pakistan_Environmental_Protection_Act.pdf

12 www.pasha.org.pk/_data/userfiles/cmsfile_1204713727_national_it_policy_1_.pdf

13 SAARC Strategic Development Goals: www.saarc-sec.org

14 www.mobilinkgsm.com/about/media/press/recycling.pdf

15 www.wastebusters.com.pk

ICTs and climate change

Pakistan is a low-emission country, but at the receiving end of negative impacts of climate change. Vulnerable as many developing countries are, the focus and attention of policy and development around climate change issues in the country remain on traditional areas including agriculture, water resources, food security and disaster management.

While several ICT-based systems and procedures are deployed to mitigate and minimise climate change impacts (e.g. early warning systems), an integrated approach to look at the use of ICTs and their connection with climate change is still missing.

However, telecommunications operators are now getting increasingly concerned about climate change and how they can adapt to minimise its negative impacts. On 9 August 2010, the Pakistan Telecommunication Authority (PTA) and cellular mobile operators in Pakistan signed a memorandum of understanding[16] on infrastructure sharing. By signing this memorandum, the mobile companies have agreed on the long-awaited tower-sharing concept, which had been implemented on a small scale earlier. This arrangement will greatly help reduce environmental hazards and fuel costs for running mobile phone towers. It is expected that wireless local loop (WLL) companies will follow suit. A group has been formed that will recommend the procedures for sharing towers for WLL companies operating in Pakistan.

Action steps

The e-waste issue so far has received little attention from the government and NGOs. To date, no scientific study has been made to assess the impact of e-waste processing on our environment. There is no reliable data available on the volume of used electronic components imported and the fraction of it recycled or dumped as solid waste. There is a dire need to determine the detrimental impact of e-waste processing on public health. This necessitates fast-tracking measures and a national strategy to avoid transforming the cities of Karachi and Lahore into dump yards.

A combination of legal, economic, social and political factors are contributing to the emergence and expansion of movements of hazardous waste and products from industrialised to developing countries. The majority of the world's toxic pollution is produced in Organisation for Economic Co-operation and Development (OECD) countries, which generate more than 95% of all hazardous waste – the principal waste-exporting countries being Germany, the Netherlands, the United States, the United Kingdom and Australia.

In order to address the e-waste crisis in Pakistan:

- In its forthcoming IT Policy, the government of Pakistan must include the issues of greening ICTs and e-waste disposal as priority objectives with proper provision for financial and human resource support.
- Funding should be set aside for the implementation of the various provisions of the Basel Convention.
- A special fund should be set up by OECD countries to help educate workers in the industry, as well as law-enforcing agencies, regarding the hazards from e-waste.
- Raising awareness about e-waste issues is necessary at different levels including government, NGOs, the private sector and the general public.
- To ensure sustainable e-waste management, an adequate regulatory and legal framework has to be developed and implemented.
- To meet the greening ICTs objectives, telecommunications operators should also think of sharing other resources such as optical fibres, franchises, customer care centres, etc.
- The improved coordination of government departments for regulating e-waste and greening ICTs in Pakistan is necessary. ■

16 www.pta.gov.pk/index.php?option=com_content&task=view&id=1420&catid=92&Itemid=301

PERU

Consorcio para el Desarrollo Sostenible de la Ecorregión Andina
Jorge Bossio and Miguel Saravia
www.condesan.org

Introduction

For the United Nations World Commission on Environment and Development, sustainable development must meet current needs without compromising the ability of future generations to meet their own.[1] Clearly, we cannot talk about sustainable development while we are using more resources than those we can restore to reach it. Therefore, sustainable development of social groups must combine economic development, social development and environmental protection.[2]

The Andes mountains host an extraordinary ecological and cultural diversity along with a long history and traditions which make them unique. The Andean region spans seven South American countries and is home to approximately 40 million people, most of them descendants of centuries-old cultures. Geographically, the Andes have a wide array of landscapes, where the mountains are divided by inter-Andean valleys with remarkable rivers, ravines and lakes. This mountain relief is naturally covered by fog forests, piedmont forests (bordering the jungle), dry forests, moors, grasslands and high plateaus; at higher altitudes, snow-covered mountains and glaciers. In all of these landscapes we can find a great diversity of wetlands that generate an outstanding hydrological situation. Nevertheless, according to international institutions, Peru will be the only country in the Americas to suffer water stress in the next twenty years because of the irregular temporal and spatial distribution of water along with an inadequate management of resources and increasing pollution.

Disasters are the main cause of non-structural poverty in rural areas since they produce severe shocks in the regional economy and rural survival systems.[3] Desertification has become increasingly problematic since the 1970s because of actions such as deforestation, drainage of the wetlands, indiscriminate logging in order to increase the "agricultural frontier", and overgrazing by livestock, which translates into 60% of the high Andean fields suffering from erosion. These are an important concern, as they contribute to a micro-climate change in the Andean basins.

The report of the Intergovernmental Panel on Climate Change (IPCC) determined consistent scenarios of temperature increase with incidences higher in the Andes than in adjacent lower areas. Impact patterns are found in highly vulnerable contexts in Andean populations, especially in rural areas where systems created by small farmers prevail. Such systems have faced difficult conditions associated with environmental processes such as the degradation of resources and socioeconomic processes affecting the welfare of rural inhabitants. Some of the most important impacts of climate change in the Andean region are:[4]

- An increase in the frequency of extreme events (rain, drought) and associated risks (floods, desertification).
- Direct effects on livestock due to decreases in the availability of fodder.
- An increase in the incidence of diseases associated with changes in temperature and humidity.
- Changes in the availability and spatial and temporal distribution of rainfall. The conversion of critical ecosystems is affecting hydrological regulation and the withdrawal of glaciers is impacting on the availability of water for irrigation. Both factors are having a mixed impact on the livelihoods of Andean communities.
- A net decrease in crop yields and associated impacts on the economy and food security of small farmers devoted to mixed systems (for both subsistence and the market).

What is the role of information and communications technologies (ICTs) regarding this problem? It is estimated that ICTs are responsible for 2% of CO_2 emissions.[5] In the last year, the rapidly growing uptake of mobile phones and internet in Peru has led to an increase in the carbon footprint and electronic waste (e-waste) in the area. Based on Mike Berners-Lee's estimates of the carbon footprint of mobile phone use,[6] carbon emissions in Peru generated by the mobile phone sector would be approximately 4.5% of the country's total emissions (nearly one million tonnes of CO_2 a year).[7]

On the other hand, ICTs facilitate the development of information systems that support early warning, diagnostic and monitoring processes, and are also an aid for awareness

1 www.un-documents.net/wced-ocf.htm

2 Bossio, J. F. and Perona, G. (2009) *Sistemas de información rurales en el Perú: situación y perspectivas*, Lima, CEPES.

3 Soluciones Prácticas ITDG (2009) Cambio climático, tecnología y pobreza rural en el Perú: siete experiencias, *LEISA revista de agroecología*, March.

4 Taken from research in progress: "Andean prospects regarding the impact of and vulnerability to the effects of climate change in the Tropical Andes", Francisco Cuesta, Manuel Peralvo, Andy Jarvis, Julio Postigo, Wouter Buyter et al.; "Indicators to evaluate the impact of climate change on the biodiversity of the Andean Community countries", Francisco Cuesta, Carolina Chiriboga, Manuel Peralvo, Arturo Mora, María Teresa Becerra, Andy Jarvis and Julian Villegas.

5 Gamero, R. (2009) *El cambio climático: una oportunidad para las TIC.* www.enter.es/mybox/cms/9720.pdf

6 Berners-Lee, M. (2010) *How Bad Are Bananas? The carbon footprint of everything*, Profile Books, London.

7 Based on an estimated 57 g per minute for calls originated on mobile networks and 47 kg annually per telephone in service, with 24.7 million mobile phones in service and 17.3 billion minutes of traffic in 2009, according to the national telecommunications regulator, OSIPTEL. www.osiptel.gob.pe

campaigns for the population and corporate sector regarding the responsible management of natural resources.

Finally, we recognise the potential of ICTs to improve the efficiency of the management of resources of other areas, including transportation and energy. Some studies indicate that the use of ICTs could generate reductions of nearly 20% of total emissions.

E-waste

According to the Institute for the Promotion of Sustainable Development (IPES), the market for electronic devices grew over 30-fold between 1997 and 2009. In the last fourteen years, 72,000 tonnes of e-waste have piled up in the country. Considering a seven-year period of useful life, in 2015 Peru will have amassed 208,000 tonnes of e-waste. The national customs authority SUNAD reported that 22,000 tonnes of computers and IT components entered the country in 2009.[8]

Figures from the National Institute of Statistics and Information (INEI) regarding household access to ICTs in 2008 indicate that 29.5% of homes had access to fixed-line telephones, 56.7% to mobile phones (at least one per household) and 16.5% had at least one computer. All these goods and services have increased compared to the data for 2000, especially the number of mobile telephones, which has grown more than 50%, followed by the number of computers (16% growth).[9]

In Peru there were more than 24 million active mobile phone lines as of December 2009, 50% of them outside of the capital city, according to the telecommunications regulator, OSIPTEL.[10] The import of new desktop computers in the second quarter of 2009 (April-June) decreased 32.6% compared to the same quarter of 2008, with a total of 22,600 units; at the same time, laptop computers recorded an increase in the third quarter of 2009 with nearly 130,000 imported units, a figure significantly higher than the 70,000 units recorded for the same period in 2008.[11] These figures show a significant increase overall in imported computers in Peru.

On the other hand, Peru has an important industry of assembly and repair of computers which represented more than 70% the total computers sold in 2008.[12] This industry, mostly informal and low-cost oriented, refurbishes pieces of obsolete computers and supplies "recycled" computers to the cities outside the capital. As researchers at IPES indicate, this informal recycling is helping to cover the internal demand, although this practice has an adverse effect on both health and the environment.[13]

These data indicate that there has been a rapid increase in the use of electronic devices and a need for policies and strategies for the collection of technological waste. As Peru is not a manufacturer of ICT products, there is no pressure from consumers or shareholders regarding the management of e-waste within the country.

In Lima, there are three formal companies that collect e-waste: Rimpe, Coipsa and San Antonio. Nevertheless, these companies only process 3% of the 15,000 tonnes of mobile phones and computers that reach the end of their useful life every year in Peru.[14]

Some companies have initiated waste collection campaigns as a part of their corporate social responsibility programmes, among them mobile phone operators such as Movistar and Claro. The *Reciclame* (Recycle Me) campaign launched in February 2010 by Movistar and Nokia sent 28,000 devices – roughly six tonnes of mobile phones, accessories and batteries – to be recycled in Mexico and the United States. The same month, Claro announced a similar recycling programme with the support of the Ministry of the Environment and the cooperation of Coipsa, a private company. The latter will be responsible for disassembling mobiles and accessories in order to identify the materials that can be recycled in Peru. Cards, plates and batteries will be exported to specialised refineries that treat this type of waste.

A recent joint initiative of IPES, the Ministry of the Environment and the Municipality of Santiago de Surco (Lima) focuses on supporting e-waste collection initiatives. The pilot was launched on 3 June 2010 and it is expected to be replicated nationwide. In its latest National Environmental Action Plan, the Ministry of the Environment describes its strategy as follows: "To develop actions for the treatment and final disposal of electronic waste, focused on the development of initiatives to manage e-waste including spare parts, batteries and other components containing dangerous substances and elements. Actions will be put in place to monitor and supervise the manufacturers and importers of such devices and components to be responsible for their management and final disposal without jeopardising the environment and health of the population."[15]

Impacts of ICTs

Even when it is clear that we still need more research to accurately measure the contribution of ICTs to the reduction of carbon emissions in some manufacturing processes, the SMART 2020 report, *Enabling the Low Carbon Economy in the Information Age*,[16] published by the Global e-Sustainability Initiative (GeSI), estimated that ICTs can contribute to a reduction of more than 15% of carbon emissions up to

8 Espinoza, O., Villar, L., Postigo, T. and Villaverde, H. (2008) *Diagnóstico del Manejo de los Residuos Electrónicos en el Perú*, IPES, Lima. ewasteguide.info/files/Espinoza_2008_IPES-Empa.pdf

9 INEI (2009) *Las Tecnologías de Información y Comunicación en los Hogares*. www.inei.gob.pe

10 www.osiptel.gob.pe

11 Dominio Consultores (2009) *Reporte de Importaciones de Computadoras Portátiles*, Dominio, Lima.

12 Ibid.

13 Espinoza et al. (2008) op. cit.

14 Torres López, F. (2009) Hay 72 mil toneladas de basura electrónica acumuladas en el Perú, *El Comercio*, 2 November.

15 Ministry of the Environment (2010) *Plan Nacional de Acción Ambiental 2010-2021 (Draft)*, MINAM, Lima. www.minam.gob.pe/index.php?option=com_docman&Itemid=65

16 www.smart2020.org/_assets/files/02_Smart2020Report.pdf

2020, which represents five times the carbon footprint estimated for the sector itself. At the same time, other studies estimate a 20-30% reduction for the European Union.[17] This contribution is basically indirect and is a consequence of the increase of energy efficiency and lower consumption of fuel because of the intensive application of ICTs.

An example of these indirect contributions in Peru is the use of intelligent transportation systems that the Ministry of Transportation and Communications has established as mandatory in all main roads throughout the country. This system will allow better vehicle flow and savings in time and resources for the users of the roads.

Other positive impacts in the reduction of carbon derived from a higher use of ICTs is represented by telework, which can potentially lower the need for daily travel for a great number of people, and therefore will result in the lower use of fuel. In addition, the intensive application of ICTs to information systems is providing immediate access to critical information for the management of natural resources. The same logic could be applied regarding the relation between ICTs and risk management.

Telework

Telework is most often given as an example of the use of ICTs to reduce carbon emissions. On the one hand, it cuts down on vehicle emissions through cutting down travel, as well as the emissions related to energy used in workplaces such as lighting, air conditioning, elevators and office equipment. Even when teleworkers use energy at home, there is a net saving of energy because the increase in the energy used by the person at home represents less than a third of the energy used in the workplace.[18] On the other hand, Cairns et al. indicate, after reviewing the literature regarding the impact of telework on traffic, that although teleworking reduces the amount of travel and distances travelled, it can also motivate people to live farther away from their company offices.[19] Nevertheless, empirical studies show that the net result is a decrease in the amount of time spent travelling and distance travelled on average. The magnitude of such reductions depends on the special characteristics of every area of study. Regarding employees who can potentially work remotely, it is important to consider that only 11% of employees in Peru are professionals and an additional 5.8% are office employees, according to figures from the Ministry of Labour. Despite this, according to Cairns et al., results for the United Kingdom indicate that although there are positions and areas of work with higher potential than others, there are possibilities of teleworking for most types of position and kinds of work.[20] The potential for telework has not yet been studied in Peru and therefore constitutes an important pending task.[21]

Information systems

Climate change is a threat, and its level of risk depends on the vulnerability of the population and ecosystems. In the last decade, the use of ICTs has been decisive in the development of information systems to provide critical data that make it possible to measure the threat, monitor vulnerability and build future impact scenarios. The effectiveness of adaptation and mitigation measures depends more and more on timely, accurate and updated information.

In general, as noted by Ospina and Heeks, ICTs have a positive impact on the ability of the society to adapt to climate change by linking resources, institutions and structures. In the same way, ICTs strengthen the resilience capacity of societies by allowing them to rebuild their survival systems and therefore to mitigate the effects of disasters.[22]

Among the most important uses of ICTs in this field are geographical information systems. An example of this is the *Geoservidor*[23] developed by the Ministry of the Environment in the last year, which will serve as a mechanism for the communication and exchange of geospatial information. This will be available for researchers and decision makers to access relevant information through the internet. This initiative joins the National System for Environmental Information (SINIA), a system that integrates the existing capacities of public institutions involved in environmental activities. This system also uses information provided by satellites in order to monitor deforestation processes, such as those used in the REDD (Reducing Emissions from Deforestation and Forest Degradation) initiative that is being implemented by the UN Food and Agriculture Organization (FAO) in Peru. The Andean Regional Project for Adaptation to Climate Change (PRAA) is another example: it is responsible for monitoring the withdrawal of glaciers in the Peruvian Andes. This programme has implemented two new monitoring stations in the Huaytapallana and Salkantay snow peaks.

However, civil society has been developing information systems since 1990 for the management of natural resources.[24] We could mention:

- SIA Huaral, the Agricultural Information System for the Huaral Valley, an information service made up of fourteen community information centres (telecentres) located in rural areas, and an information portal with content that responds to the needs of the farmers in the valley.

17 Gamero (2009) op. cit.

18 Irwin, F. (2004) *Gaining the Air Quality and Climate Benefit from Telework*, World Resources Institute, Washington. pdf.wri.org/teleworkguide.pdf

19 Cairns, S., Sloman, L., Newson, C., Anable, J., Kirkbride, A. and Goodwin, P. (2004) Smarter Choices: Changing the Way We Travel, *Teleworking*, Department for Transport, London.

20 Ibid.

21 A first attempt to solve this question will be the research of economist Rosa Morales of the Institute of Peruvian Studies (IEP) in the next months in order to estimate the potential impact of telework in the reduction of greenhouse gases through the decrease in the consumption of fuel in the city of Lima.

22 Ospina, V. and Heeks, R. (2010) *Linking ICTs and Climate Change Adaptation: A conceptual framework for e-resilience and e-adaptation*, Institute for Development Policy and Management, Manchester.

23 geoservidor.minam.gob.pe/geoservidor/index.aspx

24 Bossio and Perona (2009) op. cit.

- SIRA Arequipa, administered by the most relevant agricultural institution in the region, Sociedad Agricola de Arequipa. As noted by Bossio et al., "the idea is to generate a regional system that organises and provides information to the different stakeholders in the rural environment in order to make decision making easier."[25] This information system helps to build capacity for resilience such as the capacity to face foreseeable climate changes, the management of assets, redundancy of services, shortened response time, flexibility to take action and self-organisation.[26]

Finally, in the risk management area we can highlight a number of ICT applications,[27] including:

- Early warning systems such as the National Information System for Disaster Prevention and Response (SINPAD)[28] and SIAT Piura, which was implemented with the support of Oxfam.
- Events inventory systems such as the DesInventar database.[29]
- Communication systems for emergency situations, for example, those implemented by the government since the earthquake of 2007.

These tools constitute a fundamental contribution to the processes of adaptation to climate change, especially in socially and economically vulnerable contexts. This is the case in Peru, where the capacity to be prepared for and adapt to changes is key for the stability of the livelihood systems of rural populations.

Notes towards action steps

It is important to recognise that even when the use of ICTs generates additional consumption of energy and polluting solid waste, their use has an indirect impact on an efficient use of resources in industry and sectors such as transportation and trade.

Nevertheless, we have no empirical, conclusive evidence to accurately determine the positive impact of the implementation of ICTs in productive and service sectors in Peru.

On the other hand, information systems have proved to be useful instruments for institutions and people involved in or concerned about sustainable development.

Despite this, they cannot reach all of the population effectively except when they are designed and implemented from a local perspective and through the appropriation of the local media and processes to communicate the information. When these conditions are met, they facilitate collaborative learning and the development of communities of practice regarding the responsible management of natural resources. ■

25 Bossio, J. F., López, J., Saravia, M. and Wolf, P. (2005) *Desarrollo Rural y Tecnologías de Información y Comunicación. Experiencias en el Perú: Lecciones aprendidas y recomendaciones*, Intermediate Technology Development Group and Ministry of Agriculture, Lima.

26 Ospina and Heeks (2010) op. cit.

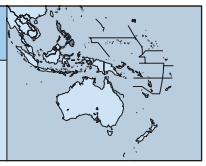
27 For more information see Damman, G. (ed.) (2008) *Sistemas de información y alerta temprana para enfrentar el cambio climático*, Soluciones Prácticas ITDG, Lima and Gómez, C., Prado, G. and Carrasco, H. (2007) *Tecnologías respondiendo a los desastres*, Soluciones Prácticas ITDG, Lima.

28 sinpad.indeci.gob.pe/PortalSINPAD

29 www.desinventar.org/en/projects/promoter

PHILIPPINES

Foundation for Media Alternatives (FMA)
Alan G. Alegre and Patria Gwen M. L. Borcena[1]
www.fma.ph



Introduction

The Philippines has always been a global success story when it comes to mobile telephony. It is a developing country with a significantly high mobile diffusion rate: mobile subscriptions have now reached 80% of the population.[2] As the main communications tool for citizens across all social classes, mobiles are also helping drive the country's steadily increasing number of internet users, from just 2% of the population in 2000, to more than 27% in 2010.[3] These realities have obviously fuelled a steady demand for information and communications technology (ICT) gadgets and equipment manufactured and assembled in or imported into the country.

But there is a worrisome underside to this. Consumption of electronic products and services are therefore increasing at an unprecedented rate, with the amount of accumulated obsolete equipment – electronic waste (e-waste) – growing over time. It may reach crisis proportions if systemic policy gaps, low public awareness and weak institutional capacities are not effectively addressed soon.

This report describes the emerging e-waste problem in the Philippines, with a focus on ICT waste. It summarises whatever statistics exist, and describes the country's present e-waste "ecosystem". It outlines the national policy and regulatory context, and lists some initiatives that address aspects of the problem. An initial action agenda for confronting the problem of e-waste is also presented.

The impending crisis

Generating e-waste

The unprecedented consumption of electronic products that eventually become obsolete drives the growing problem of internally generated e-waste. In addition to this, e-waste is also generated via the importing of second-hand and scrap electronics. E-waste-specific data are scant, but some indicative statistics can be cited.

ICT use: PC and mobile telephony use in the Philippines has increased tremendously. From just 34,000 mobile subscriptions in 1991, mobile subscribers have reached almost 79 million in 2010; almost four in five Filipinos own a mobile phone. Computer and internet access has also been steadily growing. Household PC ownership was only pegged at 5.9% in 2006,[4] but is steadily rising. Based on available census data and new statistical analysis, the increasing number of PCs in the country (both household and business) has also been estimated in Table 1.[5] The ubiquity of PCs in schools and workplaces, plus cheap internet cafés in urban areas, drive PC use and internet penetration. Recent studies place internet use at about 27%, ranking the country within the top 20 global internet populations.[6]

ICT trade:[7] Electrical and electronic equipment is one of the country's largest imports, constituting more than 40% of total imports. Total ICT imports reached PHP 57.7 billion (USD 1.2 billion) and total import volume hit 70.8 million kg in 2006. Total wholesale trade in ICT equipment increased from PHP 14.5 billion (USD 302 million) in 2005 to PHP 17.4 billion (USD 362 million) in 2006. Total ICT manufacturing output averaged PHP 750 billion (USD 1.56 billion) for the same period. Market analysts project Philippine computer hardware spending for 2010 to reach USD 1.6 billion, rising to USD 2.5 billion by 2014.[8]

Import clearances for "recyclable EEEs" (i.e. second-hand electrical and electronic equipment, but also eventual electronic scrap) continue to be issued by government, and are rising over time. A total of 191 clearances were issued from the year 2000 (19 issued) to 2007 (30 issued, highest in the period). In 2007 alone these clearances represented 98,823 metric tonnes imported into the country, mostly from Korea and Japan.[9]

The declining prices of PCs, notebooks and mobiles are further driving the adoption of technology, and non-stop technological development leading to quick product turnover fast-tracks the obsolescence of these devices.

1. Alegre is executive director of the FMA. Borcena is president of the Greenresearch Environmental Research Group. Research support from Randy Tuano and Daryl Ruiz.
2. Iglesias, M. (2010) Mobile users push up RP's Internet penetration, *Malaya*, 9 June. www.malaya.com.ph/06092010/busi9.html
3. internetworldstats.com/stats3.htm
4. National Statistics Office (2006) *2006 Family Income and Expenditure Survey*, public use file.
5. Villavert, R., Peralta, G. L. and Ramos, S. (2009) Estimation of Obsolete Computers in the Philippines, presentation at the 2009 Workshop of the Asian Network for Prevention of Illegal Transboundary Movement of Hazardous Waste, Kuala Lumpur, Malaysia, 20-22 January. www.env.go.jp/en/recycle/asian_net/reports/sixthyearwork/Session_III/04PhilippinesS3.pdf
6. Royal Pingdom (2010) The top 20 countries on the Internet, and what the future might bring. royal.pingdom.com/2010/07/27/top-20-countries-on-the-internet
7. Figures from National Statistics Office (2005 and 2006) *Annual Survey of Philippine Business and Industry* and *Foreign Trade Statistics*, public use files.
8. Philippine Information Technology Report Q1 2010. www.companiesandmarkets.com/Summary-Market-Report/philippines-information-technology-report-q1-2010-264539.asp
9. Sanez, G. G. (2009) Update on Enforcement Activities of the Basel Convention: Philippines and Situation in Environmental Concerns related to Recycling Activities: Philippines, presentations at the 2009 Workshop of the Asian Network for Prevention of Illegal Transboundary Movement of Hazardous Waste, Kuala Lumpur, Malaysia, 20-22 January. www.env.go.jp/en/recycle/asian_net/activitiesreport.html

Table 1. **PC stock in the Philippines**							
	2000	2001	2002	2003	2004	2005	2006
Household	468,380	571,232	674,084	776,936	928,696	1,080,455	1,232,215
Business	2,269,563	2,225,966	2,268,911	2,308,084	2,382,658	2,415,630	2,443,001
Total	2,737,943	2,797,198	2,942,995	3,085,020	3,311,354	3,496,085	3,675,216

Calculating e-waste quantities

There have been recent efforts to calculate the volume of ICT waste in the country, specifically in the area of PCs. PC sales data from 2000 to 2010 were tracked and the totals were estimated at 2,078,695 units. PC obsolescence was then calculated using end-of-life models and analysis. Without going into details of the statistical model, the following are the estimates of an academic team from the University of the Philippines.[10]

The number of obsolete PCs generated from 2003 to 2010 was calculated at 1,360,739 units. Of this total, only 444,501 (33%) are estimated to have been recycled, while 191,438 (14%) were thought to be landfilled (amounting to 6,000 tonnes). The rest are probably stored. By end-2008, the estimated 131,534 units stored were thought to be still waiting to be recycled or landfilled (or taken back by manufacturers).

Filipino culture is averse to a quick disposal of obsolete e-products, with many preferring to keep them for possible future use or resale. However, the country's collection and recycling ecosystems are underdeveloped and do not provide options that end-users can rely on. In addition, overall consumer awareness of recycling options is low.

Disposing of e-waste

The fate of much of the country's e-waste is not fully known. Some studies have mapped the e-waste disposal flow and pollution pattern in the country.[11]

Some local manufacturers (e.g. those in export zones or industrial parks where centralised waste facilities exist) have more formal disposal procedures, and some hazardous wastes from these sites are sent to licensed waste treatment facilities. However, the common e-waste disposal scenario for small/medium-scale enterprises (a vast majority of the country's economic sector) is of it being mixed with other solid waste, and probably landfilled. Here it is processed by the informal recycling sector: dumpsite waste pickers, itinerant waste pickers, small buyers/vendors, and junk shops.[12]

At the household level, owners of mobile phones and PCs typically turn over usable old products to relatives or friends when opting to buy a newer model or different brand; they also may sell these to second-hand shops. Unusable units are mostly stored in homes, but some find their way to the odd recycler.

Waste pickers typically collect and sell their wares to junk shops. In turn, these are then sold to formal recyclers for dismantling, and recovery of metals, plastics and glass. Junk shops may resort to burning to extract specific metals (e.g. copper). Some of the recovered materials are passed on to the electronics industry for reuse, or to other industries, domestic or abroad.[13]

The government admits that recycling of such e-waste is by and large a backyard industry that is largely informal, not covered by proper environmental permits and clearances, and lacking business permits.[14]

Environmental, safety and health issues

The increasing number of discarded technologies corresponds to an increasing percentage of hazardous materials which compounds the disposal and pollution problem, and can further result in damage to occupational safety, community health, and the environment. Greenpeace reported that since a large portion of discarded devices end up in landfills or with backyard recyclers, informal labourers and waste pickers, depressed communities and their environment get exposed to toxic heavy metals such as lead, cadmium, mercury, chromium, halogenated substances including brominated flame retardants, and polyvinyl chloride (PVC).[15]

The process of recovering gold in some backyard operations has also led to the draining of acid wash into septic tanks or open canals, causing pollution of nearby water sources including groundwater; this compromises not only community health, but also the biodiversity in nearby areas.[16] There are also cases where the incineration of e-waste has led to community complaints of very bad odours emanating from industrial waste processing plants.[17]

10 Villavert et al. (2009) op.cit. The statistical model was adapted from an earlier work which calculated e-waste volume of white goods: Peralta, G. L. and Fontanos, P. M (2006) E-waste Issues and Measures in the Philippines, *Journal of Material Cycles and Waste Management*, 8, p. 34-39.

11 Greenpeace Southeast Asia (2005) *Toxic Tech: Pulling the Plug on Dirty Electronics in Southeast Asia*, p. 12. www.greenpeace.org/raw/content/seasia/en/press/reports/toxictech_in_sea.pdf

12 Ibid.

13 Ibid., p. 13.

14 Sanez, G. G. (2009) Situation in Environmental Concerns related to Recycling Activities: Philippines, op. cit.

15 Greenpeace Southeast Asia (2005) Toxic Tech: Looming E-waste Problems for Thailand and Philippines, 28 September. www.greenpeace.org/seasia/en/news/toxic_threat_in_th_rp

16 Greenpeace Southeast Asia (2005) *Toxic Tech: Pulling the Plug…*, op. cit., p. 13.

17 Ibid., p. 15.

Policy and regulatory context

Instruments and institutions

The Philippines has no comprehensive policy framework to deal with e-waste. The fact that its environmental protection agency, the Department of Environment and Natural Resources (DENR),[18] has no official definition of e-waste attests to this. Similarly, the Commission on Information and Communications Technology (CICT)[19] – the government agency overseeing ICT policy – has not included e-waste management in the country's ICT plans and roadmaps despite civil society recommendations as early as 2006.[20]

The overall framework for managing all solid waste in the country is RA 9003 (Ecological Solid Waste Management Act 2000),[21] where e-waste could be classified as "special waste". Given the presence of toxic substances in e-waste, its closest definition is under "hazardous wastes" as defined in RA 6969 (Toxic Substances and Hazardous and Nuclear Wastes Control Act 1990) and its implementing rules and regulations, DAO1992-29.[22] RA 6969 regulates the handling, storage and disposal of hazardous materials, and also provides for the registration of hazardous e-waste generators, as well as importers, recyclers and facilities. Although this law has neither a clear provision for the management of e-waste nor a definition, at least it recognises that e-waste has toxic components. Other related policy instruments that may have a bearing on e-waste exist as well.[23]

The absence of a clear policy framework – reflecting a lack of political will – is a major reason for government's poor institutional capacity to deal with the mounting problem of e-waste. Though a few companies have begun their own take-back schemes, this has had limited effects since they are purely voluntary.[24] To date, no executive or legislative instrument codifies and enforces commitments towards extended producer responsibility (EPR).

Over the years there were efforts to incorporate e-waste concerns into new policy instruments.[25] The National Solid Waste Management Commission (NSWMC),[26] for example, drafted an administrative order (AO) in 2004 pushing for EPR, but it was seen as lacking teeth, and did not prosper.[27] DENR's Environmental Management Bureau also tried to draft an AO on e-waste, but this was bogged down within the bureaucracy, and also has not been issued. A similar bill on e-waste was filed in the 14th Congress in 2007 but was never acted upon up to its adjournment in June 2010.[28]

There may be a fresh opportunity to push these policy issues with the newly installed administration of President Benigno Aquino III. One of this report's co-authors specifically raised e-waste in a dialogue with the newly appointed DENR Secretary Ramon Paje, who acknowledged the policy gap and the need for the NSWMC to produce a draft e-waste policy framework that the newly installed Congress could enact, and that his agency could implement.[29]

International commitments

The Philippines is a signatory to some multilateral environmental agreements, most importantly the 1989 Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal.[30] However, the Basel Convention has a "recycling loophole" which can lead to the dumping of toxic wastes in the guise of second-hand goods.[31] The Philippines has not yet ratified the Basel Ban Amendment, which amends the Convention, and bans all exports of hazardous wastes from developed countries to all other countries for any reason.[32]

While failing to ratify the Basel Ban Amendment, the Philippine Senate however ratified the controversial Japan-Philippine Economic Partnership Agreement (JPEPA) in 2008. JPEPA allows the importation of Japanese chemical, hospital and municipal wastes into the Philippines, bolstered by a zero tariff provision that seemed to serve as an incentive to engage in toxic waste trade.[33] At the onset of the anti-JPEPA campaign, the *Philippine Daily Inquirer*'s editorial observed: "Going by the treaty, it seems that the Philippines is now positioning itself as a global waste dump."[34] The Basel Action Network warned: "The waste trade liberalization provisions of JPEPA… can alter the national and global legal landscape and abilities to implement the Basel Convention and its decisions."[35]

18 www.denr.gov.ph

19 www.cict.gov.ph

20 See for example Foundation for Media Alternatives (2006) *Civil Society Comments on the 2006-2010 Philippine Strategic Roadmap*, preliminary draft submitted to the CICT, 23 October. Typescript.

21 www.chanrobles.com/republicactno9003.htm

22 RA 6969: www.chanrobles.com/ra6969.htm; implementing rules and regulations: www.denr.gov.ph/policy/1992/ENV_DAO_92-29.pdf. Subsequent Administrative Orders DAO 1997-28 and DAO 2004-36 further try to fill perceived operational gaps.

23 These include other environmental laws (e.g. Clean Air and Clean Water Acts), and also efforts by specific agencies such as the Bureau of Customs to define its role viz. RA 6969 (i.e. transshipment of goods).

24 Greenpeace Southeast Asia (2005) *Toxic Tech: Pulling the Plug…*, op. cit., p. 19.

25 Carisma, B. (2009) Drivers of and Barriers to E-waste Management in the Philippines, IIIEEE Thesis for the Master of Science in Environmental Sciences, Policy and Management, Lund University and others, p. 27.

26 The NSWMC is an inter-agency and multi-sectoral body created by RA 9003 to oversee policies and plans in solid waste management.

27 Greenpeace criticised the draft's lack of substance and absence of important provisions such as the "polluter pays" principle enshrined in the Philippine Agenda 21 and many environmental laws. Greenpeace Southeast Asia (2005) *Toxic Tech: Pulling the Plug…*, op. cit., p. 20.

28 The May 2010 elections resulted in a new 15th Congress being elected; all previous bills not enacted – including the e-waste bill – would have to be refiled and go through the legislative mill from scratch.

29 Greenresearch (2010) Summary Process Documentation of Green Convergence Meeting with DENR Sec. Ramon Paje, Quezon City, 19 July.

30 Others to which the Philippines is a signatory are the Montreal Protocol on Substances that Deplete the Ozone Layer and the Stockholm Convention on Persistent Organic Pollutants.

31 Gutierrez, R. (2007) Divining Intent: A Look at Japan's Waste Trade Policy and its JPEPA Implication, report prepared for the Basel Action Network and the Magkaisa Junk JPEPA Coalition.

32 Basel Action Network (2006) *JPEPA as a Step to Japan's Greater Plan to Liberalize Hazardous Waste Trade in Asia*, BAN, Quezon City, p. 14.

33 For further critique of JPEPA, please see: junkjpepa.blogspot.com

34 Philippine Daily Inquirer (2006) Toxic Incidents, editorial, 1 December. services.inquirer.net/print/print.php?article_id=35733

35 Basel Action Network (2006) *JPEPA as a Step…*, op. cit., p. 18.

Action steps

To be fair to government and non-governmental stakeholders, there have been various efforts over the past years to address aspects of the problem, even amidst policy and institutional gaps. Space limitations prevent us from comprehensively listing the various sectoral and multi-stakeholder initiatives and assessing their impact. But below is a glimpse of some that could be relevant in evolving an action agenda:

- Some companies now attempt to lessen the toxic components during production. For example, Samsung, Sony, Sony Ericsson and Nokia have committed to remove toxic flame retardants and PVC plastic from some of their devices.[36] Others are implementing EPR via take-back schemes, notably Nokia and Hewlett-Packard.[37]
- The Philippine Business for the Environment network's 400 members participate in a pioneering Industrial Waste Exchange Program (IWEP).[38]
- "Recyclables fairs" and "waste markets" are regularly set up in major shopping malls, with drop-off bins for people's unused electronic devices.
- The iSchools Project of the CICT has embarked on PC maintenance, recycling and e-waste management training for state universities and colleges.[39]
- Awareness and advocacy campaigns continue. For example, Greenpeace pushing EPR adoption and encouraging "green cyberactivism"; environmental organisations sustaining the highly visible and strategic anti-JPEPA campaign; media companies and celebrities conducting recycling awareness campaigns such as *Bantay Baterya* (Battery Watch).

Such laudable initiatives must be expanded to form part of a comprehensive e-waste action plan,[40] which should include:

- Development, adoption and implementation – and monitoring/evaluation – of a comprehensive e-waste policy framework and implementation plan. Such systems and processes must involve all stakeholders. The framework must include strong EPR principles and programmes for companies, and a more effective recycling and materials recovery programme that offers incentives and convenience for end-users.
- The Philippines should immediately ratify the Basel Ban Amendment and suspend the implementation of JPEPA subject to a comprehensive multi-stakeholder review, particularly of its provisions on the trade of toxic e-waste.[41] Environmental safeguards (especially regarding toxic waste trade) should be integrated into all trade agreements.
- Continuing research and regular data gathering. In partnership with academia and research institutions, studies on e-waste issues (e.g. actual volume of domestic generation of e-waste, and amounts of e-waste entering the country from abroad) must be undertaken. Baseline data must be generated, and analytical and mathematical models adopted to trace current waste pathways and predict future trajectories of e-waste generation and disposal.
- Public information and education. Increased public awareness about the looming e-waste crisis, its negative effects, and a menu of proper responses is essential. Schools, media organisations and NGOs must lead creative information campaigns adapted to Filipino socio-cultural practices, translated into different local languages, via all possible channels.
- Institutional adjustment within DENR, CICT and others. Aside from initiating inter-agency coordination, DENR must set up internal structures that focus specifically on e-waste, as a distinct area from general solid waste. Institutional baseline assessments of all concerned government agencies – their capacities and infrastructures to control, monitor and regulate e-waste – is essential. CICT should designate a commissioner who can coordinate a focused e-waste effort with ICT stakeholders. Funding and internal capacity building is needed to build a cadre of personnel adequately trained in e-waste issues.

In all of these, collaborative partnerships among key stakeholders (scientists, environmental groups, educators, the informal sector, media, industry players, policy makers, and concerned government agencies) must be promoted for a critical common understanding of the e-waste problem to emerge, and to foster a shared commitment to strategic participatory action. ■

36 See Greenpeace (2005) Pulling the Plug on Dirty Electronics, 23 May. www.greenpeace.org/international/en/news/features/pulling-the-plug-on-dirty-elec

37 Greenpeace Southeast Asia (2005) *Toxic Tech: Pulling the Plug…*, op. cit., p. 19.

38 IWEP builds linkages among various industries, facilitating exchange of industrial waste for reuse and recycling. Carisma (2009) op. cit., p. 31.

39 Dalangin-Fernandez, L. (2010) Recycle old computers for public schools, *Inquirer.net*, 24 June. newsinfo.inquirer.net/breakingnews/infotech/view/20100624-277314/Recycle-old-computers-for-public-schools

40 Summary of points culled from existing research (notably Carisma [2009]), NGO advocacy documents, as well as the authors' own recommendations.

41 Philippine NGOs are calling for a comprehensive review of JPEPA with civil society representation; the treaty's revocation is also being proposed as an eventual option. Philippine-based UN Civil Society Assembly (UNCSA) recommendation during the Tri-Sectoral Conference on the Medium-Term Philippine Development Plan 2011-2016, 3 August 2010, Quezon City.

ROMANIA

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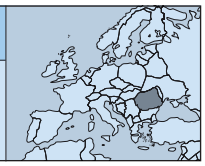

Introduction

The relationship between information and communications technologies (ICTs) and the environment is a new issue that is emerging in international[1] and European Union (EU)[2] forums as a response to growing concern about climate change. Meanwhile, in Romanian public discourse, debates on *information technology* and the *environment* have followed separate threads. This report is an attempt to bridge the gap between the two areas.

Policy and legislative context

Romania has taken significant steps since the fall of the Communist regime in terms of aligning to European and international policy-making practices (1989–2009). Accession to the EU in 2007 imposed stricter standards and tighter regulations in all areas, including in fields like environmental protection and ICTs. Key ICT and environmental legislation was adopted during the EU accession process, in the form of national adaptations of EU directives.

According to expert assessment, there is coherent climate change legislation, a strategy and a detailed implementation plan in place in Romania, although it is lagging behind EU standards in terms of implementation. Climate change policy documents do not mention ICTs as tools of mitigation or adaptation, but refer to them implicitly as tools for risk management. Waste management has also been tightly regulated and largely publicised in Romania, but ICT-related electronic waste (e-waste) has attracted little public attention compared to large household appliances, research has shown.[3]

As far as the Romanian ICT legislative environment is concerned, the alignment process to EU regulations has been quick and efficient, due to a strong business drive, and to consistent funding targeted at knowledge transfer (e.g. e-government, internet rights, data security and telecentre management issues). The United States Agency for International Development (USAID) funded and assisted the Romanian Initiative for Information Technology, a knowledge transfer project targeting policy makers, legal system actors and telecentre developers, and the World Bank funded the eRomania Gateway initiative in order to empower knowledge society developers.[4]

However, there are several gaps concerning the overall Romanian policy-making process: a lack of legislative stability, misconduct of political elites, poor institutional capacity, a low level of public awareness on policy-making issues, and a low level of public participation in decision-making processes. Power and inequality are culturally embedded in Romanian society: people often take leaders' decisions for granted[5] and consider participation as risk taking.

Climate change policy

A climate change and e-waste policy scan completed in September 2009 highlighted the main laws and regulations issued by the Romanian Ministry of Environment after the fall of the Communist regime (1989).[6] In terms of climate change policy, in 1992 Romania signed the UN Framework Convention on Climate Change (UNFCCC) and ratified it in 1994 (Law No. 24/1994). The Kyoto Protocol was adopted by Romania in 2001 (Law No. 3/2001). In 2005 the Romanian government adopted a decision approving the National Strategy on Climate Change for the 2005-2007 period (Government Decision No. 645/2005). Later that year a Strategic Plan for Climate Change 2005-2007 was adopted (Government Decision No. 1877/2005).

After EU accession (2007), a Ministerial Order (1170/2008) adopted the Guide on Adaptation to Climate Change Effects, with action steps and recommendations due to be revised every second year. The Guide has proposed several measures:

- Multi-annual research programme on adaptation to climate change effects
- Creation of a scientific interdisciplinary group in order to post-evaluate the research studies
- Updating of climate change scenarios in Romania by the National Administration of Meteorology
- Organisation of a national information campaign
- Integration of climate change coping strategies into environmental legislation and policy making.

1 Maclean, D. and St. Arnaud, B. (2008) *ICTs, Innovation and the Challenge of Climate Change*, International Institute for Sustainable Development, p. 3. www.iisd.org/pdf/2008/ict_innovation_climate.pdf

2 Forge, S., Blackman, C., Bohlin, E. and Cave, M. (2009) *A Green Knowledge Society: An ICT policy agenda to 2015 for Europe's future knowledge society*, SCF Associates Ltd., p. 2. ec.europa.eu/...society/eeurope/.../green_knowledge_society.pdf

3 Daedalus, M. B. (2009) *Echipamente electronice si electrice existente in gospodarii si atitudinea populatiei fata de echipamentele electronice uzate*, Ecotic. www.ecotic.ro

4 Bakó, R. (2007) Romania, in Finlay, A. (ed.) *Global Information Society Watch 2007*, p. 195. www.giswatch.org/gisw2007/en/download

5 Heidrich, B. (2001) *Szervezeti kultúra és interkulturális menedzsment*, Human Telex Consulting, Budapest, p. 85.

6 Bakó, R. and Péter, P. (2009) *GreeningIT Policy Mapping for Romania*, Association for Progressive Communications.

Other national measures related to climate change have been Government Decision No. 780/2006, establishing a scheme for greenhouse gas emission allowance trading, and Emergency Governmental Ordinance No. 152/2005, concerning integrated pollution prevention and control.

Waste management policy

Waste management policy in Romania has two major documents: the National Strategy on Waste Management, and the National Plan on Waste Management. The first is a 50-page strategic document analysing policy issues in waste management, while the latter is more detailed and addresses operational issues. Both documents were elaborated in 2003 for the period 2003-2013. Although the Romanian waste management system follows EU standards in terms of policies and targets, it does not meet EU results: for example, the EU target for e-waste is 4 kg/person/year, while Romania collects less than 0.07 kg/person, environmental experts stated.

There are special legal provisions for e-waste and used batteries, but their implementation and enforcement have a long way to go. Good practices are visible though: there is a monthly national campaign for collecting e-waste, encouraging people to put old fridges, TV sets, washing machines and computers outside their houses, which the local waste management company then collects. Due to this campaign, the average amount collected in 2009 was almost 2% of the national target, experts estimated. E-waste associations (the most visible being Ecotic) had an online media campaign in 2009 to advertise their services. In May-June 2010 a public awareness campaign, funded by e-waste management companies, called for photos and videos of e-waste, which it called "the monsters of your community".[7] The media campaign is backed by the Ministry of Environment and Forests – a good example of cooperation between civil society, business organisations and the government. Perhaps as a result, research on e-waste-related attitudes and behaviours, conducted in Romanian urban areas, has shown positive trends in terms of a willingness to recycle dysfunctional appliances.[8] At the same time, however, 70% of the Romanian urban population surveyed is not aware of the laws and regulations related to e-waste.

ICT policy

As far as ICT policy is concerned, from 2000 to 2007 Romanian legislative efforts have been driven both by EU accession requirements and a strong business lobby. As a result, visible efforts have been made concerning digital inclusion (see GISWatch country report 2007),[9] infrastructural investments (GISWatch country report 2008),[10] and modest results concerning the quality of online content provision (GISWatch country report 2009).[11]

ICT policy priorities have been set by the Ministry of Communications and Information Society for the medium term in its strategic planning documents.[12] Three key policy areas have been identified: communications, information technologies and EU structural funds. Strategic documents do not address environmental issues. However, a Romanian ICT policy scan resulted in three documents which explicitly referred to environmental issues:

- The Ministry of Communications and Information Society's Strategic Plan for Universal Access states that implementing basic access to ICT services throughout the country will decrease urban agglomerations and serve environmental protection: lower pollution levels, a smaller gap between rural and urban areas and enhanced social cohesion.
- Government Decision No. 175/2004 concerning criteria of ecological labelling for laptops establishes the technical parameters and the information provision needed for a greener, low energy-consuming and more easily recyclable computer.
- Ordinance No. 125/2003 issued by the Ministry of Communications and Information Technology concerning the import and selling of mobile telephones prescribes the technical parameters of electromagnetic radiation in order to protect users' health.

Environmental divide: What does it mean?

The policy scan has shown that key stakeholders in policy making – governmental agencies, business organisations and civil society activists – are not aware of the issues at stake; that is, the link between ICTs and environmental issues. Indicators for the environmental impact of ICTs are not publicly available, and are not even discussed at important public events: the main issues on the agenda of key ICT actors in 2009-2010 were e-government, the eRomania project, EU funding, and cooperation between the government and IT companies. The lack of visibility of civil society organisations at major governmental ICT events and the dominance of major business players are striking elements of public ICT discourse in Romania, as already signalled in GISWatch country reports 2007, 2008 and 2009.

Key stakeholders for a future green ICT agenda, as assessed in September 2009 for the Romanian GreeningIT research plan,[13] include a wide range of organisations, groups and individuals. *Governmental agencies* in charge of planning and implementing environmental and ICT

7 www.hotnews.ro/concurs_foto_video_vreau_o_romanie_mai_curata_monstrii_din_comunitatea_ta

8 Daedalus (2009) op. cit.

9 www.giswatch.org/gisw2007/countries

10 www.giswatch.org/gisw2008/GISW2008.html

11 www.giswatch.org/gisw2009/GISW2009.html

12 Planul strategic al Ministerului Comunicațiilor și Tehnologiei Informației 2007–2009; Programare bugetara 2008–2011. www.mcsi.ro/Minister/Despre-MCSI/Unitatea-de-Politici-Publice/Documente-programatice

13 Bakó, R. and Sólyom, A. (2009) *GreeningIT Research Plan for Romania*, Association for Progressive Communications.

policies are the Ministry of Environment and the eight regional Environmental Protection Agencies, key governmental agents shaping and implementing environmental policies; and the Ministry of Communications and Information Society and parliamentary commission for ICTs, key governmental actors involved in ICT policy making. *Environmental NGOs* are the main actors pioneering, spreading and implementing innovative environmentally friendly models of thinking and acting. *Opinion leaders* act as role models, innovators, advocates and quick-links between NGOs and decision makers. Their high visibility within civil society and mainstream media enables a stronger outreach of role models in terms of greening ICTs. *ICT and environmental experts,* who are found across the different sectors, have a key role in providing high-quality, accurate input to the issues at stake.

New trends

Romanian mainstream discourse does not address ICTs and environmental sustainability as connected issues. However, there are positive trends on both the ICT and environmental protection sides that show an intertwining and interaction of concerns. On the one hand, the environmental impact of ICTs gains visibility through mainstreaming e-waste issues; on the other hand, environmental organisations use ICT tools in order to promote their values and gather supporters.

An environmental index, the Green Business Index (GBI), was launched in 2010 by the Green Revolution Association. The indicator reflects the level of environmental responsibility within the Romanian business sector. The GBI will rank the top companies that demonstrate concern for the environment or natural resources and that invest in clean solutions and technologies.[14] The initiative also plans to produce a report showing the environmental footprint of the companies. The number of companies using environmental responsibility as criteria for self-evaluation shows a new approach to corporate social responsibility.

Action steps

Environmental and ICT issues still evolve on separate tracks in Romania, though with visible signs of intertwining. In order to develop a green ICT agenda in the country, several steps are necessary:

- Key stakeholders should be educated in order to promote a green approach to ICTs and a clean-tech approach to the environment.
- A set of economic indicators should be publicly available in order to assess the environmental impact of ICT use, as proposed at the 4th Internet Government Forum (IGF).[15] These should include volumes of ICT exports and imports, employment rates in ICT-related industries, income generation in ICT-related industries, and impact of ICTs on efficiency. The IGF also proposes monitoring the availability of environmental content on the internet as a measure of the success of awareness-raising efforts.
- A set of environmental indicators should be developed in order to assess the impact of ICTs on the environment, and made publicly available.
- Primary research on ICTs and the environment should be encouraged through funding.
- Romanian ICT and environmental protection officials should be more actively involved in international discussions taking place at green ICT events.
- Civil society organisations should have a more active role in promoting the green ICT agenda, along with businesses and governmental agencies.

There is room for all: inclusion and participation should be the guiding principles of a responsible, clean, connected society in Romania. ■

14 www.gbindex.ro

15 Vetter, T. (2009) Measuring the impact of Internet governance on sustainable development, report presented in Workshop #304 at the 4th Internet Governance Forum, Sharm el Sheikh, Egypt, 15-18 November. www.intgovforum.org/cms/index.php/component/chronocontact/?chronoformname=Workshopsreports2009View&curr=1&wr=48

RWANDA

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Introduction

Rwanda has done a lot in setting up a conducive framework for environmental protection and putting in place measures for mitigating climate change, but there is a need for policies on greening using information and communications technologies (ICTs) and on electronic waste (e-waste) management. Today's growing global trade in which Rwanda is expected to actively participate, inevitably will have environmental side effects that are the result of imported ICT equipment flowing into the country. If this flow is not well managed, and if appropriate measures are not taken now, the future generations and the country's economy may suffer from the undesirable effects.

Climate change: A challenge with monitoring

Like other countries, Rwanda is affected by climate change.[1] Over the last decade, the disturbance of the climate system has impacted on many different sectors of the country's socioeconomic development,[2] and the health and well-being of the people[3] as well. The most obvious impacts have been the decrease of lake water levels and water flows, the drying up of water catchments, the loss of biodiversity and the loss of agricultural productivity as a result of prolonged drought and/or sometimes floods. To deal with these phenomena requires strategic actions and equipping the country with an early warning system to predict the coming events and to reduce harm.

As a signatory to the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol, Rwanda has a clear policy on climate change and a national environmental policy that set out general and specific objectives as well as fundamental principles for improved management of the environment. These are effective both at the central and local level, in accordance with the country's current policy of decentralisation and good governance. The organic law on the environment, the national forest policy and law, as well as the country's Vision 2020 development plan have clear guidelines of what has to be done so that Rwanda can reduce the effects of climate change and CO_2 emissions.[4]

Since 1994 the country has ratified various international conventions. The UN conventions on biodiversity (1995), climate change (1998) and desertification (1998) are all linked to global warming and climate change. Rwanda really does not contribute very much to global warming, but it addresses the mitigation and adaptation measures necessary to cope with climate change. For its climate change adaptation programme, Rwanda published its Initial National Communication to the UNFCCC in 2005.[5]

Rwanda has identified six priority areas for adaptation to climate change, which include "setting up an information system for early warning of hydrological and agrometeorological systems and rapid intervention mechanisms."[6]

In 1996, National Agenda 21 and the National Environment Strategy and Action Plan were updated. The establishment of the Rwanda Environment Management Authority (REMA) is in the process of finalisation. It is the organ responsible for the execution of environment-related policies and laws.[7]

With the establishment of Vision 2020 and the Economic Development and Poverty Reduction Strategy (EDPRS), the environment was considered a cross-cutting pillar for all sectors. In the second National Information and Communications Infrastructure plan for Rwanda (NICI II),[8] it was decided that ICTs should be used to improve geographic information systems and get better meteorological information.

The country does not have an operational observatory network to facilitate an adequate understanding of national climate conditions and lacks the ability to predict local climate change.[9] The few existing meteorological monitoring stations are run down due to a lack of maintenance and expertise to track changing climatic conditions. Those that are currently operational are not representative enough to provide a true picture of climate variability.

The government's endeavour to encourage investments goes hand in hand with a careful understanding of the nature and impacts of climate variability and climate change on the economy and people's livelihoods. The government plans to gradually strengthen its meteorological service by adopting and implementing a meteorological policy and strategy,

1 Mugabe, R. (2010) Hundreds of Flood Victims Need Emergency Aid, *The New Times*, 21 May. allafrica.com/stories/201005210004.html

2 Mugabe, R. and Mukombozi, B. (2010) Rwanda: Heavy rains claim lives and hundreds homeless in Northern and Western Provinces, *The New Times*, 18 May. rwandinfo.com/eng/rwanda-heavy-rains-claim-lives-and-hundreds-homeless-in-northern-and-western-provinces

3 Humanitarian Early Warning Service (HEWS) www.hewsweb.org/floods

4 REMA (2009) *Rwanda State of Environment and Outlook: Our Environment for Economic Development*, Kigali, p. 119.

5 Interview with Patricia Hajabakiga, former minister of state for land and environment (2006-2008).

6 REMA (2009) op. cit., p. 8.

7 www.rema.gov.rw

8 Government of Rwanda (2006) *NICI II: An integrated ICT-led socio-economic development plan for Rwanda 2006-2010*, Kigali, p. 130. www.rita.gov.rw/laws/nici_plans.html

9 REMA (2009) op. cit., p. 104.

establishing an upper air observatory and establishing an atlas on the spatial and temporal distribution of rainfall, temperature and humidity over Rwanda by 2012.[10]

E-waste accumulation in Rwanda

Rwanda is currently undergoing rapid advances in the use of ICTs. Starting with the active use of computers by Rwandans in 1990s, the country believes in ICT implementation in all sectors of production to increase the pace of socioeconomic development and create value for all citizens.[11] Although Rwanda is a signatory to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, it is not at this stage worried about e-waste – a position which is potentially short-sighted.

A very significant proportion of ICT users in Rwanda rely on second-hand equipment, primarily from Europe. In recent years, used and end-of-life computers and accessories, televisions, transformers, and mobile phones have been imported from the United Kingdom (UK), Germany, Belgium and France. Most of the used computers have been distributed to students from the National University of Rwanda, the Kigali Institute of Technology (KIST), and the Kigali Institute of Education (KIE), and to small businesses and enterprises in Kigali and other towns of Rwanda.[12]

Various charity and business organisations are donating or selling low-cost computers to Rwandan people too, and their contribution to e-waste accumulation is relatively high. Their actions seem to be a way of getting rid of "home waste" by giving it to needy people who are not aware of the near-future consequences. A statement by Computer Aid, a charity organisation from the UK, urged people to donate to the organisation old Pentium II and III computers that they may have been planning to send to landfills. For donors, this is a way to do their bit for the environment and for the Rwandans who will appreciate it.[13] Apart from Computer Aid, there are various companies in Kigali, both Rwandan and Chinese, that are helping Rwandans get cheaper used computers. These initiatives are safe if they are aware of e-waste and its consequences, and if they are shipping good working computers. If not, this is a short-term solution for environmental protection which should be considered a global concern. Besides, this used ICT equipment is coming into the country with no clear measures established to manage it, and with no clear understanding amongst the population of the dangers it can cause.

Significant challenges that Rwanda is facing in the management of e-waste include, among others:

- Unknown amount of e-waste (lack of inventory)
- Lack of awareness of its impacts on people's health and the environment
- Lack of formal or informal e-waste collection and management systems in the country
- Lack of infrastructure for sound hazardous waste management, including recycling
- Lack of policy and legal framework for e-waste management
- Lack of strong and effective regulatory framework for toxic chemicals and waste management.

New trends

Having an economy that is heavily dependent on rain-fed agriculture, Rwanda's economy and people's livelihoods are vulnerable to climate variability and climate change. Agriculture, biodiversity and water resources are more likely to be affected by climate variability and climate change.[14] To cope with this problem, the country is building a mast at the Kalisimbi volcano whose use will include weather forecast data collection to warn farmers and economic operators on climate change. These data will be complemented by data from countrywide meteorological stations which need to be equipped with up-to-date ICT technology that can help to raise awareness and stimulate dialogue about the effects of climate change on vulnerable communities.

As far as e-waste is concerned, data on waste generation, sources of waste and quantities disposed of in existing sites are not available.[15] In Rwanda, there are a number of ministries and institutions whose mandates are related to climate change and e-waste disposal. Currently, the ministries at the policy level include the Prime Minister's Office (PRIMATURE), Ministry of Infrastructure (MININFRA), Ministry of Health (MINISANTE), and the ministry in charge of ICTs in the President's Office.

Among public institutions, REMA comes first as an environmental management authority. It plays a big role in environmental protection. To contribute to the better use of paper (as a way to protect forests), it urges all public institutions to go paperless by adopting the use of document management systems within institutions, and when necessary, to use printers and photocopiers that use both sides of the paper.

As for the Rwanda Utilities Regulatory Authority (RURA), its principal functions and responsibilities as stipulated by law are to regulate the activities of identified public utilities, ICTs (telecommunications network and services), broadcasting, and waste products from residential or business premises, among others.[16] Recently it put in place[17] a service in charge of creating awareness on e-waste and promoting e-waste management, and setting up a regulatory

10 Ibid., p. 104.

11 Government of Rwanda (2006) op. cit.

12 Interview with an expert consultant in the environmental sector, Kigali 2009.

13 Coates, R. (2004) Computer Aid to treble PC delivery to Rwanda, *silicon.com*, 13 May. www.silicon.com/management/cio-insights/2004/05/13/computer-aid-to-treble-pc-delivery-to-rwanda-39120654/

14 REMA (2009) op. cit., p. 126.

15 Ibid., p. 23.

16 RURA (2008) *Annual Report 2008*. www.rura.gov.rw/reports/2008AnnualReport.rar

17 www.rura.gov.rw/index.php?option=com_content&view=article&id=107&Itemid=142

framework for e-waste management. This is also meant to establish recycling facilities. The service is new and most of its actions so far in the area are at the stage of planning and human capacity building, including drafting an e-waste policy in partnership with all Rwandan environmental stakeholders.

Apart from companies that import ICT equipment, private sector institutions are not very active in dealing with the e-waste issue. Some initiatives are done by the Rwanda Computer Network (RCN), whose business is the assembly of computers parts, and e-ICT, which is an institution dealing with ICT training and maintenance. Small and medium enterprises are consumers of e-waste products. Some of them collect used toner cartridges for recycling.

The role of civil society organisations in dealing with e-waste is limited due to the lack of human capacity in the field. Most interventions in environmental protection by civil society are oriented to the activities of deforestation and terracing.

Currently, some organisations are in possession of piles of used computers and printers stored in their office premises, with no knowledge on how to dispose of them. One way different institutions are using to get rid of e-waste is to call repairers and offer them broken computers and printers whose parts are in turn used to repair other machines. They recognise however that there is a need for the environmentally friendly disposal of e-waste.[18]

Action steps

Regarding climate change, at the moment there is a need to document the nature and impacts of greening using ICTs and greening ICTs, to strengthen existing livelihood coping strategies before any introduction of new high-tech solutions.

Coordination of efforts within and between government, the private sector and civil society in promoting adaptation to climate change and sustainable development through sharing information will encourage innovation, reduce duplication and maximise the efficient use of limited resources. There is also a need to strengthen national capacity for effective engagement in the regional and global negotiations and collective actions to mitigate and adapt to climate change.

In Rwanda e-waste is becoming a serious challenge for the future due to the fast-growing volume of e-waste imported from the West and the lack of both an effective policy and infrastructure for sound hazardous waste management. Furthermore, there is low public awareness of the hazardous nature of e-waste, coupled with the use of low-end or crude recycling techniques.

In Vision 2020, ICT is a key pillar of development and therefore the e-waste issue needs to be considered for its challenges and opportunities. There is, for instance, a need to establish innovation hubs and centres of excellence, including small businesses to make early steps in the local development of recycling technologies.

Above all, raising public awareness is an urgent action that is necessary so that Rwandans are informed on how to cope with both climate change and e-waste. Specific information on climate change and e-waste needs to be disseminated through regular publications, and through electronic and other media. Workshops, seminars and talk shows should be organised in languages deemed appropriate to ensure access by all members of the Rwandan public.

There is also an urgent need for public participation in decision-making processes through public hearings, written submissions, and consultative meetings with various groups. ■

18 Interview with Paul Barera from the Rwanda Telecentre Network and Innocent Benineza from the national NGO DUHAMIC-ADRI, Kigali, May 2010.

SAUDI ARABIA

Saudi Arabian Strategic Internet Consulting (SASIc)
Rafid Fatani
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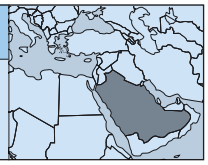


Introduction

Saudi Arabia has set itself two goals regarding climate change and awareness of the issue: ensuring that the preservation, protection and improvement of the environment are at the heart of its basic law, and that this law should be taken as an integral part of overall development planning in all projects in the Kingdom, including industrial, agricultural and architectural initiatives. Although the Saudi authorities are working hard in endorsing awareness of climate change and its related issues, they have failed in the implementation of this law. That said, the use of information and communications technologies (ICTs) has dramatically helped shift climate change awareness levels to new highs, driven by the magnifying effect of climate change on existing development challenges and vulnerabilities.

Saudi Arabia has not launched many practical projects on climate change and very little on electronic waste (e-waste). However, recently the use of ICTs for environmental sustainability has been on the rise. There is growing use of Web 2.0 applications, including videos and blogs, to stimulate community debates over climate change issues and raise their concerns for decision makers and broader audiences. This was most recently highlighted during the devastating floods that occurred in the city of Jeddah in late November 2009.

Despite the global economic slowdown, Saudi Arabia continues to be a lucrative market for technology products and services as it invests to upgrade its ICT and communications infrastructure. In 2010, Saudi ICT spending is forecast to record higher single-digit growth compared with 2009. The Kingdom's ICT market has a number of positive drivers, including a growing population and government projects. That said, internet penetration levels in the country remain at a very low 27.1%.[1]

Policy and legislative context

Article 32 of Saudi Arabia's Basic Law of Governance (issued by Royal Order No. A/9 on 1 March 1992) provides that: "The State shall endeavour to preserve, protect and improve the environment and prevent its pollution."[2]

This law has two relevant principal regulatory controls:

- The General Environment Law[3]
- The Executive Regulation of the General Environment Law in the Kingdom of Saudi Arabia.[4]

In broad terms, the Regulations provide details in respect of each of the provisions of the Environment Law. Consistent with the broad principles of Article 32 of the Basic Law of Governance, the objectives of the Environment Law are to:

- Preserve, protect and develop the environment and protect it from pollution.
- Protect public health from activities and acts that harm the environment.
- Conserve and develop natural resources.
- Include environmental planning as an integral part of overall development planning in all industrial, agricultural, architectural and other areas.
- Raise awareness of environmental issues, strengthen individual and collective feelings of responsibility for preserving and improving the environment, and encourage national voluntary efforts.

The Environment Law, the corresponding regulations and associated standards, along with the international treaties to which the Kingdom is a party, combine to provide a solid legal framework for the regulation of activities related to the environment. However, not much of this is seen to be enacted on the ground, and enforcement of legislation has been limited, if taken into consideration at all.[5]

The role and impact of the private sector regarding environmental sustainability

Global businesses recognise that environmental responsibility is good business. Whether green projects are driven by an organisation's desire to protect the environment, reduce costs, produce eco-friendly goods to meet growing consumer demand, or comply with increasing levels of government regulation, the results can be both good for the environment and good for business. Information technology plays a large role in helping companies become eco-enterprises.

Oracle, one of the leading enterprise software companies in the market, has been enforcing an environmental stance in its applications, operating systems and software. Many entities in Saudi Arabia have used Oracle's systems. Saudi-branded restaurants such as Kudu, which have expanded globally, have been using Oracle E-Business Suite Development since 2005. Since then, Saudi companies have been increasingly using the Oracle E-Business Suite. This includes Al-Jomaih Automotive Company (the sole distributor of Cadillac, Hummer, Saab and Opel; the company's

1 www.internetworldstats.com/me/sa.htm

2 Bureau of Experts, Council of Ministers: www.boe.gov.sa/boe/english.html

3 Issued by Royal Decree No. 34 dated 28/7/1422H, corresponding to 16 October 2001 ("Environment Law").

4 Umm Al-Quda Gazette, issue No. 3964, dated 28/8/1424, corresponding to 24 October 2003 ("Regulations").

5 Al Tamimi & Company (2009) Law Update: Environmental Law in the Kingdom of Saudi Arabia. newsweaver.ie/altamimi/e_article001368618.cfm

range of vehicles also includes Chevrolet and GMC). The Council of Saudi Chambers of Commerce and Industry has used the Oracle eco-friendly technology in the process of legalising documentation online. In 2006, the Ministry of Health announced their intention to implement the Oracle 10g Database across 150 clinical centres in the Kingdom, to centralise their medical data.[6]

Another example of companies in the private sector going green is the multinational company IBM. IBM's corporate policy on environmental affairs was first issued in 1971. It is supported by the company's global environmental management system, which is the key element of the company's efforts to achieve results consistent with environmental leadership. It attempts to ensure that the company is vigilant in protecting the environment across all of its operations worldwide.[7]

IBM Middle East announced the implementation of an energy conservation programme at Dubai Internet City in 2008 to significantly reduce IBM's carbon emissions, in collaboration with TECOM Investments' Sustainable Energy and Environment Division (SEED). The programme was expected to reduce approximately 76 tonnes of carbon emissions annually in the IBM Middle East offices alone.[8]

IBM has also held many events during the past year regarding corporate policies and environmental sustainability. On 27-29 January 2010, it held a dialogue on energy, the environment and sustainability: "The Global Eco-Efficiency Jam".[9] Other events were also held by IBM Middle East, such as "Power your Planet with Smarter Systems" and "Storage for a Smarter Planet".

More recently, *Arabian Business* magazine reported that Saudi Arabia has been interested in harnessing solar energy to drive its growing array of desalination plants. In April of this year, the Kingdom announced a partnership with IBM to pursue this goal. The King Abdulaziz City for Science and Technology (KACST) has teamed up with IBM to study the possibility of building a solar-powered desalination plant in the city of Al Khafji, in the northeast of the country. The facility would feature ultra-high concentrator photovoltaic (UHCPV) technology, jointly developed by IBM and KACST, and could provide 30,000 cubic metres of water per day for over 100,000 people. To date, the most common methods used for seawater desalination are thermal technology and reverse osmosis.[10]

This said, unfortunately most of the multinational companies have launched Middle Eastern initiatives from Dubai in the United Arab Emirates, and not Saudi Arabia. This is mainly due to the fact that international collaborations are common there, given that the more relaxed social laws influence company location decisions. However, the future does hold hope for more collaboration with these companies to help facilitate a greener Kingdom with the establishment of cross-sector law in promoting international trade in the country.

The role and impact of the government

The government authority charged with the responsibility of protecting and preserving the environment is the Meteorology and Environmental Protection Agency (MEPA). The role of MEPA is generally to:

- Review and evaluate the condition of the environment
- Conduct environmental studies
- Document and publish environmental information
- Prepare environment protection laws, standards and regulations
- Promote environmental awareness.

Importantly, one of MEPA's duties is to ensure that all ministries, departments or other government establishments:

- Observe the environmental regulations, standards and criteria
- Adopt necessary procedures to coordinate and cooperate with each authority which is empowered to approve projects which may negatively impact on the environment (here referring to the licensing authorities).

Where MEPA confirms the violation of any environmental criteria and standards, it may require the guilty party to stop the breach and rectify any negative impact within a specified time, and submit a report (in a form approved by MEPA) as to the steps taken to prevent further breaches.

MEPA can force the guilty party to comply with these steps where it fails to do so. The most severe penalties relate to acts involving:

- The introduction, discharge or disposal of hazardous, poisonous or radioactive wastes into the Kingdom, its territorial waters, and exclusive economic zone.
- A failure to comply with the regulations dealing with the handling of such materials.

In these instances, penalties can include imprisonment for up to five years; a fine of up to SAR 500,000 (USD 133,300); the payment of compensation; elimination of the violation by remediation works; and closure of a facility or detention of a vessel for up to 90 days.[11]

Considering the above, not one high-profile case has come to light. It seems implementation of policy is the holdback.

6 www.oracle.com

7 www.ibm.com/ibm/environment

8 www.arabianbusiness.com/press_releases/detail/12894

9 www.ibm.com/ibm/sa/en/green/ecojam/index.shtml

10 www.greenprophet.com/2010/04/09/19572/saudi-arabia-teams-with-ibm-to-develop-solar-powered-desalination-plant

11 Breaches of other provisions of the Environment Law can expose the guilty party to a fine of up to SAR 10,000, elimination of the violation by remediation works, and closure of the facility for up to 90 days.

The role and impact of civil society

Recently and particularly in the last couple of years, there has been a growth in civil society groups dedicated to environmental sustainability and research regarding a greener Saudi Arabia. In 2008, a public advocacy group, Save Corniche Jeddah, started by lobbying for the safe and hazard-free development of Corniche Jeddah, the country's main seaport in the western region.

Its main aims and objectives were to create public awareness and bring about clear interventions from local authorities by creating a "pictureport" (picture report) petition to submit to His Highness Prince Khalid Al Faisal, Prince of the Makkah Region, to show him the reality of the decaying state of our national attraction. The intention was to submit this petition by the end of March 2008. The report was submitted, but unfortunately the petition did not go through.

After that a second group was founded by the same activists called "Muwatana", which literally means "Citizenship". However, it is also an Arabic acronym made up of the first (and in some cases second) letters of *Musharaka* (Participation), *Walaa* (Allegiance), *Amanah* (Trust), *Tumouh* (Ambition), *Numou* (Growth) and *Tatweer* (Development). Muwatana was a key participating group in the disaster relief initiative regarding humanitarian aid and environmental sustainability after the tragic floods that occurred in Jeddah in November 2009.

Another, more focused environmental group is Naqa'a Environmental Enterprise. The name Naqa'a is an Arabic term for the word "Purity": the group works in pursuit of the purity of air, water and land, in order to save the planet for the coming generations.[12] Naqa'a is the first youth-driven environmental movement. It was started at Dar Al-Hekma College in Jeddah, and has now spread elsewhere across the Kingdom. Naqa'a Environmental Enterprise's vision is to incorporate ecological life standards into social values in society through promoting pioneering green practices.

Research and awareness are major parts of Naqa'a's activities. Spreading environmental awareness will encourage people to take up activities such as recycling, and to understand it as an essential value of the "green life". Naqa'a facilitates recycling for the local community in the city of Jeddah. It is hoped this will become a model for all the cities of the Kingdom. The first project that Naqa'a worked on was called "Smart Recycling".

The issue of climate change is relatively new and civil society activities in this regard appear limited. People working on environmental causes in Saudi Arabia tend to keep things quiet so that they can be done more swiftly away from government bureaucracy and regulations. Nevertheless, increasing awareness of climate change and the growing role of ICTs, and their potential in combating climate change, is starting to be felt.

New trends

In the last few years, Saudi Arabia has witnessed unprecedented growth in demand for internet services, which has inevitably increased awareness of climate change issues. However, government over-bureaucracy and a lack of willingness to implement environmental policy are likely to continue. Highlighted below are some of the top trends that are expected to continue in the coming year:

- The growing use of Web 2.0 technologies, which are serving as integrated hubs for individuals, organisations and their extended networks to connect, communicate, access and share tailored news and information.
- ICTs are being used to generate real-time data to monitor environmental trends. Online initiatives have yet to run out of steam. An example of this was seen during the period when Jeddah experienced floods in late November 2009: a network knowledge system highlighting real-time devastation that could not be hidden by the traditional media, as is usually the case.
- Web 2.0, internet and mobile phones are being used to facilitate community access to locally relevant knowledge, including helping locals to better adapt within a context of extreme floods, or other environmental issues.

Action steps

The discussion so far represents only a small part of a complex and evolving debate over the role of ICTs and the environment in Saudi Arabia. At the same time, issues such as climate change and ICTs constitute a very new field of enquiry where much remains to be explored.

Saudi Arabia's priorities and governmental perspectives need to become a central part of the debate, if the potential of technologies is to contribute to more holistic, inclusive responses to the challenges posed by a changing climate.

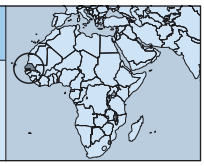
The following action steps are required to stimulate debate on climate change in Saudi Arabia:

- The government needs to act on implementing environmental laws that have already been established.
- Environmental laws need to be reviewed and updated regularly.
- Transparency needs to be encouraged through the government publishing a list of environmental offenders. More governmental campaigns are required to build confidence and awareness about ICTs and climate change. ■

12 naqaaenterprise.wordpress.com

SENEGAL

GOREeTIC
Coura Fall
www.goreetic.org



Introduction

In a recent local TV show, an official from the landfill in Dakar informed the public of the excellent work they had done in partnership with NGOs such as Enda-Ecopole, and how they had sensitised the public on the issue of waste management.

But the dump in Dakar, Mbeubeuss, and others like Colobane and Reubeuss, collect daily quantities of valuable electronic scrap which are, paradoxically, the delight of waste pickers. Moreover, the proliferation of information and communications technology (ICT) products in homes and offices means more energy is consumed – and electricity is a rare commodity in Senegal.

In July 2009, Sénéclic,[1] the executive body that deals with electronic waste (e-waste) in Senegal, commissioned a study on e-waste. A year later, what has been done in response to this study? Have the recommendations, including the establishment of a waste unit, been considered or implemented?

Policy and legislative context

The "preservation of a healthy environment" is enshrined in Senegal's constitution. Article 8 stipulates that "every man is entitled to a healthy environment." At the international level, Senegal has signed and ratified the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and the Basel Ban Amendment, and in November 1999, it developed a national plan for waste management.

Senegal is also the headquarters for the Basel Convention Regional Centre for Francophone countries in Africa. Operational since 1999, the Regional Centre focuses on the environmentally sound management of chemicals and hazardous waste. All these indicate that there is real commitment and political will in the country to deal with hazardous waste.

The Environmental Code is the principal legal instrument for the management of waste. However, the country has no specific regulations on the management of e-waste.

The threat of e-waste

The exponential take-up of ICTs in developing countries, and especially the introduction and success of mobile telephony, has meant growing piles of unprocessed old technology. This is worsened by the import of second-hand equipment from developed countries. One of the greatest concerns is that some of this waste finds its way into the countries as "development aid".[2]

The growth of e-waste in Senegal is causing some alarm, with reports predicting that countries like Senegal and Uganda can expect a four- to eight-fold increase of e-waste from PCs alone by 2020.[3]

In order to reduce the consequences of e-waste, Senegal has launched two initiatives: the first by Enda-Ecopole and the second by Sénéclic.[4] The Sénéclic initiative, in particular, offers best practices that can be shared with other developing countries.

Launched on 10 January 2008, the Sénéclic initiative aims to recycle all electronic waste at its end of life. The initiative is supported by the Global Digital Solidarity Fund (DSF) and benefits from the technical expertise of the Swiss Federal Laboratories for Materials Testing and Research (Empa).

Sénéclic has adopted an inclusive approach when establishing its national strategic committee. There is a representative from almost all government departments, and the committee includes non-governmental organisations, academics, and the private sector. The committee was essential in advising, facilitating and networking during the e-waste baseline study.

The study was carried out by the African Institute of Urban Management (AIUM) in Dakar, which has already done similar studies on solid and hazardous waste in many countries including Benin, Burkina Faso, Niger and the Comoros Islands. Empa's first mission to Senegal was held from 6 to 11 January 2008. The aim of the visit was to define the scope of the work, and to set up coordination and planning groups for the study.

For these reasons, meetings were held with the National Employers Council, the Observatory on Information Systems, Networks and Information Highways in Senegal (OSIRIS), the Organisation of ICT Professionals (OPTIC), the Institute of Environmental Sciences (ISE), the Agency for State Informatics (ADIE), and Enda-Ecopole. Visits to the Mbeubeuss landfill and the second-hand market in Reubeuss were also carried out.

The study was interested in three types of e-waste: computers (including laptops) and their peripherals; televisions; and mobile phones. It aimed to assess the total flow of e-waste entering Senegal, the estimated useful life

1 www.Sénéclic.com/html/Sénéclic.php?xx_rubrique=Objectif&xx_texte_id=1026

2 Fadjri, W. (2009) Gestion des déchets électroniques: Le danger des ordinateurs, frigos, téléviseurs… venant d'Europe, *Balancing Act*, French edition, 103, March. www.balancingact-africa.com/node/15920

3 www.sciencedaily.com/releases/2010/02/100222081911.htm

4 Présidence de la République/Sénéclic (2009) Lancement du projet e-waste au Sénégal. www.Sénéclic.com/html/Sénéclic.php?xx_rubrique=Objectif&xx_texte_id=1015

of electrical and electronic equipment in households, public and private institutions, and disposal habits and patterns.

It was clear from the findings that there was a need to set up an e-waste management system, given that in the absence of an organised network, unsafe recycling activities thrived in the informal sector. Sénéclic is seeking funding for the establishment of the e-waste management chain and will work with any organisation, government or entity wishing to invest in this sector.

New trends

A regional workshop was held at Cheikh Anta Diop University in Dakar on 13 and 14 July 2010. The workshop, with the title "The management and recycling of e-waste in West Africa: The cases of Benin, Mali and Senegal", was held under the auspices of the ISE. For this workshop, an exploratory research study was funded by the International Development Research Centre (IDRC) which explored issues relating to the management and recovery of e-waste in the West African sub-region.

According to a media statement, during the Dakar meeting, the scientific community agreed to "an overall assessment in relation to the basic international documents relating to the subject, which should lead to strategic actions focused on the institutionalisation and regulation of e-waste, including its economic and social management."[5]

Indeed, a legal framework is necessary to define the roles and responsibilities of each actor in the e-waste chain (i.e. producers, distributors, consumers, players in the recycling of e-waste and the authorities). The extended producer responsibility principle is also worth considering. At the same time, legislation should ideally also ban the import of electronic devices more than five years old.

Action steps

The following recommendations can be made:

- Provide environmental education through community information centres and community radio.
- Convince social partners of their responsibility to put pressure on policy makers to address environmental problems. It should be stressed that the situation will become so severe that it will threaten the economy and that it is the responsibility of politicians to act now to prevent business disasters and end the vicious cycle of ignorance.
- Establish partnerships with the private sector to develop more efficient technologies in recycling and energy.
- Promote scientific studies to implement new measures to fight against the negative effects of e-waste.
- Establish a structure for recycling e-waste in Senegal in collaboration with the government, the private sector and NGOs.
- Implement the extended producer responsibility (EPR) principle. ■

5 Agence de Presse Sénégalaise (2010) Plaidoyer pour la prise en charge des déchets toxiques par l'Université, *allAfrica.com*, 13 July. fr.allafrica.com/stories/201007130977.html

SOUTH AFRICA

groundWork
Rico Euripidou and Mary Lawhon
www.groundwork.org

Introduction

South Africa is a middle-income country characterised by extensive inequality, which is significant to the issues of both climate change and electronic waste (e-waste). South Africa is frequently referred to as a country with both "first" and "third" world characteristics – it has international business centres with high-tech facilities next to townships without basic services – and faces the challenges of both high rates of consumption and the pressure for cheap energy. The carbon impact of these demands is exacerbated by the country's dependence on coal, making it one of the most carbon-intensive economies in the world. Business and government are the core information and communications technology (ICT) users in South Africa, but there is also a substantial use of computers in homes and schools. E-waste has been recycled to some extent for decades, but there is a growing awareness of the need for a more organised, comprehensive and environmentally sound management of discarded technology. South Africa has yet to see e-waste dumping in the same extent noted in other African countries, yet there remains concern about the as yet unknown scope and scale of e-waste imports. Further, a recent incident in which imports were tracked and isolated at a South African port in May 2010, and still remain in the country, raises concerns about the South African government's capacity – and indeed international capacity – to adequately respond to the challenge. South Africa has an extensive history of active civil society; environmental NGOs have raised the issues of climate change and e-waste with government and the public in various ways over the years. However, the country has yet to draft e-waste-specific legislation.

Policy and legislative environment

Although South Africa does not have policies on either climate change or e-waste, these issues are being brought to the attention of government. The national government commendably developed both a National Climate Change Response Strategy and a Long-Term Mitigation Scenarios plan, and promised to pass a climate change policy by the end of 2010. As one of the BASIC nations (the middle-income countries of Brazil, South Africa, India and China), it plays a leadership role internationally regarding climate change. Despite these promising efforts, major concerns remain. South Africa's dependence on coal is highly problematic, and there are limited investments in renewable energies. There are contradictions in the government's approach towards economic growth and the steps required to reduce emissions, evident in the controversy over a World Bank loan approved in April 2010 to build a new coal station. Further, the use of questionable, technocratic and unproven means for reducing emissions suggests that the national energy supplier, Eskom, and the coal industry still hold significant influence over the formation of climate change responses.

E-waste legislation also has not been passed. South Africa is party to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal. However, it has not supported the Basel Ban Amendment, nor has it signed the Bamako Convention on the Ban of the Import Into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes Within Africa. The National Environmental Management: Waste Act of 2008 contains no mention of e-waste, nor does the current draft of the National Waste Management Strategy. However, the e-Waste Association of South Africa (eWASA), an industry-led body dedicated to improve e-waste management in the country, is working with various government officials with the aim of developing regulations.

E-waste: Working together, working apart

E-waste must be seen within a broader context – a legacy of international environmental injustice and a history of consistent and repeated underestimation by regulators of the risk of pollutants and toxic chemicals from industrial processes and wastes. This underestimation of risk has been true for asbestos, lead, mercury, the pesticide DDT, dioxins and ozone depleting chlorofluorocarbons (CFCs) and now e-waste. Often it has taken decades for regulators to acknowledge these risks and take proper regulatory action, including banning or restricting the use of these substances. The role of NGOs is to look at emerging evidence and to warn about these dangers long before this point occurs, as well as to critique processes which might hinder precautionary regulation.

Formal e-waste recycling has been occurring in South Africa since 1992, with Desco, located in Johannesburg, one of the first recyclers of e-waste. Desco recycles all kinds of e-waste, and its efforts range from the manual dismantling of waste, to the granulation of circuit boards to enable the extraction of precious metals. A small refurbishing centre is also situated at its recycling lot in Gauteng. Several large e-waste recyclers now operate in major economic regions in the country, such as Johannesburg and Durban. Additionally, the manual recycling of e-waste occurs at different levels along the waste-collection chain, including by informal collectors (waste pickers), who separate electronics into their component parts, bringing only the valuable components to the recyclers; semi-formal traders in e-waste, who collect from dumps and other scrap points; and scrap dealers.

South Africa has an extensive mining sector, and metals from e-waste enter into the processing and refining facilities set up for mining, with gold smelters seeing the economic potential of recycling e-waste, as gold production in the country decreases. It has been claimed that the strict regulation of gold is one of the reasons why there is limited informal smelting of e-waste in order to retrieve precious metals. There have been no verifiable reports of the use of chemical baths to access precious metals, although the burning of cables to extract the copper does occur. Despite some efforts to study e-waste recycling, the quantities and environmental consequences remain rather elusive. Although there are relevant national regulations regarding environmental and health and safety concerns, scrap recyclers have not historically been regulated as businesses dealing with hazardous wastes. An unquantified though notable amount of e-waste is exported for processing, both to Europe and Asia. One study estimated that when it comes to PCs and e-waste from PCs, as much PC e-waste is exported by weight, as is imported in the form of second-hand computers.

Challenges in collaboration

E-waste began to gain more attention nationally in 2004, as awareness grew about its role as a potential resource that should be kept in South Africa and as a potential danger that needed to be more effectively managed. In Cape Town, engineer Gerry Newson began exploring options for recycling and refurbishment, working with the now-defunct organisation Footprints and attempting to expand the scale and scope of these initial efforts, while local activists and consultants, supported by international researchers from the Swiss organisation Empa (Swiss Federal Laboratories for Materials Testing and Research) conducted an initial baseline study into e-waste (in Gauteng), and began to engage local and national government and business stakeholders. South Africa became one of three countries in Empa's first e-waste knowledge-sharing programme (together with China and India). It is worth bearing in mind that e-waste had effectively been on the civil society agenda for some time. NGOs such as Community Education Computer Society had been reusing old technology for use in schools and non-profit organisations for years, and numerous activists had been questioning the dumping of second-hand computers in Africa, and were calling for recycling fees collected in Europe to be paid to the countries of destination.

After extensive consultation, it was decided that there should be an association to coordinate e-waste practice in South Africa (advocacy efforts supported by Empa had already been working loosely under the eWASA title, although there was no formal association). There were contrasting visions of what the role of this body should be, who should be included and how it should be run, but the current form is an industry-led association. While this is a positive step in the sense of showing industry leadership for addressing a problem, it simultaneously raises some concerns around process. eWASA is currently headed by a local businessman (a former president of the IT Association) although it is intended to eventually be led by an executive board which has yet to be filled. This board is to be made up of manufacturers, currently all of large multinational firms. For the ultimate decision-making capacity of such a body to be in the hands of multinational producers raises concerns – and the absence of key stakeholders, such as ICT civil society groups, from eWASA forums is notable, both in terms of eWASA's current failure to engage them properly, and suggestions of *their* indifference to helping to develop an e-waste management system in the country. eWASA has three regional bodies, and its members include manufacturers, recyclers and refurbishers, as well as environmental NGOs who found out about the process through various contacts rather than invitation. They had to request to participate and currently pay membership fees.

eWASA has developed standards, audits and certifies its members, and provides them with information and assistance in order to improve practices. While these are positive steps, the development of standards by an industry-led body must not replace government regulation, and additionally these standards must undergo participatory public processes if they are to be adopted into legislation. Attention must be paid to ensure that small and informal recyclers who may be unable to pay membership fees or the costs of auditing, and are currently absent from the process, are not marginalised. eWASA also seeks to establish an advanced recycling fee, another positive step which will help subsidise comprehensive care for end-of-life materials. How this fee is used must be determined through a transparent process, and support for small and/or community-run operations should be given priority.

Parallel to this project, Empa and Hewlett-Packard developed a pilot project in Cape Town. The project was a collaboration of small businesses under an umbrella not-for-profit organisation. Since then, the individual components have been incorporated into existing businesses which now form the e-Waste Alliance. The alliance is made up of businesses, which perform three functions: refurbishing, dismantling for recycling, and waste-to-art. Businesses within the alliance agree regional boundaries for collection, exchange materials at a fair cost, and ensure that components are used for their highest potential function (i.e. what can be refurbished gets sent to a refurbisher). Members are expected to maintain environmental and health and safety practices, and resolve conflicts through the structure of the alliance. The alliance hopes to spread this model throughout the country and region. The project exemplifies some of the challenges with developing community- or worker-owned businesses in the e-waste industry, for despite initial support, the new businesses were taken over by larger, existing entities. There are concerns regarding why these projects failed in their intended state, and how support could be provided for such operations. However, the broader structure represents a promising way for improving e-waste management.

Illegal imports slip through

While these efforts are being made to improve practices among formal recyclers, there are parallel but currently under-emphasised concerns regarding the import of e-waste. Information regarding the import of e-waste is scarce everywhere, and this is true in South Africa as well. The difficulty of tracking e-waste internationally and the possibility of import as second-hand goods makes this form of waste particularly challenging to trace. However, watchdog environmental NGOs have been able to track some illegal exports. In May 2009, the Basel Action Network (BAN) informed authorities in South Africa that e-waste collected in the United States by a charity was on its way to South Africa for recycling. They also informed their BAN partner in South Africa, groundWork. groundWork then informed eWASA, the South African Revenue Service and the Department of Environmental Affairs. Despite this knowledge weeks ahead of time, and informing local authorities and the provincial environmental department, the shipment of e-waste still entered Durban harbour later that month. Uncertainty about whose responsibility it was to handle the situation resulted in no action being taken, and the shipment was sent hundred of miles inland to Johannesburg. Reports suggest that the shipment was to be retained and inspected there, where it remains under government oversight.

This story is significant because it shows the challenges not just of finding e-waste imports, but of the bureaucratic shortcomings which have so far prevented the return of the shipment *even when discovered.* It illustrates gaps in the ability of the South African government to enforce their obligations under the Basel Convention and the need to consider not just policy but implementation.

Due to legal ambiguities regarding the ownership of the e-waste, it so far has not been returned to the United States. While it is significant that through the efforts of NGOs this shipment was caught, it raises questions as to how frequently these imports are occurring and slip through unnoticed by NGOs and officials. In short, South Africa is currently vulnerable to e-waste imports because there are no internal policies, and insufficient regulatory oversight to mitigate future imports of e-waste. It also suggests that there is little strength in the industry association at this point (given that it is still finding its feet), and that it is not yet playing the strong coordination role that it should in order to mitigate the illegal dumping of waste.

New trends

New trends regarding e-waste regulation are likely dependent upon the actions of eWASA, and its relationship to government and civil society. The adoption of standards to provide further details for regulating e-waste management in the country is a positive step, but there is a need for caution regarding the translation of eWASA standards into government regulation without prior public participation. Industry self-regulation and creation of its own standards creates an uncomfortable precedent.

The Cape Town model for collaborative alliances is attempting to be spread to other parts of the country, such as Durban. These efforts will likely suggest whether such a model can be successfully implemented elsewhere. In terms of the ownership of e-waste projects as discussed above, a pilot project run by the provincial environmental department in KwaZulu-Natal province is soon to be turned over to private hands, but it is not yet decided whether it will become community owned or given to an established recycling company.

Another potential new trend relates to efforts for organising amongst waste pickers. With support from the NGO groundWork, groups from different landfills are seeking to have a greater role in local and national decision-making processes. Although various stakeholders have noted the role of waste pickers in current e-waste management, waste pickers have so far not been widely consulted, in part because they are reportedly a rather inaccessible group. Waste pickers and local site entrepreneurs were engaged as part of a municipal programme to stimulate entrepreneurial activities at waste collection points in Johannesburg, and engagement with waste pickers does happen at the local government level in various cases. Nevertheless, efforts of waste pickers in organising into more visible bodies might enhance their ability to inform decision makers about their role and the kinds of policies they would like to see.

Finally, eWASA is working towards establishing an African e-waste forum. Although the idea is still in its infancy, there is the potential for further regional cooperation through such a forum. Such a forum should build on existing civil society regional relationships, be transparent and ensure the inclusion of diverse stakeholders early in the process.

Action steps

- An evaluation of the current extent of contamination, and remediation of contaminated sites.
- Caution in the recycling process, such as the recycling of plastics with brominated flame retardants.
- The production and dissemination of information on health impacts for workers and the public.
- Internal country monitoring of e-waste, where it comes from and where it goes, and more broadly the harmonisation of tariff codes to better enable this monitoring.
- The adoption of a national take-back scheme, such as that being developed by eWASA, with appropriate subsidies from industry.
- National level support for the Basel Amendment and Bamako Convention.
- Debate around the import of regional e-waste.
- Ensuring environmentally unsound technologies and products that are prohibited or controlled in developed countries are not imported.
- An increase in public awareness campaigns regarding means of safe disposal and the location of safe drop-off sites. ■

SPAIN

Pangea; Tecnologia per Tothom (TxT)
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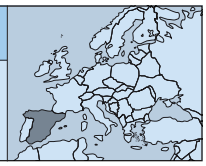

Introduction

The level of information and communications technology (ICT) penetration in Spanish society is very high, making up 4.61% of the country's gross domestic product (GDP). According to official statistics, 57% of households have a computer and 39% have internet access, while 94% of companies are connected to the internet.[1] There was 109.1% penetration of mobile telephony in the fourth quarter of 2009[2] – in other words, there are more mobile phone lines (51 million) than inhabitants (46 million). Spain has a good legislative framework, and a long but uneven practice of electronic waste (e-waste) management. The issue of ICTs and climate change, however, is still in its infancy.

Policy and legislative context

Royal Decree 208/2005, which adapts EU Directive 2002/96/CE on e-waste into national law, establishes the responsibility of manufacturers and importers of ICTs in this regard. The international agreements signed by Spain concerning the import and export of hazardous waste are the Basel Convention (1989) with the Ban Amendment (1995); the London Convention Protocol (1996); the Rotterdam Convention (1998); and the Stockholm Convention (2001). The Basel Action Network (BAN) qualifies Spain's commitment to enforcing these agreements as excellent.[3] There are very serious penalties for dumping hazardous waste, causing serious environmental damage, and hiding relevant data, with fines ranging from EUR 30,000 to EUR 1.2 million.

The Integrated National Waste Plan (PNIR) 2007-2015 states that "measures will be established to facilitate the reuse of elements and components of e-waste."[4] Although the Ministry of the Environment and Rural and Marine Affairs declared that it would develop and publish a Manual for the Reuse of e-Waste before 2009, to date it has not been published and the ministry has not made significant progress in the prioritisation of the issue.

E-waste policy and practice

A draft law on a sustainable economy, as approved by the government and submitted to debate in the Spanish parliament in the spring of 2010,[5] mentions (in Article 3.5) the importance of promoting waste treatment. According to the bill, the government should adopt policies to combine economic development with waste minimisation. In Article 33, "Sustainability in the management of public enterprises", it establishes criteria for awarding public sector contracts, which include adequate waste management practices and the use of recycled and reused materials. It devotes two articles to the management of waste in Title III "Environmental Sustainability". Article 93, "Increased deduction for environmental investment" refers to the amendment of the Corporate Tax Law for the deduction of investments involving the reduction, recovery or treatment of industrial waste in general. Article 108, "Common goals of public policy for a sustainable urban environment", stipulates that the government will formulate and develop policies in support of a sustainable urban environment and also promote more efficient services in waste management. It also includes a series of controversial legal amendments to allow the blocking of websites that facilitate unauthorised downloading of copyrighted content. This has raised criticism, given that legislation on a sustainable economy modifies intellectual property law, and does not address or help in the ongoing process of dematerialisation.[6]

E-waste is handled by the Integrated Management System (SIG). However, reuse is not addressed by the system, which only deals with recycling. For instance, the ECOTIC foundation, the Spanish leader in the management of e-waste, working with more than 400 companies, collected a total of 47,052 tonnes of e-waste from across Spain in 2008 – an increase of 51.5% compared to 2007 – including 4,520 tonnes of ICT waste. However, ECOTIC only does recycling, and in its 2008 annual report the word "reuse" does not appear.[7]

The absence of studies and standards on how to measure the gains of ICTs and environmental sustainability is an important limitation. Although Spanish law[8] defines priorities for the treatment of this waste (first reusing, then recycling, energetic valorisation, and finally disposal) we consider there is not enough transparency in the percentages

1 Spanish Central Bank (2010) *Summary of ICT indicators*. www.bde.es/webbde/es/estadis/infoest/si_1_5.pdf

2 Telecommunications Market Commission (2010) *Fourth Quarter 2009 Report*. www.cmt.es/cmt_ptl_ext/SelectOption.do?nav=publi_trimestrales

3 Basel Action Network (2010) *Country Status/International Toxics Progress Report Card*. www.ban.org/country_status/report_card.html

4 Ministry of the Environment and Rural and Marine Affairs (2008) *Plan Nacional Integrado de Residuos (PNIR) (2007-2015)*. www.mma.es/secciones/calidad_contaminacion/pdf/PNIR_22_12_2008_%28con_tablas_y_planes%29.pdf

5 Gobierno de España (2010) *Propuesta de Ley de Economía Sostenible*. www.economiasostenible.gob.es/wp-content/uploads/2010/03/01_proyecto_ley_economia_sostenible.pdf

6 Red Sostenible (2010) *Oscurece tu Web*. red-sostenible.net/index.php/Oscurece-tu-web

7 Fundación ECOTIC (2009) *Memoria 2008*. www.ecotic.es/files/MEMORIA%202008%20ECOTIC.pdf

8 Gobierno de España (2005) *Royal Decree 208/2005 on Electric and electronic equipment and management of waste*. www.electrorecycling.net/docs/directivas/RD%20208-2005%20sobre%20RAEEs.pdf

achieved by each treatment method and not enough incentives for the SIGs towards reuse. For example, incinerating PC motherboards is considered the same as recycling components manually, despite the release of toxic chemicals into the atmosphere.

A widespread practice in public and private organisations is the replacement of ICT equipment within a short time span, usually limited to the period under extended guarantee (typically three years). For instance, in the public research environment, the common practice is to establish a depreciation plan for a period of three years. This minimises the maintenance and upgrading costs of previously acquired equipment, and treats ICT equipment as consumable goods, which leads to a lot of e-waste and little or no reuse. In addition, the upgrading cycles of proprietary software with extra features sometimes deliberately force older hardware or software to become obsolete as a sales strategy to create pressure on the customer to purchase new hardware or software again. The marketing campaigns from most mobile operators continue promoting the frequent (e.g. yearly) substitution of mobile devices even if the old one is completely functional. In contrast, tenders for the acquisition of ICT equipment for public administrations and large companies are more frequently including requirements involving energy efficiency, e-waste management and CO_2 emissions.

One of the most active NGOs in Spain around the issue of ICT e-waste is Greenpeace, which publishes the Green Electronics Rankings.[9] At the same time, grassroots movements and associations work at the local community level to change views and practices. For instance, the association *Tecnologia per Tothom* or "Technology for Everybody" (TxT)[10] works on engaging students to take civic responsibility and offers training through a Reuse Workshop, among other activities, with support from the Centre of Cooperation for Development at the Technical University of Catalonia (UPC).[11] The workshop is a hands-on session where participants learn how to repair a computer. It was started in 2003, and is held twice a year. By July 2009 more than 800 computers were repaired, installed and handed over to 102 solidarity projects. It expanded from six projects involving twenty computers in 2003, to 25 projects involving 87 computers in 2009.

ICTs and climate change

The ongoing efforts towards e-business, e-government and, in general, the role of ICTs in the dematerialisation of processes and services, results in clear improvements in efficiency, the reduction of travel needs, the reduction in resources required for manufacturing and the removal of packaging and distribution, the transfer of and access to information without using paper (newspapers, books, etc.), and new business models for the distribution of software, music, art, movies and games.[12] ICT systems have also brought more efficiency in processes such as traffic control in large cities, the smart power grid with its capability of integrating renewable electricity, and the monitoring and regulation of the environmental impact of diverse human activities.

The Organisation for Economic Co-operation and Development (OECD) report *Towards Green ICT Strategies: Assessing Policies and Programmes on ICT and the Environment*,[13] released in 2010, is a survey of 92 programmes and initiatives (50 from governments and 42 from industry associations) across 22 OECD countries, plus the European Union. It looks at the direct effects of ICTs (initiatives focusing on environmental impacts produced by ICTs themselves) and at the enabling effects of ICTs (initiatives focusing on reducing environmental impacts by using ICT applications). According to Annex 1 of the report, Spain is still not addressing any of these aspects, being among the worst rated in the OECD, together with the Czech Republic, Greece, Luxembourg, Mexico, Poland and Turkey.

Corporate social responsibility initiatives are resulting in some progress in the use of ICTs in combating climate change. Private companies, through the Global Reporting Initiative, are reporting successes as part of their corporate social responsibility portfolios. A 2009 report by Vodafone and Accenture[14] studies the potential reductions in CO_2 emissions made possible by mobile technology in the following industries: ICTs (by developing technology and providing the necessary connectivity); logistics and transport (through intelligent logistics); basic services (through smart grids); production systems and service maintenance management (through intelligent manufacturing); and services for business activities (through dematerialisation).

New trends

Research, development and innovation in the above areas are promising signs. However, there is an important absence of government push on the following issues: funds for new initiatives, amortisation of technologies, and standardisation. For example, the National Plan on Research, Development and Innovation 2008-2009 does not prioritise funding for projects focused on ICTs and climate change. There is also no mention of funding mechanisms for ICTs in the climate change monitoring agreement between Spain and the United Nations.[15]

9 Greenpeace (2009) *Ranking Verde de Electrónicos*, 15th edition. greenpeace.org/espana

10 txt.upc.edu

11 www.upc.edu/ccd

12 de Pablo, F. (2008) Sostenibilidad en las TIC, *BoleTIC*, 46, p. 22-26. www.astic.es/la-asociacion/boletic/boletic-n%C2%BA-46-junio-2008

13 www.oecd.org/dataoecd/3/7/44001912.pdf

14 Vodafone and Accenture (2009) *Las telecomunicaciones y el CO2: Cuantificación del papel de la tecnología móvil frente al cambio climático.* www.vodafone.es/conocenos/responsabilidad-corporativa/descargas/att00015968/carbon_connections.pdf

15 Ministry of the Environment and Rural and Marine Affairs (2009) *Fifth National Communication to the United Nations Framework Convention on Climate Change.* www.mma.es/secciones/cambio_climatico/documentacion_cc/divulgacion/pdf/5cn.pdf

The Secretary of State for Telecommunications and Information Society of the Ministry of Industry, Tourism and Trade, Francisco Ros, said in 2010 that the period 2006-2009 has seen more than 50 research and technological development projects in the field of ICTs and sustainability, involving an investment of EUR 110 million, in areas such as green ICTs, energy saving in households, ICT networks, energy efficiency and renewable energy. However, the balance – and perhaps imbalance – among these focus areas is not known.

Action steps

There is consensus in Spain on the importance of the management of e-waste and the potential of ICTs in the mitigation of climate change. However, while the first topic is becoming mainstream, despite its shortcomings, the second lurks behind arguments concerning using ICTs for productivity, modernisation and reducing costs. The role of ICTs in mitigating climate change may not be the driving force for the introduction of ICTs, but the potential for the reduction in costs and time due to an increase in productivity, accessibility and comfort is. For instance, the draft legislation on a sustainable economy, discussed in parliament in spring 2010, simply refers to a reduction of emission of GHGs, promotion of corporate environmental responsibility, and the creation of a common system for the purchase of CO_2 credits. Similarly, the Granada Ministerial Declaration on the European Digital Agenda proposes to "[e]xplore ways to seize the opportunities of cloud computing for productivity and efficiency gains, as well as environmental gains especially for European public bodies, small businesses and communities."[16] Environmental issues appear, but in a diluted way, and as the last item.

We believe it is necessary to promote awareness on reuse instead of disposal on the issue of recycling e-waste, and to value organisations and companies doing good work in these areas. The promotion of reuse instead of the more cost-effective disposal requires the introduction of new incentives and regulations by the national and European government. Corporate social responsibility goes beyond compliance with the law, and companies that promote it should be recognised.

There is a need for a systemic approach, where multiple organisations work together to tackle the complete life cycle of a product. Even the numerous initiatives in e-waste management are quite isolated. The integration of good e-waste practices into the everyday purchase and use of ICTs is needed to ensure that proper e-waste management becomes the norm.

The required push is coming from NGOs, particularly environmental protection organisations in collaboration with NGOs focused on ICT technologies, from the academic sector, and from several international companies that have already adopted specific measures to optimise environmental sustainability. The government, currently focused on alleviating and managing the economic crisis, will follow in the coming years as a result of this push. ■

16 www.eu2010.es/export/sites/presidencia/comun/descargas/Ministerios/en_declaracion_granada.pdf

SWEDEN

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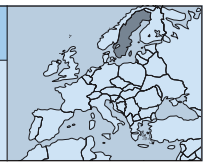

Introduction

Sweden is a country where public procurement legislation is strong – as in the rest of the European Union (EU) – and relatively well followed. Procurement procedures are regulated in detail in the Public Procurement Act.

Swedish authorities constitute a large part of the market for information and communications technology (ICT) goods and services,[1] which means that environmental requirements from these authorities could be a good way of getting momentum in making these goods and services more environmentally friendly.

However, the authorities face certain problems when trying to include environmental factors as criteria in their public tenders.[2] The Public Procurement Act regulates the procurement process in detail, and any breach against any of the sections may lead to the procurement being challenged in court, with the risk of having to redo a tender process. There have been many cases[3] where procurement contracts have been successfully challenged because the public tender included environmental criteria which were in breach of the public procurement legislation.

Policy and legislative context

The main legislation affecting this issue is the Public Procurement Act, which derives from EC directives that effectively harmonise public procurement processes within the EU. National acts in the EU, including the Swedish act, strictly conform to the directives, and prejudicial cases from the European Court of Justice are applicable in Sweden, even if they derive from other member states.

The authorities must follow the procedures set out in the Act during the whole procurement process. As the proceedings must be clearly documented and these documents become publicly available immediately after the winner is chosen, it is relatively easy for a losing company to discover if there are any faults made by the public authority during the proceedings. If any faults are found, losing companies have a high chance of successfully challenging the procurement. The process would then have to be corrected or redone entirely, depending on the type of fault made, which usually is very costly for the public authority, both economically and in terms of time. If the fault or breach is severe the authority may also suffer from loss of goodwill.

Is there room for greener ICTs within the legal framework of public procurement?

A public authority's procurement process starts with a public announcement of the procurement, which opens the way for any company to submit a tender for the service or goods in question. Normally the authorities publish a public tender which specifies the service or goods that are procured through a large number of criteria, both referring to the company and referring to the procured service or goods. The criteria on the services or goods can roughly be divided into two categories: mandatory criteria (or qualifiers) and evaluation or award criteria. All criteria have to comply with the four general EC principles of non-discrimination, equal treatment, transparency and proportionality.

The competing companies' tenders normally follow the set criteria in the public tender very thoroughly and contain no items of expenditure that do not put the company or its tender in a better opportunity of winning the procurement. This means that environmentally friendly features generally are not included if there are no specific environmental criteria in the public tender, as environmentally friendly features often imply a higher initial cost. As a result, public authorities need to include specific environmental criteria to be able to procure environmentally friendly services and goods.

For example, an authority that would like to procure environmentally friendly computers could set up a mandatory criterion of power consumption less than a certain level of efficacy; tenders including computers with a higher energy consumption than the required level will then not be considered. The power consumption could also be included as an evaluation criterion; for example, the tender price will be multiplied by the efficacy in watts and the lowest result will win the procurement.

In theory it is relatively simple; however, it is not at all certain that these criteria meet the general principles of procurement. As there may be several ways of measuring the efficacy (including or excluding stand-by mode, wireless-off mode, etc.) these requirements may not be deemed transparent for the tendering companies – one company might tune its computer for the lowest overall energy efficiency and may lose the procurement because the authority only measures the energy consumption in working mode. The requirements could also be deemed as not fulfilling the principles of proportion and/or equal treatment since measuring work mode energy consumption will not necessarily lead to the most environmentally friendly computers being procured.

As many procurement contracts are very valuable for the winning company, only a small chance of winning would

1 Ewa Thorslund, Swedish IT and Telecom Industries, interview via e-mail.

2 DIGITALEUROPE (2010) *EU "Green" Public Procurement.* www.digitaleurope.org/fileadmin/user_upload/document/Position_on_green_pu_1268933193.pdf

3 For example, case 3627-06 of the Stockholm Administrative Court of Appeal and European Court of Justice C-448/01.

be enough for a losing company to challenge the procurement proceedings in court. So to include such criteria, there is a need for a level of standardisation that makes environmental criteria fulfil the general principles and become lawful according to the public procurement legislation. These standards are often represented by different "eco labels", such as the EU Ecolabel (known in Sweden as the EU-Blomman) and the KRAV, Energy Star and TCO-95 labels, among others. There are a number of eco labels that all use their own way of measuring certain environmentally related factors, which to some extent solve the problem of transparency mentioned above by making the process of measuring as well as drafting the tender document easier.

However, these eco labels must be compliant with both public procurement legislation and the general principles. In 1999 a Swedish case ruled that the EC directives should be interpreted as not permitting the requirement of an eco label in tenders and thereby excluding all products without the eco label regardless of the product's actual environmental features. To comply with the principle, a criterion has to be phrased as requiring eco-labelled products *as well as any product that could qualify for the eco label in question*. If this last addition to the criterion is not made, the criterion does not comply with the principle of equal treatment. Furthermore, the court ruled that to comply with the principle of proportion the environmental requirements of an eco label must be based entirely on scientific information proving that the environment benefits from the requirement.

The outcome of the ruling was that public authorities could use eco labels as long as products with equal features as the eco-labelled products were accepted. As many eco labels stand for well-known and accepted environmental requirements, the use of eco labels was still a convenient mechanism on which to base procurement requirements. However, the ruling also made it clear that even if an eco label and its requirements are widely known and well accepted within the industry, it is not necessarily compliant with procurement law because there is a lack of scientific evidence proving that the environment benefits from the requirement. The authority must make its own assessment whether the requirement has enough scientific basis to serve as a procurement requirement, which creates uncertainty for the authorities.

This uncertainty, of whether an eco label should be used in public procurement, is a problem for the public authorities as well as for the industry and the organisations behind the eco labels. The public authorities at least have to specifically assess whether an eco label can be used without risking the success of the procurement.

Despite problems with internal public authority bureaucracy, it is, according to experts,[4] far from impossible to include environmental criteria using eco labels. This is also confirmed by the EC directive,[5] where Article 23, subject to certain formulations of the requirements, allows for environmental criteria to be used. But it may be difficult to know how to include them in accordance with the Public Procurement Act. The risk of the procurement procedures being challenged seems to make officials working with public procurement reluctant to include these criteria, and environmental concerns are not assigned priority.

That the procurement of ICTs could be greener seems not to be questioned. However, the solution to the problem might not be that obvious. As outlined above, there seem to be a number of reasons for the problem which could prove to be hurdles to improving the situation. The procurement legislation is a problem, partly because it is not very flexible, but even more so because it is cumbersome for officials and the procurement authorities to deal with – there is a general lack of knowledge of how to design procurements within the existing legislation.

What is discussed less is the role of the ICT industry in this matter. The industry plays a very important role in developing new standards for products and services, as well as standards on environmentally friendly technical specifications, which could be used in public procurements.

New trends

In the last few years there has been a high focus on green public procurement generally in Europe: the concept has even been labelled with its own abbreviation, "GPP". Many of the EU's different departments have acted to make procurement greener and a GPP help desk was set up in January this year. The focus of most of these initiatives seems to be on the authorities – to make them focus more on environment when procuring goods and services. Toolkits as well as guidelines for officials working with public procurement are now available for free on both European and Swedish web pages. However, it seems as if almost all of the focus on GPP, both from European and Swedish authorities, is only on the authorities and not on the other actors involved. The ICT industry is often not highlighted as an important stakeholder, and there seems to be no comprehensive study with a multi-stakeholder approach.

What we currently see is that there are discussions on how to include new factors – but when should they be deemed as acceptable in public procurements? The ICT industry actors are discussing how they could develop their own standards. One question is then: Will these standards be set at a good level or just on a level that is suitable for the industry?

4 DIGITALEUROPE (2010) op. cit.

5 Directive 2004/18/EC of the European Parliament and of the Council of 31 March 2004 on the coordination of procedures for the award of public works contracts, public supply contracts and public service contracts. eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32004L0018:EN:HTML

Action steps

As has been described above, civil society plays a very minor role in the development of greener public procurement of ICTs. There certainly is momentum in making public procurement in general greener, including procurement of ICTs. In a process like this I believe it is very important that a multi-stakeholder approach be set up; it seems right now that this process lacks proper participation from civil society. Civil society needs to make its voice heard in the forums where discussions on green procurement are taking place. Currently a lot of work is being conducted at the EU level as well as in Swedish government agencies. It is possible to interact in these processes as a consultative body.

I believe civil society should focus on:

- Approaching Swedish government bodies as well as EU bodies and demanding consultative status.
- Highlighting areas which currently need more scientific research to be eligible as public procurement requirements.
- Highlighting that not only specific technical features should be included as requirements in tender documents, but that the public tender should have a full environmental focus, including life cycle analysis requirements and/or ecological footprint analyses. ■

SWITZERLAND

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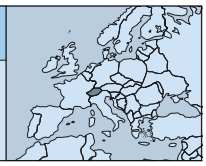


Introduction

In the mountains and valleys of Switzerland you will hardly find any dumped electronic waste (e-waste). Neither is e-waste an issue in public discourse – compared to other waste management concerns. Switzerland is known to be the homeland of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal and Geneva hosts its secretariat.[1] When it comes to e-waste, the public perception seems to be: "Out of sight, out of mind."

Yet according to the Federal Statistics Office (FSO), the figures for computers per household are still increasing. The proportion of households with at least one computer is now around 76%.[2] So where do all the old computers and communications devices go?

Policy and legislative context

In early 1998, Switzerland passed legislation on the Return, Take-Back and Disposal of Electrical and Electronic Equipment (ORDEE).[3] Under this ordinance, retailers, manufacturers and importers are required to take back, at no charge, appliances of the kind that they normally stock. Consumers, for their part, are obliged to return end-of-life appliances, and are not allowed to dispose of them via household waste or bulky item collections. The ordinance covers all sorts of electrical/electronic devices, including IT and telecommunications equipment.

Collection and disposal are managed by the Swiss Foundation for the Disposal of Wastes (SENS) and the Swiss Association for Information, Communication and Organisational Technology (SWICO). The purchase price of all appliances covered by the ORDEE includes a prepaid disposal charge based on voluntary sectoral agreements (co-regulation). Equipment can, as a result, be returned free of charge.[4]

According to observers, this e-waste management system is well organised and has been fairly implemented over the years. The average Swiss is known to be disciplined and has a rather developed sense of environmental issues. Nevertheless, at the end of 2008, the Swiss Federal Council commissioned an examination on how the potential of information and communications technologies (ICTs) for sustainable development could be realised to a greater extent, and how the risks of technology could be reduced. To this end the Federal Office of Communications (OFCOM), together with the Federal Office for Spatial Development (ARE), commissioned INFRAS, an independent consulting group providing policy analysis and implementation services,[5] to draw up an inventory and identify deficits and possible courses of action.[6]

E-waste competence

Their report was published at the end of 2009, and concludes: "From the ecological viewpoint, it is the consumption of energy and resources in particular which is particularly relevant. In this area there is great potential for reducing consumption over the total lifecycle [of ICTs] (i.e. in the production and utilisation of scarce resources, in both operation and use, as well as in recycling and disposal). In addition, ICTs play an important role in making processes 'smarter' (i.e. more intelligent and therefore more efficient, or in replacing energy-intensive applications)."

The three main recommendations of the comprehensive report that runs to some 100 pages include targets like "developing and implementing the national strategy on 'Green ICT'," and notes "a lack of overall coordination and targeted linking of the various activities under the umbrella of a comprehensive concept." A national "Green ICT" strategy, the report says, would have to be drawn up by the Confederation with the involvement of businesses, research institutions and NGOs. The problem of e-waste plays a peripheral role in the report, while the question of ICT and sustainable development more broadly is considered "relevant on many levels."[7]

Governmental representatives emphasise that Switzerland has one of the "best established e-waste management systems worldwide." From the beginning, the Swiss Federal Laboratories for Materials Testing and Research (Empa) has been part of the technical control system for Swiss operators. The system is organised in four categories of producer responsibility organisations (PRO), which handle specific categories of e-waste.[8] One of the partners is SWICO Recycling – the unit of SWICO which handles mainly ICT and consumer electronics waste, including personal

1 The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, 22 March 1989, is the most comprehensive global environmental agreement on hazardous and other wastes. The Convention came into force in 1992. www.basel.int

2 www.bfs.admin.ch/bfs/portal/de/index/themen/20/22/press.Document.91920.pdf

3 Verordnung über die Rückgabe, die Rücknahme und die Entsorgung elektrischer und elektronischer Geräte (VREG), 14 January 1998. www.admin.ch/ch/d/sr/c814_620.html

4 www.bafu.admin.ch/abfall/01472/01478/index.html?lang=en

5 www.infras.ch/e/index.php

6 Federal Office of Communications (OFCOM) (2009) *ICT and Sustainable Development in Switzerland.* www.bakom.admin.ch/themen/infosociety/03451/index.html?lang=en

7 www.bakom.admin.ch/themen/infosociety/03451/index.html?lang=en

8 www.e-waste.ch

computers.[9] Building on this experience, the State Secretariat for Economic Affairs (SECO) first mandated Empa in 2003 to implement case studies of the situation of e-waste recycling in developing and transition countries in Asia and Africa. The case studies share knowledge and experience gained through this system and establish "Knowledge Partnerships in e-Waste Recycling".[10]

And what about transboundary movements of hazardous waste from Switzerland to developing countries? SWICO officials say that devices collected by the Swiss system operators must be recycled in Switzerland – at least that is the target of the SWICO system. The few components that cannot be recycled in the country for technical reasons (like monitor glass and printed circuit boards) are transferred to neighbouring countries such as Germany or Sweden for safe recycling. For the export of electronic junk, however, special permissions from the Federal Office for the Environment (FOEN) are needed.[11]

An information request from Greenpeace Switzerland on the reliability of the official statements showed no particular contradiction between official statements and practice on the ground regarding the handling of e-waste. A spokesperson referred to the rather common practice in other European countries to declare electronic junk from computers and handhelds as "second-hand goods", and thereby circumvent legal restrictions in place. But, the spokesperson said, "we never particularly investigated e-waste handling and potential abuses in Switzerland – nevertheless, there is no evidence so far that e-junk from the country is brought to developing countries."[12]

The only hint on potential export abuses of e-waste from Switzerland was found in a Greenpeace report from 2008 called "Poisoning the poor: Electronic waste in Ghana". A Greenpeace investigation team in the country "saw containers of e-waste from Germany, Korea, Switzerland and the Netherlands being opened at Tema harbour, the biggest port in Ghana."[13] Another Greenpeace spokesman suggested "there is no systematic control mechanism in place" and therefore "we do not know whether intermediaries buy such stuff and recycle it in poor countries."[14]

Switzerland is said to be in the vanguard of dealing with e-waste, including mobile phones. In 2002 it helped to launch a successful initiative to convince the telecom industry to recycle old phones or dispose of them correctly. The deal – the first of its kind – has served as a model and has since given thousands of unwanted mobiles a new lease of life. "We have developed collection strategies in Switzerland, Europe and North America, which represent a very important pillar in combating e-waste," a FOEN representative said. "It is important to assist developing countries to set up similar systems to properly deal with cellphones and computers."[15]

Swiss lobbying for ecological disposal

Switzerland has repeatedly used international conferences and forums, like the Conference of Parties to the Basel Convention held in Bali, Indonesia in June 2008, to lobby for more efficient disposal of old electronic goods. FOEN officials are concerned that as international trade increases, so does potential waste. Waste wrongly disposed can have a serious impact on human health and on the environment. In Bali, the Swiss delegation lobbied conference participants to create partnerships similar to its mobile phone solution to deal with old computers.[16]

The Basel Action Network (BAN), the watchdog of the Basel Convention,[17] testifies that e-waste is increasingly sold and exported from rich countries to developing ones for so-called "reuse". But the stock is often beyond use or repair and is in reality "e-scrap". This ends up being dumped and burned, with serious impacts on the environment and on health, as has been seen in Nigeria. A 2005 study by BAN concluded that up to 75% of scrap TVs and computers shipped to Nigeria for "reuse" ended up buried or burned. In Bali, the network called for the introduction of mandatory testing and monitoring before any second-hand equipment is exported to prevent this from happening.[18]

New challenges

The average life span of computers in developed countries has dropped from six years in 1997 to just two years in 2005. Mobile phones have a life cycle of less than two years in developed countries, specialists say (despite actually lasting for about seven years). Shorter life cycles are an indicator of the increased need and use of raw materials for new computer and mobile production. The ecological consequences of these consumption patterns are often not fairly considered, either by producers or consumers.

Whereas electronic items in general have a return rate in the country of almost 80%, only 15% of the 2.8 million mobile phones sold in Switzerland per year have in the past been returned for recycling. Observers assume that the rest are collected and stored in households for years. The SWICO

9 www.swicorecycling.ch/default.asp?lang=e

10 Swiss e-Waste Programme: ewasteguide.info/node/4141

11 swissinfo (2004) E-Schrott-Weltmeister sein – leicht gemacht!, 22 April. www.swissinfo.ch/ger/index/E-Schrott-Weltmeister_sein_-_leicht_gemacht!.html?cid=3863598

12 Greenpeace Guide to Greener Electronics: www.greenpeace.org/switzerland/de/Publikationen/Chemie/Guide-to-greener-electronics and inquiry by the author.

13 Greenpeace (2008) *Poisoning the poor: Electronic waste in Ghana*. www.greenpeace.org/raw/content/international/press/reports/poisoning-the-poor-electonic.pdf

14 swissinfo (2004) Bessere Sonderabfall-Entsorgung angestrebt, 23 October. www.swissinfo.ch/ger/index/Bessere_Sonderabfall-Entsorgung_angestrebt.html?cid=4160986

15 swissinfo (2006) Reducing the growing e-waste mountain, 1 December. www.swissinfo.ch/eng/index/Reducing_the_growing_e-waste_mountain.html?cid=672494

16 swissinfo (2008) Switzerland lobbies for better e-waste disposal, 22 June. www.swissinfo.ch/eng/top_news/Switzerland_lobbies_for_better_e-waste_disposal.html?cid=672556

17 www.ban.org

18 www.swissinfo.ch/eng/top_news/Switzerland_lobbies_for_better_e-waste_disposal.html?cid=672556

Recycling programme is trying to change this, and is even using Google Maps where mobile owners can verify where the nearest recycling centre is.

Specialised institutions like SWICO Recycling declared at a recent media conference (in the summer of 2009) that the return of old mobiles could be "useful for the environment." Mobiles normally consist of a high concentration of reusable precious metals like copper, aluminium, iron, silver or gold, and up to 40% of these materials can be reused. Around 50% of the material in a mobile phone has to be burned; the remaining 10% needs to be disposed of using special processes.[19]

But even a well-functioning system of waste management may lead to environmental problems, according to an eco-record study conducted by Empa. Used electronic items are transported up to 39 kilometres on average, leading to total CO_2 emissions of 340 tonnes per year. Reducing such disposal distances in the country is a challenge for SWICO Recycling and SENS.[20]

Action steps

- Developing and implementing the national strategy on green ICTs, as suggested in the report on ICT and sustainable development in Switzerland.
- Convincing users to return their mobiles for recycling, to increase the return rate of mobile phones to the level of other e-items (which is around 80%).
- Developing a network of country-wide collection and recycling units to avoid CO_2 emissions that are the result of the long-distance transport of e-waste.
- The introduction of mandatory testing and monitoring before any e-waste is exported to prevent serious impacts on the environment and on health, as suggested by BAN.
- Civil society groups have an important role to play in addressing the e-waste problem as well. Important functions already fulfilled by civil society groups are agenda setting, data collection and education. An important additional role civil society groups could play is to start up a discussion on the usefulness and characteristics of future electronics. In this context, an e-waste policy paper by the Centre for Research on Multinational Corporations (SOMO) offers specific policy options and recommendations for the public sector, businesses and social groups for stimulating the collection, reuse and recycling of e-waste. These have been placed on the agenda of countries that export and import e-waste alike, and several initiatives are being developed to combat (illegal) e-waste exporting.[21] ■

19 Push-Monatsthema: Handys als Rohstofflieferanten. www.umweltschutz.ch/index.php?pid=486

20 Computerworld.ch (2008) Handy-Recycling ist wenig beliebt, 7 April. www.computerworld.ch/aktuell/news/44442/index.html

21 Van Huijstee, M. and De Haan, E. (2009) *E-Waste Policy Paper*, SOMO, Amsterdam. goodelectronics.org/news-en/somo-conference-on-e-waste-in-brussels-1

Additional sources

Abfallentsorgung (Waste Management) www.cusstr.ch/repository/105.pdf

Institutions of higher education in Europe to take up sustainable procurement of computers, online petition by Procure IT Fair procureitfair.org/petition

Rights for People, Rules for Business www.rightsforpeople.org/?lang=en

Schmidt-Bleek: Checkliste Dematerialisierung www.nachhaltigkeit.info/artikel/checkliste_fuer_produkthersteller_526.htm

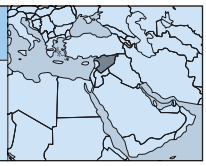
Schweiz - Nachhaltigkeitsstrategie, 2008-2011 www.nachhaltigkeit.info/artikel/europaeische_politik_6/mehr_europa_30/schweiz_nachhaltigkeitsstrategie_2008_2011_1384.htm

StEP Initiative (2010) *Solving the E-Waste Problem* www.nachhaltigkeit.info/artikel/step_initiative_1075.htm

Swiss Federal Council (2010) *Sustainable Development Strategy* www.are.admin.ch/themen/nachhaltig/00262/00528/index.html?lang=en

SYRIA

Anas Tawileh



Introduction

In the past decade, Syria has adopted a proactive approach towards environmental challenges and the preservation of natural resources. The Ministry of State for Environmental Affairs was established in 2009 to lead the country's environmental programmes and initiatives. Previously, the government's environmental efforts were delegated to a special entity called the General Authority for Environmental Affairs. The establishment of the ministry is a strong signal of the government's acknowledgement of the environmental challenges facing the country, and the urgent need for action in this regard.

The environmental problem is complex and multifaceted. Issues that need to be tackled range from solid waste management to hazardous waste, electronic waste (e-waste), recycling and climate change, to name a few. This reality challenges environmental efforts, particularly in resource-constrained regions. Countries in such regions are forced into prioritising their interventions and initiatives and focusing their investments on the most pressing issues. This seems to be the case in Syria, where despite the significant efforts being undertaken in the environmental sustainability field, important areas such as e-waste are not yet tackled properly.

Policy and legislative context

The most significant legislation in Syria with regards to environmental sustainability is Law No. 50, enacted in 2002. This legislation provides an extensive framework for tackling environmental challenges, including supporting research activities, raising awareness, setting standards and developing indicators, monitoring, assessing trends in challenges such as desertification and devising appropriate countermeasures to environmental degradation. It also established the General Authority for Environmental Affairs, a governmental entity with a mandate to formulate environmental public policy and develop a national strategy for environmental protection. Another entity, the Environmental Protection Council, which consists of seventeen cabinet members and six union leaders, has been formed to approve and, if necessary, amend the strategies and policies developed by the ministry. The legislation also established the Environment Support and Protection Fund, which was intended to fund activities and projects related to environmental protection in the country.

Unfortunately, despite its rather wide coverage, the legislation does not specifically address issues related to information and communications technologies (ICTs) or e-waste. It does, however, include provisions to tackle the management of solid and dangerous waste.

In 2007, the Syrian government, in partnership with the United Nations Development Programme (UNDP), launched a project to support the development of the Initial National Communication (INC) of Syria that would be presented to the United Nations Framework Convention on Climate Change (UNFCCC)[1] (it is worth noting that Syria is a signatory to the UNFCCC and the Kyoto Protocol). A report published by the project in March 2010 states that the total CO_2 emissions in the country have increased from 52.66 teragrams (Tg) in 1994 to 79.07 Tg in 2005. These figures are significantly lower than those of the EU and other highly developed countries. However, as the country is affected by climate changing factors from other regions, the report predicts the warming in the country in 2041 will be higher than the global average. The report concludes with several action steps to mitigate the impact of these environmental trends.

E-waste: An emerging challenge

Syrians have not yet engaged in recycling as an important part of waste management. Despite the fact that non-organic waste per capita in the country is much lower than its levels in developed nations, accelerating economic growth and household consumption indicate that waste management will soon become a critical issue. This is particularly relevant to e-waste. The decreasing prices of electronic equipment resulting in their greater affordability, combined with growing penetration of technology, has meant that increasing quantities of equipment are being imported into the country. According to the International Telecommunication Union (ITU), the number of mobile phone subscribers in Syria exceeded 7,056,200 by the end of 2009.[2] The ITU's statistics also put the number of internet users in the country at 3,565,000. Given the continuously shrinking life span of electronic devices, including mobile phones, laptop computers, MP3 players and other gadgets, the challenge of e-waste can be easily anticipated.

In a study by Allam and Inauen,[3] the researchers reported that no major e-waste activities are taking place in Syria. However, the Basel Convention Regional Centre for the Arab States (BCRC) and the Syrian government have engaged in a pilot project to identify and quantify hazardous waste

1 www.undp.org.sy/index.php/our-work/environment-and-energy-/79-enabling-activities-for-the-preparation-of-syrias-initial-national-communication-to-the-unfccc-qpims-3525-nc-eaq

2 www.itu.int

3 Allam, H. and Inauen, A. (2009) *E-Waste Management Practices in the Arab Region*, Centre for Environment and Development for the Arab Region (CEDARE), Cairo. ewasteguide.info/files/Allam_2009_R'09.pdf

inventories in the country.[4] While this project does not focus primarily on e-waste, it intends to study the issue as part of the larger hazardous waste problem.

Careful examination of the e-waste problem in Syria offers some interesting insight. Apparently, the vast majority of Syrians do not dispose of their old or obsolete electronic gadgets by throwing them away. A sizable market for second-hand devices and spare parts operates in the country, and most devices find their way into one form of reuse or another. This may be attributed to the high cost of electronic devices compared to the average income, which also has another effect in increasing the life span of electronic devices. These trends tend to delay the emergence of e-waste as a pressing problem, but certainly do not eliminate it.

The challenges that need to be addressed by the government in the area of environmental sustainability in general, and in e-waste in particular, are varied and significant. The fact that the government has engaged in a pilot project to develop inventories of hazardous waste in the country is a commendable start. The country's environmental sustainability legislation (Law No. 50, 2002) requires the development of waste classification schemes, and appropriate methods for the treatment of different types of waste. Recently, the Ministry of State for Environmental Affairs launched several initiatives to translate these requirements into practice. For example, an action plan was formulated to engage with the private sector in developing the required infrastructure for recycling. Another initiative for "green industry" was recently started in collaboration with the United Nations Environment Programme (UNEP).

While these initiatives and activities will undoubtedly improve the waste management situation in Syria, they need to be supplemented with action that engages the larger community. Important areas of action include awareness raising, reporting and data collection, and promoting the virtual delivery of goods.

Using ICTs to address environmental challenges

ICTs provide a viable and effective way to communicate with large audiences. Moreover, emerging Web 2.0 technologies enable higher levels of user interaction and engagement, and are highly conducive to community building and mobilisation. As a result, these technologies offer significant leverage to support the efforts of the government and civil society in addressing environmental challenges.

At the first level of engagement, the internet and mobile phones can be utilised as mediums to raise awareness about environmental issues and the impact of the careless disposal of electronic equipment. Several campaigns have successfully capitalised on the rising penetration of mobile phones to broadcast messages on topics ranging from health to road safety. The Syrian Environment Protection Society[5] started to embrace the internet in its outreach activities, and launched a website that encourages visitors to send their feedback and contribute their articles and opinions.

Another area in which ICTs hold great potential is reporting and data collection. These activities are very labour intensive, and require the deployment of substantial resources. ICTs can provide a channel for "crowdsourcing" that would enable citizens to report on environmental issues or incidents. This channel can also be used to collect information needed for the development of environmental indicators, or in estimating and evaluating the volumes of e-waste generated in the country.

ICTs can also be exploited to reduce the overall volume of waste by encouraging and supporting the transition from physical to virtual goods delivery. This is particularly relevant in Syria where the virtual goods (such as electronic books and MP3 music downloads) consumer culture is still weak. The government can adopt favourable policies for the creation and distribution of virtual goods, and at the same time discourage consumption of their physical alternatives, to accelerate this transition. If implemented successfully, this will result in large volumes of physical items being substituted by electronic versions, reducing the amount of obsolete physical items going into landfills and waste management facilities.

The internet can also provide an effective medium to share information about climate change and e-waste with the general public, such as indicators, trends and analyses. Making such information available stimulates research activity around available data, and informs and supports the mobilisation efforts of organisations and individuals concerned about these issues. The data that will result from projects like those being implemented in cooperation with the BCRC or UNEP would provide a great starting point.

An important policy consideration in managing e-waste is the introduction of a levy or tax that applies to products which contain hazardous materials to fund the safe disposal or recycling of these products at the end of their life span. Such a fee should be applied to products imported into the country, as well as those produced domestically, as most of the electronic products in use are imported. The proceeds of this fee can be added to the Environment Support and Protection Fund, to be invested later in safe disposal and recycling projects. The government can also stimulate positive behaviour among the general public by providing incentives for the use of more environmentally friendly electronic devices. This model has been implemented by many countries and regions around the world, with highly encouraging results. Further reinforcement of this policy can be demonstrated by introducing specific provisions for the safe disposal of e-waste and the use of environmentally friendly technologies into the public sector's procurement regulations.

New trends

Environmental sustainability is increasingly becoming an important concern for the government and the general public. As more emphasis is placed on the problem globally, and

4 www.bcrc-egypt.org/downloads/PSC5/progress.pdf

5 www.seps-sy.org

more media coverage is dedicated to climate change and e-waste issues, the public awareness of their importance and urgency is growing. The number of articles and news stories related to environmental sustainability published in the country increased by an order of magnitude over the past year, and the problem seems to be attracting attention in the different forums of public discourse.

Many initiatives and organisations are being launched to tackle the formidable challenges of environmental sustainability. Because Syria is not considered a significant contributor to global warming, the country cannot do much in this regard. This means that the resources and local interventions should be focused on other challenges, including solid waste management, desertification, water safety, hazardous waste and e-waste.

The emerging trends in higher technology adoption and increased affordability of electronic devices indicate that the problem of e-waste, though not considered a major issue currently, will soon become a significant challenge. The massive quantities of cheap, low-quality electronics available in the local market (imported mainly from China) suggest that the country has an urgent need for a comprehensive policy and enforcement framework that places appropriate checks and balances on market growth to avert a looming environmental and public health disaster.

Actions steps

- Urgently introduce legislation and policy measures that specifically address the issue of e-waste.
- Adopt a zero-tolerance policy towards the enforcement of environmental legislation, particularly with regards to hazardous waste.
- Introduce environmentally friendly taxes or levies on consumer and industrial electronic equipment to fund safe disposal at the end of the equipment's life cycle.
- Facilitate collaboration in research, advocacy and the media to tackle e-waste and climate change problems by sharing information about the environmental status in the country.
- Adopt internationally accepted indicators for e-waste and climate change and establish the required processes to collect and disseminate information for these indicators. ■

UGANDA

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Introduction

Uganda has been mentioned as one of the countries that have relatively low volumes of electronic waste (e-waste) – but it is likely to have a surge in e-waste volumes in the future. An assessment undertaken by the United Nations Industrial Development Organization (UNIDO) and Microsoft in 2008 indicates that in 2007 around 300,000 PCs were installed in Uganda; 75% of them in governmental, educational and non-governmental organisations. It was estimated that around 15% of computer imports enter the country as second-hand computers and in 2007 up to 50,000 personal computer units might have reached their end of life, though only a small portion seemed to appear in the waste stream.[1] E-waste flows from personal computers alone are expected to increase four- to eight-fold by 2020.[2]

E-waste management is a new area in Uganda and there is limited public awareness on the potential hazards posed by e-waste to human health and the environment. Like in most developing countries, infrastructure for e-waste recycling is limited and there is no appropriate solution for recycling, treatment and disposal of hazardous fractions. Unproblematic fractions from computer waste, such as plastic and metal, can be recovered in existing recycling facilities, but hazardous fractions such as leaded cathode ray tubes (CRTs) and capacitors containing polychlorinated biphenyls (PCBs) and other toxic substances need new solutions. The entire country has only one incinerator at Nakasongola.

However, there have been a number of advances towards the management of e-waste, with some companies establishing refurbishing facilities. In 2008 Uganda Green Computers Company Ltd. (UGCCL), a computer refurbishment and e-waste recycling initiative, was piloted in Uganda with the ultimate goal of providing small and medium enterprises with access to affordable quality hardware in Africa, and to build a "green" recycling industry.[3] UGCCL is a joint venture between the government of Uganda, UNIDO and Microsoft.

Policy and legislative context

Uganda's constitution commits the state to protecting its natural resources through national objectives XII, XXI and XXVII.

Objective XII commits the state to protecting important natural resources including land, water, wetlands, minerals, oil, fauna and flora on behalf of the people of Uganda. Objective XXI commits the state to taking practical measures to promote a good water management system at all levels. Objective XXVII, dealing with the environment (i-iv), commits the state to:

- Promoting sustainable development and public awareness on the need to preserve the environment for present and future generations.
- Effective utilisation of natural resources and preventing or minimising damage and destruction to land, air and water resources resulting from pollution or other causes.
- Promoting and implementing energy policies that ensure that people's basic needs and those of environmental preservation are met.
- Protecting important natural resources, including land, water, wetlands, minerals, oil, fauna and flora on behalf of the people of Uganda.

Uganda has no specific e-waste legislation. However, there are national laws and international conventions and guidelines to which it is signatory that have a bearing on e-waste. They include, among others:

- The National Environment Act 4/1995 which provides for sustainable management of the environment, including establishing an authority as a coordinating, monitoring and supervisory body for that purpose.
- The National Environment (Standards for Discharge of Effluent into Water or on Land) Regulations S. I. No. 5/1999 which regulate the management of waste.
- The National Environment (Solid Waste Management) Regulations S. I. No. 52/1999 which regulate the management of solid wastes.
- The Water Statute 9/1995 which provides for the use, protection and management of water resources and supply.
- The National Environment (Delegation of Waste Discharge Functions) Regulations S. I. No. 56/1999 which provide for monitoring and implementation of standards.
- The National Environment (Management of Ozone Depleting Substances and Products) Regulations S. I. No. 63/2001 which regulate management of ozone-depleting substances.

1 Wasswa, J. et al. (2008) *E- Waste Assessment in Uganda: A Situational Analysis of e-Waste Management and Generation with Special Emphasis on Personal Computers*, UNIDO, Microsoft and Empa.

2 StEP (2010) Urgent Need to Prepare Developing Countries for Surge in E-Wastes. www.step-initiative.org/news.php?id=0000000131

3 UNIDO (n.d.) Electronic Waste (e-Waste): Threat and opportunity. www.unido.org/index.php?id=268

- The Waste and Hazardous Waste Management Regulations (2000) which regulate the management of wastes and hazardous wastes including: sorting, disposing, transportation, packaging, labelling, internal movement, transboundary movement, notification procedures, and environmental impact assessments.
- The Environmental Impact Assessment Regulations S. I. No. 13/1998, whose objective is to collect, organise, analyse, interpret and communicate information that is relevant to the consideration of the initiation of a new project.
- The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal.
- The Vienna Convention for the Protection of the Ozone Layer.
- The Stockholm Convention on Persistent Organic Pollutants (POPs).

Banning second-hand imports in Uganda: A policy failure

E-waste drivers in Uganda include the continued growth of the telecom industry following liberalisation; growth in internet usage as a result of private and government initiatives in the deployment of wireless access infrastructure; lack of e-waste-specific regulations in the National Environment Act; and high taxes on brand-new electronic goods, with the exception of computers, where there is a zero taxation policy.[4]

The government's introduction of a zero tax policy on the importation of computers in 2007 has had a bearing on the large portion of imported second-hand computers that have increased the waste stock, given that their life span is short compared to new computers. In 2009 Uganda was reported as the first East African country to ban the importation of second-hand electronics: a positive step in safeguarding the environment. The ban was welcomed as a measure that would stop the dumping of old scrap into the country, given that there are no defined standards to monitor e-waste disposal and few private investors in e-waste management.

However, the ban has met a lot of criticism from stakeholders in the ICT industry who think it is likely to lock out the majority of people from accessing ICT services, since brand-new computers are expensive. The policy is also said to be unrealistic since it does specify the technology but not the age of the items to be banned.

Some of the views expressed by members of the I-Network Dgroup[5] on the ban include a suggestion to combine proper accredited disposal facilities with incentives that encourage delivering discarded hardware to these centres, rather than merely banning second-hand ICT equipment. Others saw e-waste as an opportunity, given that it contains valuable materials, and that there are e-waste companies being established that will enable safe disposal with proper techniques and equipment. It was also suggested that the cost of recycling computers should be built into the price, and that it becomes a vendor's responsibility to take care of e-waste, as is done elsewhere in the world.

The ban has had a negative impact on the activities of refurbishing companies and organisations that depend on importing used computers. Non-governmental organisations that provide used computers for the education sector were hit hard.[6] An example of such an organisation is Camara,[7] an Ireland-based NGO that sources used computers from Irish and British companies and individuals. It cleans data off the hard drives, and refurbishes and loads them with educational software, before setting them up as learning centres in schools in Africa and Ireland. After the ban, Camara stopped importing used computers and offering training temporarily.

In March 2010 a review of the ban on importation of second-hand electronics was proposed. A more targeted approach to banning technology that is harmful to the environment, instead of uniform application to all second-hand electronics will be considered. There is a need to establish more infrastructure and mechanisms to handle waste streams if the aim is to reduce the unmanaged growth of e-waste.

E-waste practice in Uganda

E-waste management practices in Uganda are largely crude and can be categorised as collection, refurbishment, recycling and disposal.

According to the National Environment Management Authority (NEMA) there is no formal collection of e-waste in Uganda. Informal collection of obsolete computers exists where individuals survive on selling scrap from computers for cash to plastic plants, or metallic components to informal vendors.

Informal computer refurbishing[8] appears to be well developed and some of the major informal refurbishing centres include Computer Facilities, Global Tech Computer Distributors Uganda Ltd. and SMB General Suppliers.

Few formal e-waste refurbishers[9] exist in Uganda. Examples are:

- Second Life Uganda and Interconnection Uganda, both major commercial refurbishment centres.

4 Mugisha, E. (2009) E-Waste Management in Uganda: Current Perspectives, paper presented at the e-Waste Management Forum: Circulating Success, Cairo, Egypt, 9-10 February.

5 www.i-network.or.ug/newsletter/newsletter-q2-2009/minister-announces-the-ban-on-old-computers.html

6 Nakkazi, E. and Musoke, R. (2010) NGOs importing used computers may close as ban bites, *I-Network Newsletter*, January-March. www.i-network.or.ug/newsletter/q1-newsletter-2010/ngos-importing-used-computers-may-close-as-ban-bites.html

7 www.camara.ie

8 Informal refurbishers are small companies and individuals who do upgrading of operating systems, exchange peripheral hardware like keyboards and mouses, and provide local tech support, repair and customer service as well as distribution of computers.

9 Formal refurbishers are commercial refurbishment centres where used computers are imported and refurbished for resale.

- Midcom Service Centre, a Nokia-authorised customer-care centre established in 2006, has set up mobile phone "take-back" collection points at all its centres and does refurbishment in-house.
- UGCCL offers a full life-cycle model, which includes the return of the refurbished PCs to the centre at the end of their useful life, disassembling the hardware and reuse of the working hardware components. High-value material like copper and circuit boards is sold. The centre locally recycles simple materials such as steel and plastics, and works with regional or global recyclers for the proper disposal of substances such as lead glass. Its best practices will be replicated across the region. UGCCL's target for local refurbishment is 10,000 PCs per annum. Each refurbished computer is loaded with Microsoft software and costs about USD 175.[10]

There are recycling options for different waste streams generated by a PC (the plastics, ferrous metals, aluminium and copper). Plastic plants are extending their operations to include plastics from e-waste. They buy computer casings from informal collectors and from Kampala City Council landfills. Examples of such plastic plants include Plastic Recycling Industries Uganda and Sunshine Plastics.

A few metal recycling plants exist, such as Steel Rolling Mill and Shumuk Aluminium Industries. There are no recycling options for hazardous e-waste fraction such as cathode ray tubes and lead glass. As mentioned, UGCCL works with regional or global recyclers for the proper disposal of these substances. There are no informal leaching activities that extract precious metals from e-waste (e.g. gold recovery).

Downstream vending is a common practice and vendors engage in resale of whole units, refurbishing for reuse, dismantling into parts, and selling copper components to local welding practitioners.

Kampala City Council and municipal councils in other urban towns are responsible for collection and disposal of solid non-hazardous waste at designated landfills. Even with such systems in place control measures to ensure separation of plastic waste are not sufficient. Outdated waste disposal methods lead to polluted groundwater, contaminated soil, air pollution from the burning of plastics, and risks of getting cancer among people who work and live around the recycling and dump sites. Even though no communities or individuals are reported to have been affected by the e-waste problem, there is a need to come up with appropriate measures of handling e-waste.

On the other hand, a wide range of valuable materials contained in e-waste including silver, gold, palladium, copper and indium can turn the recycling of e-waste into a lucrative business opportunity. Boosting e-waste recycling rates can also have the potential to generate employment opportunities, as is the case with metal and plastic waste.

Summary of challenges

Existing practices (both formal and informal) are, however, faced with a number of challenges: sourcing of e-waste remains a problem locally; publicity of the functions carried out by the refurbishment centres is still weak; e-waste is not accorded the same importance as conventional waste; high investment costs and costs related to environmental compliance are a disincentive to e-waste recycling; and recycling centres could be overwhelmed by a sudden surge in e-waste supply given their current size.

Solving the problem of e-waste requires a comprehensive framework that looks at issues around policy and legislation; technology and skills; and business and financing,[11] around which a number of challenges exist in Uganda:

- The lack of a specific legal framework, low national/government priority, and uncoordinated enforcement of e-waste-related laws.
- Lack of environmental health and safety standards, the strong influence of the informal sector, lack of collection infrastructure, cherry-picking activities, and low skills and awareness.
- In relation to business and financing, limited industry responsibility, high costs of logistics, possible exploitation of workers from disadvantaged communities, and false consumer expectations.

New trends

In a very recent development, an e-waste management policy for Uganda[12] is being developed and first round consultations regarding the draft policy have been finalised. Currently the Ministry of ICT has called for comments and inputs from stakeholders to improve the draft policy. The e-waste management policy will provide specific legislation for proper management and disposal to safeguard human health and the environment against potential hazards.

The national e-waste policy will have the following objectives:

- To provide for establishment of e-waste facilities in the country.
- To mobilise and sensitise the government, private sector and communities on the proper management and handling of e-waste on a sustainable basis.
- To provide specific e-waste laws and regulations from the acquisition and handling to the final disposal processes.

10 EMEA Press Centre (2008) Computer Refurbishment Centre Opens for Business in Kampala. www.microsoft.com/emea/presscentre/pressreleases/UgandarRefurbPR_12062008.mspx

11 Schluep, M. et al. (2009) *Recycling – From E-waste to Resources*. www.unep.org/pdf/Recycling_From_e-waste_to_resources.pdf

12 Ministry of ICT (2010) Draft Electronic Waste Management Policy for Uganda, Draft V6.4.

- To develop a critical human resource base knowledgeable in handling e-waste.
- To provide for resource mobilisation for efficient management and disposal of e-waste.
- To provide guidance on the standards of ICT equipment that is imported into the country.
- To establish incentives for encouraging both local and foreign investors to establish e-waste facilities in Uganda.

This policy aims at enforcing several strategies for e-waste management that include the establishment of e-waste management infrastructure, awareness and education, human resource development, and resource mobilisation.

Private initiatives/pilot projects on e-waste management[13] are being established. A case to note is a programme run by Computers for Schools Uganda (CFSU), an NGO that collects obsolete computer equipment from individuals, educational institutions and other organisations. This has been achieved through creating awareness about the dangers of e-waste among communities and requesting them to surrender obsolete computers, as well as by creating incentives such as exchanging one free computer for every seven to ten obsolete computers. CFSU collects, sorts, dismantles and refurbishes computer units or components that are in good condition. Plastic and metallic components are resold to local metal/plastic recyclers, refurbished parts are reused to fix computers at schools, while more complex components like motherboards and hazardous parts are forwarded to their partner Computers for Schools Kenya (CFSK) for further processing and disposal respectively. Over 970 obsolete computers have been collected in this pilot project supported by the International Institute for Communication and Development (IICD) and Close the Gap.

Although CFSU has received good responses from some regions, individuals and institutions, they are faced with the challenge of a lack of willingness by the Ugandan population to dispose of e-waste (high value is attached to computers even when obsolete). This is attributed to a lack of awareness and further explains why much of the e-waste in Uganda is reported as still in stock. CFSU is also faced with the challenge of rigid public procurement and disposal procedures. "Delays in decisions to dispose are so frustrating," notes Joel Kamba, the operations officer of CSFU.[14] Other challenges include lack of government support for local initiatives, a hectic process of approval and certification to handle e-waste by NEMA, and high transport costs.

Another notable trend is the growing interest in the issue of e-waste. For instance, face-to-face and online discussions are increasingly featuring e-waste. An example of such discussion platforms is the I–Network Dgroup that gives an opportunity to members to discuss current issues related to ICTs. E-waste and related policy issues are some of the topics that have featured on the discussion list this year. Some of the views expressed about the ban on importation of second-hand computers, for example, included:

> Let us advocate for new and affordable computers. Why can't we think of assembling them in Uganda instead of importing "junk"? (Aramanzan Madanda, Assistant Lecturer, Makerere University)

> ….[W]e are tired of Africa being a dumping ground for American and European crap! But not many Ugandans can afford brand-new computers. I agree on regulation of trade in used computers but I am not sure we will be able to get PCs to 10% of Uganda if we go brand new. I would suggest we walk before running. (Mutaremwa Frank)

Action steps

Given the volume of e-waste in storage and likely to be generated, the government needs to urgently address the e-waste problem to avoid the risks of an unmanageable e-waste informal sector and more informal dumping, with all its social and environmental drawbacks. Some of the action steps that need to be taken include:

- Publicity and awareness about the potential hazards of e-waste to human health and the environment.
- Putting specific e-waste policies and laws in place.
- Establishing more infrastructure for formal collection, recycling and disposal of e-waste.
- Using incentives to promote e-waste "take-back" schemes.
- Capacity building in pre-processing, such as manual dismantling of e-waste.
- Providing financial incentives to allow the informal sector to still participate in "safe" recycling processes, with hazardous operations transferred to formal recyclers.
- Pre-inspection and verification of e-waste consignments prior to shipment.
- Establishing e-waste management centres of excellence and building on existing organisations working in the area of recycling and waste management (e.g. Uganda Cleaner Production Centre).
- Cleaner production training as a preventive strategy for solving the e-waste problem for stakeholders (e.g. electronic goods dealers, collectors and refurbishers, vocational institutions, local authorities, lead agencies, statutory bodies, etc.).
- Encouraging partnerships with civil society and the private sector. ■

13 www.cfsu.org.ug/services.html#ewaste

14 Kamba, J. (2010) Surrender Obsolete Computers for E-Waste Management, *I-Network Newsletter*, January-March. www.i-network.or.ug/newsletter/q1-newsletter-2010/surrender-obsolete-computers-for-e-waste-management.html

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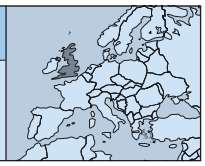

Introduction

As the sixth largest developed economy in the world, a large part of the UK's infrastructure is dependent upon information and communications technology (ICT) for its operation. More recently, the economic value of ICTs and consumer electronics has formed an increasingly important part of the national economy in its own right. As a result, over the last two decades, the ecological footprint of ICT use has changed significantly. This has been driven by three trends:[1] firstly, the continued growth and diversification of mobile communication devices and the new applications that this has created; secondly, the growth of online services as a part of everyday life, and the development of broadband networks to support this; and finally, the effects of the switchover to fully digital broadcast systems[2] and the large turnover of appliances that this has created.

Regulating e-waste

Following the privatisation of the national telecommunications provider in 1984 and the opening up of access to the communications network with liberalisation in the 1990s,[3] the use of telecommunications networks has grown rapidly. In late 2003 the Office of Communication[4] was established, merging the existing media and communications regulators, to create one body to regulate all fixed, mobile, broadcast radio and television, and broadband internet communications services. A major part of its remit has been to supervise the switchover to digital broadcasting services. Analogue transmission of terrestrial television is scheduled to end in 2012, and a target date has been set to end analogue radio transmissions by 2015.[5] The commitment to provide all homes with a broadband connection has also been a policy of government, supported by the industry, over recent years, but the date for this has slipped due to the economic recession – from 2012 to 2015.[6]

As a result of new communications and entertainment devices coming onto the market, and the digital switchover creating a larger turnover of electrical goods, there has been a large increase in the amount of electronic waste (e-waste) requiring disposal. Contrary to the government's belief that many people would retain their old equipment and buy conversion kits, as the date for the final switchover approaches, many local authorities are seeing a surge in the amount of e-waste requiring disposal.[7] As with the problems the UK experienced with the "fridge mountain" a decade ago,[8] there has been little planning in order to develop more reclamation sites to process this waste.

Britain enacted the European directive[9] on waste electrical and electronic equipment (the WEEE Directive) in 2006.[10] The purpose of these regulations is to prevent electrical and electronic goods being disposed of as part of the municipal waste stream, and to develop dedicated collection and recovery systems to ensure they are disposed of with the least harm to the environment. However, the system is highly fragmented, with local authorities, retailers and private contractors all having responsibility for collection and disposal of e-waste. Consequently there is no way to collect data effectively and to track e-waste movements within the UK. This lack of collection data permits abuse of the system[11] and hampers the regulatory authorities when they try to pursue and bring enforcement actions against those breaching the regulations.[12] Recent investigations have demonstrated that e-waste from the UK is being shipped to unregulated disposal sites in Africa and elsewhere.[13]

The regulation of e-waste is, at this moment, rather complex since there is an overlap with the regulation of hazardous substances and hazardous wastes. A lack of co-ordination means that there is little strategic oversight of the issue. At present the national waste strategies do not have a strategic overview of how e-waste will be managed in the future, and all available data is based upon estimates rather than statistics from collected waste. In England[14] (Northern

1 ONS (2007) *Focus on the Digital Age*, Office for National Statistics. www.statistics.gov.uk/downloads/theme_compendia/foda2007/FocusOnDA.pdf

2 en.wikipedia.org/wiki/Digital_terrestrial_television_in_the_United_Kingdom

3 UtilityWatch (2003) *The History of Telecommunications*. www.utilitywatch.co.uk/documents/History-of-Telecommunications.pdf

4 Office of Communications (Ofcom) www.ofcom.org.uk

5 Robinson, J. (2010) Ed Vaizey's praise for digital radio stops short of switch-off date, *The Guardian*, 8 July. www.guardian.co.uk/media/2010/jul/08/ed-vaizey-digital-radio

6 Wearden, G. (2010) Broadband target put back to 2015, *The Guardian*, 15 July. www.guardian.co.uk/technology/2010/jul/15/fast-broadband-target-put-back

7 Vaughan, A. (2009) Rise in dumped TVs due to digital switch-over, figures show, *The Guardian*, 4 November. www.guardian.co.uk/environment/2009/nov/04/tv-dump-digital-switchover

8 BBC (2002) Row over £40m fridge 'mountain', *BBC News*, 20 June. news.bbc.co.uk/1/hi/uk_politics/2055285.stm

9 en.wikipedia.org/wiki/Waste_Electrical_and_Electronic_Equipment_Directive

10 Environment Agency (2010) *NetRegs: Waste electrical and electronic equipment (WEEE)*. www.environment-agency.gov.uk/netregs/topics/WEEE/default.aspx

11 Pearce, F. (2009) Greenwash: WEEE directive is a dreadful missed opportunity to clean up e-waste, *The Guardian*, 25 June. www.guardian.co.uk/environment/2009/jun/25/greenwash-electronic-waste-directive

12 Warren, P. (2009) Organised crime targets waste recycling, *The Guardian*, 8 July. www.guardian.co.uk/technology/2009/jul/08/recycling-electronic-waste-crime

13 Milmo, C. (2009) How a tagged television set uncovered a deadly trade, *The Independent*, 18 February. www.independent.co.uk/news/world/africa/how-a-tagged-television-set-uncovered-a-deadly-trade-1624873.html

14 DEFRA (2007) *Waste Strategy for England*, Department for the Environment, Food and Rural Affairs. www.defra.gov.uk/environment/waste/strategy/strategy07/index.htm

Ireland, Wales and Scotland have their own strategies), current trends mean that the amount of e-waste requiring disposal is estimated to rise from 2.3 million tonnes per year in 2010 to three million tonnes per year in 2017.[15]

Ecological impacts of energy consumption and the developing information society

Britain was one of the few developed states to meet its commitments under the United Nations Framework Convention on Climate Change (UNFCCC)[16] to reduce carbon emissions to 1990 levels by the year 2000. While this achievement was technically true using the arithmetic of the UNFCCC, in reality the total impact of the UK's ecological footprint has grown consistently over this same period. From the point of view of the UNFCCC's calculations, the reduction was achieved because, from the late 1980s, the UK's electricity supply system switched from coal to natural gas as its major source of fuel, and for space heating in homes and commercial buildings[17] – and as the utilisation of natural gas is more efficient this led to a reduction in carbon emissions. In reality the ecological footprint of the UK has grown because, at the same time as the change in the energy system occurred, a large proportion of the UK's manufacturing industry was moved offshore, and the increase in the use of consumer products over the last 30 years has largely been supplied from outside the UK. Because of this, the increase in emissions that these goods create does not apply to the UK's results in the data returned under the UNFCCC, but instead forms part of the emissions of other states.[18] Recent academic research estimates the real increase in carbon emissions since the 1990s, due to the expansion of economic activity in Britain, at 19%.[19] Research carried out for the Department of the Environment[20] suggests that these "hidden" embodied emissions from *all* imported goods and services could add as much as 40% to the UK's official statistics on carbon emissions – that's about 200 million tonnes per year above what is reported to the UNFCCC.

A significant factor in the expansion of Britain's ecological footprint has been the increased level of expenditure on consumer goods and services. As incomes have risen, and the costs of traditional consumer goods (clothing, food, etc.) have fallen, the British public have had a higher level of disposable income – a process also assisted by the easy availability of consumer credit. For example, there are more than 77 million mobile phone subscriptions in the UK,[21] mobiles now account for just under half the calls made, and the value of mobile communications to the UK economy is between 2% and 3% of national income.[22] Over the last decade mobile phone ownership more than quadrupled, from around 18% to 80% of all households, and the number of households with internet connections rose from around 10% to 65%.[23] Since 1970 the expenditure of British households on "communications" (a term that encompasses fixed and mobile phones as well as digital entertainment and data communications) has increased by 1,132%.[24] As a result of these and related consumer trends, British households today use 55% more energy for lighting and appliances than in the 1970s.[25]

It is forecast that by 2020 nearly half the electricity used in homes will be used to power information, communication and entertainment devices.[26] The digital switchover has been one of the drivers of this trend. Two thirds of homes now have a digital TV service,[27] and new digital displays can use up to three times the amount of power of the analogue screens that they are replacing. The use of set-top boxes and digital recording devices adds to the electricity load. This growth has in turn negated the increased efficiency of modern electrical goods. For example, two decades ago most households had only one TV set, but today a third have two sets and just over a tenth have four.[28] Consequently, while individually these devices are more efficient than ever before, it is not having an impact on overall energy consumption because more are in use at any one time.

As a result of the speedy adoption of digital communications, Britain is also top of the European league for purchasing goods and services online,[29] as well as having the most active online population with the highest average number of daily visitors (21.8 million), the highest usage

15 DEFRA (2007) Annex C10, *Waste Strategy for England,* Department for the Environment, Food and Rural Affairs. www.defra.gov.uk/environment/waste/strategy/strategy07/documents/waste07-annex-c10.pdf

16 en.wikipedia.org/wiki/United_Nations_Framework_Convention_on_Climate_Change

17 DECC (2010) Long Term Trends, *Digest of UK Energy Statistics*, Department for Energy and Climate Change. www.decc.gov.uk/en/content/cms/statistics/publications/dukes/dukes.aspx

18 IISD (2008) *Embedded Carbon in Traded Goods*, International Institute for Sustainable Development. www.iisd.org/pdf/2008/cph_trade_climate_carbon.pdf

19 Helm, D., Smale, R. and Phillips, J. (2007) *Too Good To Be True? The UK's Climate Change Record.* www.dieterhelm.co.uk/sites/default/files/Carbon_record_2007.pdf

20 SEI (2008) *Development of an Embedded Carbon Emissions Indicator*, a research report to the DEFRA by the Stockholm Environment Institute and the University of Sydney. randd.defra.gov.uk/Document.aspx?Document=EV02033_7331_FRP.pdf

21 Mobile Operator's Association (2010) *History of cellular mobile communications.* www.mobilemastinfo.com/information/history.htm

22 O2 (2004) *The Contribution of Mobile Phones to the UK Economy.* www.o2.com/media_files/news_100504.pdf

23 ONS (2010) Table 6.9, *Social Trends 40,* Office for National Statistics, p. 82. www.statistics.gov.uk/downloads/theme_social/Social-Trends40/ST40_2010_FINAL.pdf

24 ONS (2010) Table 6.3, *Social Trends 40,* ibid., p. 78.

25 ONS (2010) Household energy use for lighting and appliances rises 155 per cent, Office for National Statistics news release, 2 July. www.statistics.gov.uk/pdfdir/stenv0710.pdf

26 Owen, P. (2007) *The Ampere Strikes Back: How consumer electronics are taking over the world*, Energy Saving Trust. www.energysavingtrust.org.uk/Publication-Download/?p=4&pid=1085

27 ONS (2010) *Use of ICT at Home*, Office for National Statistics. www.statistics.gov.uk/cci/nugget.asp?id=1710. The latest statistical research on UK digital services is available from Ofcom, *The Communications Market Report,* August 2010: stakeholders.ofcom.org.uk/market-data-research/market-data/communications-market-reports/cmr10

28 ITC (2003) *The UK Television Market: An Overview,* Independent Television Commission. www.ofcom.org.uk/static/archive/itc/research/industry_info_june03.pdf

29 ONS (2010) Figure 13.4, *Social Trends 40,* op. cit., p. 188.

days per month (21 per user) and the highest average time spent per month per user (34.4 hours).[30] This in turn has challenged the traditional print media and music industries. For example, while subscriptions to digital entertainment services and downloading digital music are rising, the numbers reading a daily printed newspaper have almost halved over the last two decades.[31]

The problem with quantifying the impact of computers and digital communications in general is that the global reach of the network makes it difficult to attribute impacts to specific locations. Another difficulty is that the impacts we measure at one moment in time will soon be invalid due to the high level of growth in the use of networked services.[32] Today the internet and its associated gadgets and hardware are using about 5% of global electricity production,[33] and producing as much carbon as the airline industry.[34] Recent studies commissioned by the European Union[35] estimate the total electricity drain of ICT at about 8% of EU electricity generation, equivalent to 98 megatonnes (or 1.9%) of EU carbon emissions. This is projected to rise to 10.5% of electricity production in 2020 (the figures for the whole EU are likely to be roughly accurate for the UK individually).

New trends

It is important to note that, compared to the UK's total carbon emissions, the impact of ICTs and similar electrical and electronic goods is not the major carbon emitter. Research from the Carbon Trust[36] shows that communications and recreation between them account for much less than a third of the UK's carbon emissions. For this reason dealing with our carbon emissions is a far more difficult issue than changing our use of consumer electronics and ICTs, and will require structural change to both the UK economy and British lifestyles.

The difficulty in finding a way to reduce the impact of the ecological footprint of ICTs is that – due to changing technologies, and inconsistencies between the way the impacts of the production, use and disposal are assessed – there is a divergence of views on where the impacts of ICT lie. For example, many studies, even those by environmental advocates,[37] cite the figures produced by a twelve-year-old survey carried out for the European Commission; this states that 20% of the impact of computers takes place during production and 80% during their use by consumers.[38] More recent research states the split as nearer 50:50,[39] or tips the balance wholly the other way stating that 80% is due to manufacturing and 20% due to use.[40] Other approaches stress the economic and managerial component of developing more "sustainable" ICTs,[41] while others put greater weight on the toxic impacts of production (such as Greenpeace's *Guide to Greener Electronics*).[42] If we assume that ICTs are no different to other aspects of the developed world's lifestyle, then other studies of ecological impacts usually put the greatest burden on the production side of the equation rather than use.[43] This makes it difficult, from the consumer's position, to significantly change the level of impacts through personal change – instead we have to look to significant changes to production methods, and to significantly extending the service lifetime of goods.

As the main determinant of our use of ICTs is the health of the general economy, the present uncertain economic outlook holds the greatest potential to produce a change in the pattern and ecological footprint of their use. Certainly within the UK, due to the changing nature of our growing economic and energy supply problems,[44] how we develop our use of ICTs in the future may be very different from the trends of the past twenty years. Our need to make difficult economic choices may create a higher priority to lower energy use and extend the service life of goods, both of which have a very positive effect on the ecological footprint of consumption.

30 comScore (2008) Study reveals internet usage in Europe, *FIPP*, 15 July. www.fipp.com/News.aspx?PageIndex=2002&ItemId=13692

31 ONS (2010) Figure 13.5 and 13.6, *Social Trends 40*, op. cit., p. 189.

32 Johnson, B. (2009) Web providers must limit Internet's carbon footprint, say experts, *guardian.co.uk*, 3 May. www.guardian.co.uk/technology/2009/may/03/internet-carbon-footprint

33 Thompson, B. and Wallace, J. (2008) Smarter bytes, slimmer footprints, *Green Futures*, 13 October. www.forumforthefuture.org.uk/greenfutures/articles/Smarter_bytes_slimmer_footprints%2B

34 Petty, C. (2007) Gartner Estimates ICT Industry Accounts for 2 Percent of Global CO2 Emissions, Gartner press release, 26 April. www.gartner.com/it/page.jsp?id=503867

35 Beton, A. et al. (2008) *Impacts of Information and Communication Technologies on Energy Efficiency: Final Report*, Bio-Intelligence Service for the European Commission. ftp.cordis.europa.eu/pub/fp7/ict/docs/sustainable-growth/ict4ee-final-report_en.pdf

36 Carbon Trust (2006) *The carbon emissions generated in all that we consume*. www.carbontrust.co.uk/Publications/pages/publicationdetail.aspx?id=CTC603

37 Madden, P. and Weißbrod, I. (2008) *Connected – ICT and sustainable development*, Forum for the Future. www.forumforthefuture.org/files/Connected.pdf

38 Atlantic Consulting/IPU (1998) *LCA Study of the Product Group Personal Computers in the EU Ecolabel Scheme*, European Commission. ec.europa.eu/environment/ecolabel/about_ecolabel/reports/lcastudy_pc_1998.pdf

39 Duan, H. et al. (2009) Life cycle assessment study of a Chinese desktop personal computer, *Science of the Total Environment*, 407 (5), p. 1755-1764. www.summer.ucsb.edu/rmp/2010SamplePapers/EnvironScience.pdf

40 UNU (n.d.) *Life Cycle Assessment of IT Hardware*, UN University. www.it-environment.org/about%20project%20-%20LCA%20of%20IT%20hardware.html

41 Mingay, S. (2007) *Green IT: The New Industry Shock Wave*, Gartner's Research. www.netdesign.dk/manedens-tema/telepresence/green-it-the-new-industry.pdf

42 Greenpeace (2010) *Guide to Greener Electronics* (15th edition). www.greenpeace.org/international/campaigns/toxics/electronics/how-the-companies-line-up

43 For example, Nijdam, D. S. et al. (2005) Environmental Load from Dutch Private Consumption: How Much Damage Takes Place Abroad?, *Journal of Industrial Ecology*, 9 (1/2), p. 147-168. www3.interscience.wiley.com/cgi-bin/fulltext/120129086/PDFSTART

44 Mobbs, P. (2009) Peak Oil, the Decline of the North Sea and Britain's Energy Future, presentation to the All Party Parliamentary Group on Peak Oil, 24 November. appgopo.org.uk/index.php?option=com_content&task=view&id=55

Action steps

- To reduce the ecological impacts of ICTs we need to take a much longer-term view of our use of technology. Where possible we should plan to use all electrical devices until they wear out or are incapable of working reliably – as most of the impact of ICT/entertainment appliances takes place during production, using electrical goods until they are physically unserviceable has a lesser impact than replacing them at an earlier date because of a perceived reduction in direct power consumption or increase in functionality. This will reduce resource consumption and e-waste production.
- The growth in the UK's ecological footprint for digital communications is not defined solely by technological change, but also by the growing number of TVs, mobile phones and other appliances in use today. As we develop the new "digital culture" we must repeatedly pose the question as to whether having quantitatively "more" of these devices is qualitatively "better" for society.
- When disposing of any electrical device it is important to check that the organisation/company accepting your waste takes steps to ensure that the materials are not shipped as e-waste to any nation which does not have the infrastructure to process it to the best available techniques. Lobbying for an independent auditing and standards body for e-waste contractors would be the best way, within the present legal system, to address the complexity of the e-waste issue. ■

URUGUAY

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Introduction

Uruguay is known for its early take-up of the information and knowledge society, particularly in the Latin American region, where it is considered one of the countries in the vanguard of information and communications technologies (ICTs). Such a situation generates new environmental challenges that are being attended to in the legislative field – through an important bill that has not yet been passed – and in other good practices carried out by different companies and educational institutions.

Policy and legislative context

Uruguay does not contribute significantly to global warming: it only generates 0.05% of global greenhouse gas (GHG) emissions, according to 2004 figures. However, it is very vulnerable to the adverse effects of climate change, which threaten the country's development. In fact, extreme events like floods, droughts and storms, all of which "affect the population, infrastructure, production, services, ecosystems, biodiversity, coast areas and in particular, agriculture," are becoming more frequent.[1]

For this reason, in May 2009, the National System for Climate Change Response[2] was created to coordinate several national public and private institutions working on climate change, including companies, universities, research centres, trade unions and governmental institutions. This agency created the National Climate Change and Variability Response Plan during 2009, and the first diagnostics and identification of vulnerabilities were established.

Regarding electronic waste (e-waste), a specific law has not been passed yet, although a 2008 bill proposes an e-waste management system. However, there are some laws indirectly related to the subject,[3] aimed at ratification of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal and regulation of the handling of hazardous waste.[4] The Ministry of Housing, Territorial Planning and Environment – with its subordinate department, the National Department of Environment – is the regulator and is responsible for ensuring compliance with environmental laws.

E-waste policy, legislation and practice

The number of PCs in homes in Uruguay has increased rapidly over the last years. Data show that in 2006, 24.3% of Uruguayan households had a computer. This figure rose to 35.3% in 2008 and to 44.2% in 2009.[5] Even though Uruguay has always been well positioned in the region when it comes to access to ICTs, part of this increase is due to the implementation of the *Plan Ceibal*, the first global experience in applying the One Laptop per Child (OLPC) project, an initiative of the Massachusetts Institute of Technology (MIT). As part of this project, 370,000 XO laptops, specially designed for OLPC, were distributed to all of the country's public primary school students, who were able to take the computers home. Beginning in 2010, a second phase of this project will start, during which laptops will be distributed to public secondary school students.

These facts will place Uruguay in a complex position in the future, since large amounts of e-waste are being and will be generated in the short to medium term. Currently, e-waste in Uruguay is treated as per general waste policies. Even though there is no official record, it is estimated that in 2007, 600,000 PCs were being used, and 100,000 are thrown away each year.[6]

Although it has not been approved, the 2008 bill that proposes the creation of an e-waste management system[7] is based on the principle of extended producer responsibility, in which manufacturers and vendors who introduce technologies to the market are legally responsible for the treatment that the devices receive after their useful life. Collection and recycling of e-waste would be delegated to administrators or public or private organisations, and once recycled, the manufacturers and/or vendors could use the useful parts again. The Ministry of Housing, Territorial Planning and Environment would be in charge of the final disposal of non-recyclable pieces, in order to avoid further impact to the environment. Fines between USD 3,500 and USD 12,000 are foreseen for those who do not comply with the regulations.

The reasons that were stated to justify the implementation of the abovementioned law refer to the level of danger posed by some components of e-waste and their impact

1 Ministry of Housing, Territorial Planning and Environment (2010) *National Climate Change and Variability Response Plan: Diagnosis and strategic guidelines*. www.inac.gub.uy/innovaportal/file/5207/1/Plan%20nacional%20de%20respuesta%20al%20cambio%20clim.pdf

2 www.presidencia.gub.uy/_web/cambio_climatico/Decreto%20238-009.pdf

3 Laws No. 16.221, No. 17.220 and No. 17.283, available at www.mvotma.gub.uy

4 As per Law No. 17.220, Article 3, "hazardous" waste is waste from any origin that due to its physical, chemical, biological or radioactive characteristics constitutes a risk to human, animal, plant or environmental welfare, whether it is imported, exported or domestically produced waste.

5 Based on the National Continuous Household Survey 2009. Abridged version available in Rivoir, A. L. and Escuder, S. (2010) *Sociedad de la Información. ¿En que estamos?*, p. 3. www.agesic.gub.uy/innovaportal/v/999/1/agesic/la_sociedad_de_la_informacion_en_estadisticas.html

6 40th Regular Session of the Committee on the Environment of the Senate of the Oriental Republic of Uruguay, 9 September 2008. www.parlamento.gub.uy/sesiones/AccesoSesiones.aspUrl=/sesiones/diarios/senado/html/20080909s0040.htm#pagina450

7 www.parlamento.gub.uy/websip/lisficha/fichaap.asp?Asunto=36842&FichaPrint=s

on the environment. It is also claimed that the amount of e-waste is increasing at three times the rate of other waste, particularly when it comes to discarded PCs. The bill refers to the lack of policies that specifically regulate e-waste. It also points out that the recovery of waste not only offers relief for the negative environmental impact, but would also relieve the economic responsibility for the institutions in charge of collecting the e-waste and its final disposal, which in Uruguay is currently conducted by municipal governments.

During the discussion of the bill, it was mentioned that several countries with similar problems donate obsolete equipment to underdeveloped or developing countries, a practice that also happens in Uruguay.

Several important political actors were consulted about the bill in its early stages. Controversial points included the expected low profits from recycling and the health of the workers who work with the materials. Even though the "three R's" (reduce, reuse and recycle) criteria are applied, it is felt to be inevitable that a surplus of material that becomes garbage is generated. In addition, Uruguay does not have the special technology required for the treatment of monitors and televisions.

Several people suggested the possibility of building a hazardous waste landfill in the north of the country, where the rocky formation rich in basalt would work as an impermeable wall. The treatment would be similar to the one that radioactive waste receives when it is buried in a proper landfill. However, the bill does not propose that agencies that decide on these initiatives – in particular the National Department of Mining and Geology – participate in the matter. The weakness of the proposal lies in the possible damage to the deep layers of the Guarani Aquifer, one of the most important drinking water reserves in the world.

To date, the bill has not been passed, although different organisations and people related to the recycling of e-waste are still being consulted. One of the reasons stated by the authorities regarding the difficulty in the application of the extended producer responsibility principle is the high percentage of clones and orphaned machines that are in the market, which makes it difficult to identify who is responsible for the final disposal of the device.

The Crecoel example

Although the legal aspect of e-waste has not been defined yet, there are several experiences and initiatives that are turning into successful projects. Crecoel serves as one good example.

Since 2004, Crecoel (Cooperative for the Recycling of Electronic Devices, as per the Spanish acronym) has been operating in the Industrial and Technological Park in Montevideo. The cooperative began with an agreement signed between the Inter-American Development Bank and San Vicente, a non-governmental organisation, and training was carried out in order to improve the working conditions of waste pickers.

This cooperative is the first endeavour specialised in dismantling technological devices (computers, printers, mobile phones, TVs, etc.). Its main clients are public and private companies, which pay for this service. The companies contact Crecoel through its website[8] or are referred by the municipalities. It is important to highlight that the service includes the transportation cost, and the final cost is 30-50% cheaper than using the municipalities, which also charge for picking up e-waste and disposing of it in special plants.

Individuals who deliver their domestic devices to be recycled do not have to pay, since the company only charges for volumes higher than a cubic metre.

Once the devices are dismantled, part of the materials are sent again to the companies that may reuse them as replacement parts, and other parts (ferrous metals and components) are sent to companies dedicated to the export of e-waste. One of these companies is Werba,[9] whose main market is China. Only 20% of the material that goes to Crecoel is thrown away – in secure environmental conditions which are monitored.

Testimonies from people related to this endeavour note several positive aspects regarding the ethical principles of Crecoel. First, it creates work in secure conditions for families who used to be waste pickers, often working in unhealthy conditions. Being a cooperative, it also encourages a horizontal, communal style of engagement with its members.

Finally, it is worth mentioning the difficulty they went through when trying to make the companies understand the need for charging for the service, given the lack of awareness of the importance of the treatment that this type of waste should receive.

New trends

We can identify at least three trends regarding the application of the "three R's" principle.

- *Art and Programming Workshop (TAP):*[10] As defined by one of its coordinators: "The aim is to create a space for the assimilation and learning of the required creative skills to build, assemble, design, and recover hardware and software; to demystify technology… and at the same time, to incentivise multidisciplinary teamwork and learn to communicate… in order to socialise the experience and be able to understand what the other person wants." In this sense, it is noteworthy that e-waste is used to teach how to create new devices in the workshops.

8 www.crecoel.com

9 www.werbasa.com

10 iie.fing.edu.uy/ense/asign/progarte

- *XO waste management and recycling:* The Logistics Department of Plan Ceibal, which belongs to the Technological Laboratory of Uruguay (LATU),[11] is currently working with Plateran S.A. – a logistical services company – to deal with the problems that arise from recycling the XO laptops. Among other things, the department is analysing the amount of e-waste that is being generated and will be generated in the future as a result of the children damaging them. The intention is to reuse all usable parts in the repair of the laptops, and increase the stock of spare parts through dismantling. In this way, the initiative aims to minimise future purchases of new spare parts.
- *Other recycling programmes:* Although still at an informal level, new recycling initiatives have started. For instance, the cooperative Reciclo PC, which is similar to Crecoel, is currently taking its first steps towards training its workers, as well as improving the quality of the recycling process. The problem faced by this cooperative is the lack of a fixed and secure place to develop its activities.

Action steps

- It is a priority to create awareness of e-waste at an institutional level, whether through the media or through formal education institutions, especially primary schools. We must remember that the recycling and treatment of technological waste in Uruguay, even though it has become more important over the last years, is still a new problem.
- It is necessary to encourage political will to approve the bill that deals with e-waste, as well as to provide support for waste separation, especially for small initiatives and social organisations. These initiatives often find it very difficult at first to cover expenses such as rent and tools to carry out the waste separation work in optimal health conditions.
- Re-educating and motivating consumers regarding e-waste is essential when it comes to shared responsibilities. Even though this is not a major problem in Uruguay yet (since before throwing away an obsolete device in general people try to resell or donate it), ICT users must be aware of the fact that they are a part of the recycling process. As a consequence, policies aiming to improve the relations between businesses and final users of technology should be implemented, as well as generating synergies that motivate users to recycle.
- Finally, we think that if it is possible to plan for the updating of access infrastructure – through the Digital Agenda of Uruguay, developed by the e-Government Agency for the Information and Knowledge Society[12] (AGESIC) – it should also be possible to include an e-waste management plan in this process for discarded technology. ■

11 latu21.latu.org.uy/es

12 www.agesic.gub.uy

UZBEKISTAN

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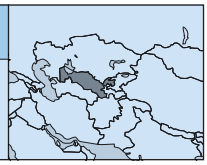

Introduction

Uzbekistan, undoubtedly, is amongst those countries badly affected by global climate change. Intensive climate warming is observed in the entire Central Asia region. The weather is warmer in summer as well as in winter. On average warming is occurring at 0.29°C per decade, which is twice as fast as the global average (0.13°C per decade since 1950).[1] A shortage of water supply and degradation of water and soil resources are burning issues in every part of the country. A considerable part of the arable land suffers from salinated groundwater and soil erosion. This in turn negatively affects the development of agriculture and other branches of the economy, and ruins the income of the rural population – which still represents the largest part of the Uzbek nation, with agriculture making up a substantial share of the Uzbek gross domestic product (GDP). There is a close connection between the quality of water and health and income of the local population. Almost a quarter of the population (six million people) is affected by the salinated water – a fact that was clearly demonstrated by World Bank and Asian Development Bank research.[2]

It is impossible to avoid mentioning another problem of the region: the Aral Sea disaster. The sea that is located in the very heart of Central Asia, and for ages actively shaped the climate in the region, is now on the verge of complete disappearance. Within the last 40 years, the total surface area of the sea has shrunk from 66,000 to 28,000 square kilometres, its volume has been reduced from 1,046 to 210 cubic kilometres and its average depth from 53 to 19 metres.[3] All this has happened due to an increase in the population from 14 million to almost 40 million in the said period, together with the impact of climate change. Two rivers (Amudaria and Syrdaria) that used to carry over 119 cubic kilometres of water into the sea, now, as a result of intensive use of water for agriculture purposes, can hardly supply a fifth of that volume. The Aral Sea basin has now turned into a new salted desert, called Aralkum, that along with two other deserts of the region (Kysylkum and Karakum) actively affect the ecological state of the country by supplying an additional 75 million tonnes of salt and sand,[4] dramatically decreasing the productivity of arable lands.

A United Nations (UN) report released in 2005 on human development in Central Asia stated that the complex ecological, socioeconomic and demographic problems in the Aral zone, such as the degradation of soil, the inferior quality of drinking water, the reduction of biodiversity, contamination of the atmosphere, and poverty of the population, are now so severe that they have become global issues.[5]

Policy and legislative context

The complicated environmental situation in the country and region as a whole called for immediate action. Grounded in a UN decision that declared the period 2005-2015 the International "Water for Life" Decade, Uzbekistan, together with neighbouring countries, acceded to the UN Convention on the Protection and Use of Transboundary Watercourses and International Lakes (1992)[6] and the Convention on the Law of Non-Navigational Uses of International Watercourses (1997)[7] that determined the main principles of the use of transboundary water reservoirs. It then developed a concept document proposing solutions to the problems arising in the Aral region with regard to the social and economic development of the region.[8]

The concept document provided for the following main activities in the field of climate change prevention:

- In arable farming: the accurate management of hydromelioration systems and strict discipline of water use with a view to further implementation of water preservation methods.
- In the communal sphere: upgrading of water supply and canal systems; the implementation of progressive sanitation equipment and water use standards.
- In industry: reduction of water use through the implementation of closed-cycle water use systems and the development of low water consumption technologies.

At the national level, the Uzbek legislature adopted the following key laws related to the environment:

- "On Forests and Forestry" (1999)
- "On Nature Protection" (1992)
- "On Water and Water Use"(1993)

1 www.uzembassy.ru/8000.htm

2 www.cawater-info.net/5wwf/national_report_uzbekistan.htm

3 arbuz.uz/w_aral_vv.html

4 iqtisod.zn.uz/148

5 www.ekois.net/wp/?p=4254

6 europa.eu/legislation_summaries/environment/water_protection_management/l28059_en.htm

7 en.wikipedia.org/wiki/Convention_on_the_Law_of_Non-Navigational_Uses_of_International_Watercourses

8 www.ca-econet.info/mfsa/14.htm

- "On Fauna Protection" (1998)
- "On Flora Protection" (1998)
- "On the Protected Natural Territories" (1994)
- "On the Protection of Air" (1997)
- "On State Sanitation Control" (1993).[9]

All of the above laws are being corrected and amended in response to the new challenges of constantly changing climate conditions. On top of this legislation – which includes statutory acts of subordinate legislation – the Uzbek government established a special body called the State Nature Committee that is responsible for control and management in the field of nature protection. It also deals with the use and reproduction of natural resources and monitors the general climate situation in the country.

Among the general statutory acts there are some tools of direct enforcement intended to deal with serious violations of rules. For instance, the Administrative Code in its Articles 65 through 96 allows for fines to be imposed on the public and officials in the amount of one to twenty times the minimum monthly wage. It describes unlawful activities such as spoilage of fertile soils (Art. 65); the violation of earth resources protection measures (Art. 70); violation of water resources protection (Art. 72); violation of water use and water consumption (Art. 74); violation of forests (Art. 77-80); violation of state-protected zones (Art. 82); contamination of the air and soil (Art. 85-88); and failure to respect requirements on the reinstatement of the natural environment (Art. 95).

At the same time, the Criminal Code of Uzbekistan contains an entire chapter dealing with crimes in the sphere of ecology and protection of nature (Chapter IV). The violator here can be imprisoned for a period of up to five years, while a minimum fine would be equal to 100 times the minimum wage on the date of the crime. The crimes described here include the violation of the norms of ecological preservation (Art. 193); deliberate concealing of the facts of environmental contamination (Art. 194); contamination of the environment (Art. 196); harm to the soil, forests and flora (Art. 197-198); violation of restrictions on the use of fauna and flora (Art. 202); and violations of the water regime (Art. 203).

While environmental laws already cover a good deal in the area of environmental protection, they constantly grow in number and scope of application.

Cooperation and global partnerships

As an answer to the challenges posed by climate change, the Uzbek government has entered into close cooperation with international institutions such as the United Nations Development Programme (UNDP), World Bank, Asian Development Bank (ADB), Swiss Agency for Development and Cooperation (SDC), British Council, ECOSAN International Fund, and GTZ.

Among the activities undertaken was an international conference organised in 2008 by the UNDP, World Bank and ADB in the Uzbek capital Tashkent, entitled "ICTs and Global Climate Change: Resistance to Pressure and Diversification".[10] The final document of the conference was entitled *Improvement of Planning and Management of Water and Land Resources*. This programme provided the following information and communications technology (ICT)-based measures to improve the ecological situation in Uzbekistan:

- Upgrading of the system for assessing and managing the quality of water resources
- Updating of hydro-ecological monitoring
- Institutional development in the sphere of water use and consumption
- Improvement of the technical state of melioration systems, and the development and implementation of water-preserving technologies
- Upgrading of knowledge and skills in the management of water and land resources
- Regular dissemination among the local population of information concerning climate change and the latest methods of resource preservation.

The issue of the common use of water resources from transboundary rivers was also discussed during the 13th International Water Congress held in Montpelier, France in 2008. The focus of the conference was on the Aral Sea and its impact on the population, flora and fauna, as well as the measures of international cooperation aimed at the alleviation of its negative consequences. An outcome of the conference was the development of the uniform strategy for the management of water resources among six countries of the region as well as the establishment of a Regional Communication Centre located in Tashkent for monitoring the climate and water situation. That centre was equipped with the latest ICT equipment and software, provided by the UNDP.

The participants at the conference also came to a common understanding that the successful implementation of its strategic aims is possible only if there is regular communication among the countries in the region when it concerns the management and consumption of water resources.

At a national level, activities in the field of climate change, sometimes focusing on ICTs, are also growing. The State Nature Committee of Uzbekistan, in cooperation with local private and public funders, develops and implements projects preventing climate change impacts and dealing with ecological crises (over 25 interventions have happened over the last five years). Several conferences were held in 2009, with titles such as: "The Aral region: Partnership for better social protection of population"; "Youth and innovative development"; "Change of Climate: Youth initiatives"; and "The

9 sreda.uz/index.php?newsid=375

10 www.ots.uz/ru/latest-news/59-news-of-uzbekistan/140-the-european-union

role of ICTs and the media in environmental protection and public health".[11]

The European Union is also active in the field. On 17 March 2010, a seminar entitled "Scientific and technical cooperation between the European Union and Uzbekistan: Priorities and opportunities for cooperation" was held in Tashkent under the patronage of the Uzbek Nature Committee. This was within the scope of the 7th European Commission Framework Programme on global strategic partnerships in ICT-related research.[12] The seminar was dedicated to the development of cooperation in scientific research in the sphere of ICT and environmental protection.

New trends

The development and implementation of new technologies in environmental protection at a national level, as well as their accessibility to every member of society, is one of the priorities of the state programme "Collaborative Development for the Year 2010".[13]

According to this programme, signed by the president in January 2010, from 2010 through 2012 the Uzbek government will implement measures towards better affordability and higher quality of ICT services for the population, including in rural areas.

In particular, USD 2 million has been allocated from the state budget for the development and modernisation of the international centre for packet switching run by Uzbektelecom. This centre will primarily be dealing with environmental issues and climate change.

A project on expanding internet channels using satellite runs until the end of 2011. USD 3 million has been set aside for this purpose.

The installation of special infrastructure for the development of environmental internet content, including data centres in all provinces of the country, is planned for the period 2010-2012. The estimated cost of the project is USD 1.4 million.

For the remainder of 2010, exhibitions, seminars, conferences and competitions have been planned, dedicated to implementation of ICTs in all spheres of life, including their use for environmental protection and prevention of climate change. As a special goal the activities this year will be focused on attracting the youth and explaining to them the necessity of personal involvement in environment protection activities.

Action steps

Taking into account the critical situation regarding the impact of climate change on everyday life in Uzbekistan and in the region, the task of elaborating environmental legislation so that it forms the legal ground for ecological protection appears to be more than important. The role of ICTs in that process cannot be overestimated.

To achieve this, the following should be done on a regional basis:

- A national strategy in each country of the region with respect to environmental protection and against climate change must be developed.
- The mechanisms of arbitration of cross-boundary disputes and reaching consensus in the environmental sphere must be produced and mutually agreed on.
- The extent of responsibility of each country as well as the share of economic participation in mutual environmental projects must be determined.
- Special bodies dealing with climate change must be established in each country and these structures must be in the closest possible communication with each other to be able to react mutually and immediately on each environmental challenge.
- The latest in ICT innovations must be used to achieve the above.

On a national level the following measures must be implemented:

- The creation of effective legal mechanisms that will promote environmental and health protection as well as ecological safety.
- The development and permanent upgrading of ICT-based systems for ecological education. Through this, the involvement of different public strata in the process of environmental protection must be achieved.
- The practical elimination of existing contradictions between natural resources acts and environmental laws by way of broad public discussion (ICT-based) among all relevant public institutions, private groups and international organisations practicing in the field.
- The development of a system of strict public standards in the field of environmental protection and air and water pollution, based on international standards and encouraging the reduction of anthropogenic pressure on the environment.
- The creation of judicial mechanisms for dispute resolution in the environmental sphere across all tiers of society.
- The creation of a system of ecological insurance.
- The harmonisation of domestic and international environmental laws by way of accession, ratification and implementation of the key instruments of international environmental protection. ■

11 www.regnum.ru/news/781984.html

12 www.ecosan.uz/units-116-107.ru.html

13 swiatelektroniki.com/index.php?mode=newsOut&newsId=2379

VENEZUELA

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Introduction

The following report is geared towards evaluating the use and management of information and communications technologies (ICTs) in Venezuela as one of the ways to resolve the problems that threaten the country's environmental sustainability. Particular attention was given to the melting of the glaciers that make up the Venezuelan Sierra Nevada as one of the critical issues that affect global climate change. The analysis of the problem allowed for the evaluation of public and private institutions and civil society with regard to the way they are dealing with climate change in Venezuela.

Environmental laws in Venezuela

In Venezuela there is a legal framework dealing with environmental management, governed by principles of sustainable development as a basic right and duty of the state and society. Among the laws and regulations that are considered related to climate change are:

- The Environmental Organic Law[1]
- The Environmental Criminal Law[2]
- Standards that regulate and control consumption, production, import, export and use of substances that deplete the ozone layer[3]
- Air quality and air pollution control regulations[4]
- Environmental assessment standards for activities that could lead to degradation of the environment.[5]

It is important to note that Decree No. 825 of May 2000 states that access to and use of the internet and ICTs in general is a priority policy for the cultural, economic, social and political development of Venezuela.[6] This decree is extended to all ministries, including the People's Power Ministry for the Environment.

The ministries of education, culture and sports, infrastructure, science, intermediate technology and industry are responsible for coordinating the implementation of Decree No. 825. In this sense, in the laws and regulations listed above, ICTs are included in the articles related to the rational use of resources. Additionally, Venezuela is actively participating in international conventions[7] with the aim of contributing to the reduction of gases causing the greenhouse effect as well as protecting the ozone layer.

Environmental context

In the following analysis, the melting of glaciers located in the Sierra Nevada in Mérida, Venezuela (which forms part of the Andes mountain range) was selected as a critical problem that is the result of global climate change. Currently, four glaciers have disappeared and two are in a process of accelerated melting, one located on Pico Bolivar or Bolivar Peak (Venezuela's highest peak), with an area of 7.48 hectares, and the other on Pico Humboldt, covering 35.61 hectares.

According to research conducted by Oriana Camacho, in the 1970s glaciers occupied 138.89 hectares of the Sierra Nevada of Mérida,[8] but currently cover only 43.09 hectares. It is estimated that under current conditions, they have a life expectancy of twelve to thirteen years and experience an average vertical retreat of nine metres a year.[9]

This retreat of the glaciers in the Venezuelan Andes is mainly attributed to rising temperatures. In studies conducted by the Inter-American Institute for Global Change Research on the retreat of glaciers in the American Cordillera (of which the Andes form one part), "the Antarctic Oscillation, the El Niño phenomenon and the Pacific Decadal Oscillation (PDO) are important factors that control the balance of glacial mass. The change in temperature

1 Gaceta Oficial Nº 5.833 de la República Bolivariana de Venezuela (2007) *Ley Orgánica de Ambiente*. www.minamb.gob.ve/files/Ley%20Organica%20del%20Ambiente/Ley-Organica-del-Ambiente-2007.pdf

2 Gaceta Oficial Nº 4.358 de la República de Venezuela (1992) *Ley Penal del Ambiente*. www.vitalis.net/Ley%20Penal%20del%20Ambiente.pdf

3 Gaceta Oficial Nº 38.392 (2006) *Decreto Nº 4.435 de la República Bolivariana de Venezuela: Normas para Regular y Controlar el Consumo, la Producción, Importación, Exportación y el Uso de las Sustancias Agotadoras de la Capa de Ozono*. www.vitalis.net/Normas%20para%20Regular%20y%20Controlar%20el%20Consumo...Capa%20ozono.pdf

4 Gaceta Oficial Nº 4.899 (1995) *Decreto Nº 638 26 de la República Bolivariana de Venezuela: Normas sobre Calidad del Aire y Control de la Contaminación Atmosférica*. www.vitalis.net/Normas%20sobre%20Calidad%20del%20Aire%20y%20Control%20de%20la%20Contaminación%20Atmosférica.pdf

5 Gaceta Oficial Nº 35.946 (1996) *Decreto Nº 1.257 de la República Bolivariana de Venezuela: Normas sobre Evaluación Ambiental de Actividades Susceptibles de Degradar el Ambiente*. www.vitalis.net/Normas%20sobre%20evaluación%20ambiental%20de%20actividades%20susceptibles%20de%20degradrar%20el%20ambiente.pdf

6 República Bolivariana de Venezuela (2000) *Decreto Nº 825: Se declara el acceso y uso de Internet como política prioritaria para el desarrollo cultural, económico, social y políticos de Venezuela*. www.cecalc.ula.ve/internetprioritaria/documentos/decreto_825.pdf

7 Gaceta Oficial (Nº 34.010, Nº 34.134, Nº 4.825, Nº 34.134), Convenios Internacionales. www.minamb.gob.ve/index.php?option=com_content&task=view&id=64&Itemid=98

8 In the state of Mérida, there are 70 peaks that are 4,300 metres or more in height; they are also the highest peaks in all of Venezuela. Of these, 54 are located in the Sierra del Norte, 14 in the Sierra Nevada of Mérida and two in the Sierra de Santo Domingo.

9 Camacho, O. (2004) Retroceso glacial y colonización vegetal en los nuevos ambientes periglaciares de los Picos Bolívar, Humboldt y Bonpland, thesis in Geography, Faculty of Forestry and Environmental Sciences, Universidad de Los Andes, Venezuela.

[also] has a significant impact on snowfall. The behaviours of the glaciers were clear signs of climate change."[10]

Added to this, in the last ten years in cities like Mérida the emission of greenhouse gases (GHGs) has accelerated and natural carbon reservoirs like forests have deteriorated. The most critical factors include: a) an increase in the number of vehicles, which congest the roads and increase GHG emissions, and b) a lack of awareness of environmental problems amongst the general public, and the unsustainable use of natural resources, such as increased logging and burning of the Venezuelan wilderness, irresponsible adventure sports that contribute to deterioration of high-mountain ecosystems, fishermen and hikers who leave tonnes of garbage behind them, and the construction of houses in national parks.

Climatological stations in Venezuela

One of the needs that exist in the area of climate change is the provision of reliable climate data. This includes having long-term accessible records, monitoring climate change with efficient technologies, and having the tools for storage and processing of data and promoting the exchange of climate information. Different organisations and institutions have been dedicated to the promotion and support of projects in this area, including the University of the Andes Centre for Scientific Calculations (CeCalCULA), the University of Bremen (Germany) Institute of Environmental Physics, the Center for Astronomical Research (CIDE), Sierra Nevada National Park, the National Institute of Agricultural Research, and the Ministry for the Environment. Among their projects are:

- *Bioclimatic Network of Mérida*[11] is a network that aims to facilitate access to information collected and generated by nine weather stations[12] installed in Mérida. The project includes a web-based bioclimatic information system, a centralised data management system and a meta-data management system. The weather stations[13] send data[14] automatically to computers, and include sensors to measure temperature, precipitation, relative humidity, solar radiation, soil moisture, and wind direction and speed. The network provides free access to the data, and public access through the web. This information allows researchers to evaluate the behaviour of glaciers, which represents a significant contribution to the management of climate information on the web.
- *Mérida Atmospheric Research Station (MARS)*[15] is part of a global network of monitoring stations that observe the status of and changes in stratospheric composition. MARS is installed on Pico Espejo,[16] which is located in the Sierra Nevada de Mérida near Pico Bolivar and has an elevation of 4,765 metres. MARS is unique because it offers one of the best observation sites for a tropical tracking station below 10° latitude. The data captured at the station is transmitted through a wireless network and stored in a data repository located in CeCalCULA. Researchers can then access the data via internet. MARS facilitates the exchange of climate information at the international level which strengthens the scientific research of glaciers.
- *GLORIA (Global Observation Research Initiative in Alpine Environments) Network*[17] is a network of high-mountain weather stations created in different countries to investigate the impacts of climate change on mountain environments. Its aim is to compare data from different mountains in the world. Currently in South America it is expected to install seventeen stations.[18] One station is situated in the Cordillera de Mérida, which will be managed by the University of the Andes Institute of Environmental Sciences and Ecology (ICAE). This will facilitate the long-term monitoring of data from the Cordillera de Mérida.
- *Government institution stations* encompass a total of fifteen climatological stations[19] administered by state agencies that handle valuable historical climate data to evaluate the behaviour of the Mérida glaciers. However, most Ministry for the Environment stations are inactive, including some run by the National Institute of Agronomic Research (INIA) of Mérida, which demonstrates serious weaknesses with regard to monitoring environmental problems.

New trends

In the last decade, Venezuela has suffered the vagaries of natural disasters (landslides,[20] floods, earthquakes, forest fires, etc.), energy problems (faults in strategic power plants, low water levels in dams, etc.) and environmental pollution, to mention the most outstanding problems. Confronting these situations has required the implementation of a series of short- and long-term measures in order to deal with the difficulties and to ensure a sustainable

10 Instituto Interamericano para la Investigación del Cambio Global (2010) *Derritiendo el hielo – Retroceso de los glaciares de la Cordillera Americana.* wwwsp.iai.int/files/communications/publications/communique/IAI_communique_2_2010_sp.pdf

11 Centro de Cálculo Científico de la ULA (CeCalCULA) (2005) *Red Bioclimática de Mérida.* www.cecalc.ula.ve/redbc/html/funcionamiento.html

12 www.cecalc.ula.ve/redbc/estaciones/estaciones_climaticas.html

13 www.hosmos.com.mx/fprod/davis.html

14 www.cecalc.ula/webclima/datos

15 Kunzi, K., Hochschild, G., Richter, A. and Wittrock, F. (2004) *Mérida Atmospheric Research Station, MARS.* www-imk.fzk.de/imk2/mira/Merida/MARS/SciSumMe.pdf

16 en.wikipedia.org/wiki/Pico_Espejo

17 Pauli, H. (2003) *Manual para el Trabajo de Campo del Proyecto Gloria.* www.gloria.ac.at/downloads/GLORIA_MS4_Web_espanol.pdf

18 www.gloria.ac.at/downloads/MemoriasCurso_GLORIA_Bolivia_200801.pdf

19 www.cecalc.ula.ve/redbc/estaciones/estaciones_climaticas.html

20 es.wikipedia.org/wiki/Tragedia_de_Vargas_(1999)

approach that involves political, social and environmental considerations, among others.

There are several ICT trends that are emerging in Venezuela, which are oriented towards a progressive way to overcome environmental problems, and support the necessary changes in the state to achieve sustainable development of the environment. Here are some key trends:

- Implementation of plans, programmes and public policies that promote sustainable development in the country with environmental criteria where ICT plays a decisive role. Since 2007 the government has implemented its Economic and Social Development Plan (2007-2013). Initiatives here are expected to deepen policies that: a) ensure the sustainable management of the biosphere, b) redesign the national system of science, technology and innovation to support programmes using ICTs, including implementing programmes for environmental education, c) ensure that production and consumption of energy contribute to the preservation of the environment, among others. The plan explicitly considers that it is imperative to pay attention to global warming and its effects, including water levels along the country's coastline.
- National warning systems using ICTs, which will interface with telecommunications networks from several nations and other national bodies or groups.[21]
- Automated weather stations to promote the exchange of critical information.
- Environmentally friendly mass-transit systems.
- Systems that control traffic congestion (intelligent traffic lights, etc.).
- An anti-corruption system for corruption control in public institutions to detect irregularities in the management of public property and to promote efficient use and development of environmental resources.[22] The feasibility of this system is supported by the Environmental Organic Law which establishes environmental audits as control mechanisms, including systematic, documented, periodic and objective assessments of the management of public institutions subject to regulation. The purpose of these is to verify compliance with the provisions of Venezuelan environmental regulations and conditions imposed by previous monitoring tools. Organisations such as CA PlaniGestion[23] offer auditing services and records of activities that degrade the environment. The implementation of ICT-based anti-corruption systems can be used by various bodies to ensure environmental sustainability and good use of resources.
- The promotion of cleaner industries.[24]

Action steps

Actions that need to be implemented in Venezuela include:

- Public policy: Strengthen current laws and regulations which explicitly mandate, at various levels of administration, the implementation of e-government and the use of ICTs when dealing with environmental issues[25] as a priority to ensure sustainable development.
- Awareness campaigns: Implement educational and information campaigns through web portals, email, chat, discussion forums, social networks, among others, to promote the use of web-based ICT services, mass transportation, clean fuels,[26] electronic waste (e-waste) recycling, efficient use of natural carbon reservoirs, and eco-sports and eco-fishing as a way to improve environmental conditions.
- Creating repositories with climate information and promoting the use of collaborative tools. This could include access to climate data via portals and software repositories in the interest of enhancing the exchange of scientific information and collaborative work. ■

21 Such as fire departments, civil defence, rescue teams, national, state and municipal governments, and the National Civil Aeronautics institute (INAC), among others.

22 The idea is to prevent illegal development concessions in national reserves, high risk areas, etc., which have caused irreparable damage to the environment.

23 www.planigestion.com/PlaniGestionEstudiosMinAmb.htm#AuditoríasAmbientales

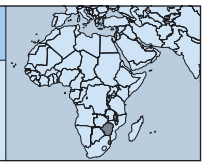
24 Revista Producto (2007) Paciente planeta: Industrias más limpias. www.producto.com.ve/286/notas/portada12.html

25 Ministerio de Poder Popular para el Ambiente, Proliferación de desechos electrónicos en el mundo. www.minamb.gob.ve/index.php?option=com_content&task=view&id=162&Itemid=99; Ministerio del Poder Popular de Energía Eléctrica (2010) Plan Nacional para Dar Respuesta a la Energía Eléctrica. www.minamb.gob.ve/files/EMERGENCIA-ELECTRICA.pdf

26 Revista Producto (2007) Paciente planeta: Cambio climático llegó a Venezuela. www.producto.com.ve/286/notas/portada9.html

ZIMBABWE

E-Knowledge for Women in Southern Africa (EKOWISA)
Margaret Zunguze
www.ekowisa.org.zw



Introduction

According to an International Telecommunication Union (ITU) online publication on "e-environment",[1] e-environment can be discussed in three main ways: the use of information and communications technologies (ICTs) as an instrument for environmental protection and the sustainable use of natural resources; the environmentally sustainable way of consuming, disposing, recycling and discarding hardware and components used in ICTs; and the use of ICTs in forecasting, monitoring and measuring the impact of natural and human-made disasters in developing countries. The Zimbabwean research component focuses on the environmentally sustainable way of consuming, disposing, recycling and discarding hardware and components used in ICTs – that is, electronic waste (e-waste).

How serious is the problem of e-waste in Zimbabwe?

In Zimbabwe, the numbers of imported electronic goods are increasing and the cost of purchasing is getting lower and lower. This research found that some of these electronic goods have a very short life span. This is confirmed by the United Nations Environment Programme (UNEP) through reports warning of a dangerous increase in the amount of e-waste, which is often simply dumped in waste disposal sites. These sites are usually frequented by the urban poor and unemployed scavenging for reusable plastics or metals for resale, posing serious health hazards to themselves as well as residents near the dumps. Developed countries manufacture millions of tonnes of products like computers, TV sets and mobile phones, as well as household appliances like refrigerators, microwaves, etc. Some of these products are exported to developing countries as new items but some, which are exported second-hand, are effectively dumped.

This research did not find any evidence of such wilful importation of electronic goods for dumping in Zimbabwe. This could be happening, however.

Disappointingly, this researcher found a very low level of e-waste readiness for Zimbabwe. Discussions with ministries and departments on ICTs, the environment and waste management revealed there is neither awareness nor preparedness at all on issues of e-waste management. As the section on policy and legislative issues will show, there is also no legislation on e-waste. With the removal of import duty, it only takes some unscrupulous businessperson to import e-waste and dump it in Zimbabwe under the guise of bringing much-needed technology into the country.

In the course of researching this article, the people interviewed initially did not think that Zimbabwe has a serious problem with e-waste. However, they changed their minds after a short exposé on the potential hazards contained in e-waste. In an Association for Progressive Communications (APC) issue paper on e-waste,[2] Alan Finlay wrote that there is a correlation between the economic strength of a country and the levels of potential e-waste. Finlay says that "in a strong economy, imported technology will be cheaper and old technology will be more readily replaced," in this way increasing the levels of e-waste. The converse could be true, so that in a recovering economy like Zimbabwe, electronic goods may be used for longer periods before replacement.

Although e-waste might not be a big issue now in Zimbabwe, it could soon become a critical issue. Companies, ministries and waste management services interviewed showed that they are just beginning to be aware of the potential hazards that e-waste poses. One ICT retailer said:

> Although prices of electronic goods have gone down, each purchase is a considerable opportunity cost [sacrifice of the enjoyment of another good]. So the purchaser will use that electronic good until it stops working. Once it has stopped working, one would take it to every dealer around town to get it working again. If all fails, one would still keep it in the house in the hope that someone somewhere would be able to repair it in the future rather than dump it.

Psychologically, people cannot really throw away electronic goods; they believe the electronic good could still have some value even in a non-functional state. Even if one was able to throw away the non-working electronic good, someone else would probably pick it up and try to make good use of it. So there is a sense in which, in this context, the possibility of electronic goods polluting the environment is very negligible.

Another respondent summarised the issue by saying, "Zimbabwe has a more advanced repair and servicing industry compared to most African countries. If you take it to *Siyaso,*[3] someone will be able to get that discarded electrical good to work in one form or another."

Harare has many shops that profess to repair any electrical good. The repair industry is very effective and most electronic equipment is either efficiently repaired or the parts are always reused in one way or another. Interviewees

1 Labelle, R. et al. (2008) *ICTs for e-Environment: Guidelines for Developing Countries, with a Focus on Climate Change*, ITU, Geneva. www.itu.int/ITU-D/cyb/app/docs/itu-icts-for-e-environment.pdf

2 Finlay, A. (2005) *E-waste Challenges in Developing Countries: South Africa Case Study*, APC, Johannesburg. www.apc.org/en/pubs/issue/e-waste-challenges-developing-countries-south-afri

3 A Zimbabwean phrase that means "Leave it like that, it works." This phrase is the name for the location in Mbare (a high-density suburb of Harare) where you find self-employed artisans who can fix anything and everything.

attributed this to the depressed economic growth in the country, which translates into fewer imports, forcing second-hand recycling companies to boom.

These sentiments may be true at an individual level, but it becomes another issue at the institutional level. Zimbabwe imports thousands of refurbished computers to equip its many schools through international bodies like Computer Aid International.[4] However, the life span of these refurbished computers is no more than three years. Through the years, schools, ministries and companies have stockpiled outdated computers that have long outlived their productive lives. Most of these institutions cannot dispose of the non-functional computer inventory due to limitations of writing off the goods from asset registers.

World Links Zimbabwe, an organisation whose focus is to facilitate the use of computers in pedagogy, encourages schools to bring obsolete computers to their workshop in Harare. World Links has a salvaging programme at its warehouse where computers are broken down to their basic parts; reusable parts are put back to use and the waste is sent to City Council municipal dumps and landfills. However, the cost of transporting these computers from remote locations to Harare is very high and there is no incentive to encourage schools to respond positively to the call. So these computers remain in cupboards gathering dust and taking up valuable space.

This state of affairs shows that although technical solutions may be available, there is a need for a legal framework, an organised collection system, logistics, and other services. The issue of e-waste needs to be discussed at national level to raise the general public's awareness and to identify places where old electronic goods could be collected for stripping down, recycling and safe disposal. As far as this research could ascertain, there is no formal institution designated to grind unusable e-waste products in Zimbabwe; maybe the individual stripping down of components and re-using the usable ones could be an effective way of dealing with e-waste and there could be no need for a formal institution to play this role. These issues could be addressed by a legislative framework on e-waste.

Dealing with hazardous waste

According to the World Computer Exchange,[5] "[a]n average computer may contain up to 1,000 toxins including lead, mercury, cadmium and other heavy metals that are known to cause damage to the nervous system, the brain, the kidneys, and can cause birth defects and cancer. It is estimated that up to 40% of heavy metals in landfills come from electronic equipment discards." The Waste Management Department of the Municipality of Harare has protocols of proper disposal for hazardous waste, but does not address the proper treatment of e-waste.

For the safe disposal of e-waste, toxic materials must first be removed. However, Zimbabwe does not have a facility that focuses on removing toxic materials from electrical goods. There is a statutory instrument on disposal of hazardous waste in general as discussed under policy and legislative processes below. Currently, companies pay a certain amount to the local waste management facility to dispose of hazardous waste substances in proper landfills. Both the Environmental Management Agency (EMA) and the Waste Management Department of the Municipality of Harare, institutions with the responsibility of waste management, agree on the need and urgency to draft procedures and processes necessary for the safe disposal of e-waste. Currently, there is no data on the percentage of e-waste or heavy metals in the landfills of Zimbabwe – another advocacy and lobby point for civil society organisations.

Environmental groups claim that the informal processing of e-waste in developing countries causes serious health and pollution problems. Zimbabwe, just like many developing countries in the world, is experiencing an increase in the take-up of ICTs.

Mobile technology usage has significantly increased, and mobiles are readily discarded due to rapid technological changes and their low average life span. Recently there has been an influx of cheap second-hand mobile phones on the market from the East. The availability of SIM cards means that anyone who wants to own a mobile phone can do so; many people now actually own more than one line. These developments are due to the relentless activities of the new Ministry of Information and Communication Technology that succeeded in removing import duty on electronic goods and reducing the cost of SIM cards to about the same amount as a loaf of bread.

Policy and regulation for e-waste

According to a report published by the UNEP Regional Office for Africa,[6] Zimbabwe signed the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal on 22 March 1989, but has not yet ratified it. The Basel Action Network's International Toxics Progress Report Card[7] also confirms that Zimbabwe has not ratified the Basel Convention. According to the UNEP report, since the Rio Earth Summit in 1992, Zimbabwe has carried out activities aimed at enforcing and strengthening existing legislation, the establishment of a radiation protection services department, the institution of a Hazardous Substances Control Advisory Board, and the introduction of hazardous waste management regulations and national guidelines for the disposal of hazardous waste for local authorities. The national priority, according to the report, is to promote the environmentally sound management of toxic chemicals through education and awareness, the development of a register of toxic chemicals as well as their classification, and the promotion of cleaner production technologies.

4 www.computeraid.org

5 www.worldcomputerexchange.org/ewaste

6 www.gridnairobi.unep.org/chm/roa/Country%20Profiles/Zimbabwe.doc

7 www.ban.org/country_status/report_card.html

The Hazardous Substances and Articles Control Act provides the legal framework for the control and management of toxic chemicals; there is however no mention of e-waste. There is therefore a need to raise awareness and lobby for the inclusion of e-waste management issues.

Discussions with the EMA revealed that there are no frameworks on e-waste management. EMA's mandate includes the engagement of multi-stakeholders in its quest to manage natural resources and protect the environment. The most recent legislation is Statutory Instrument 10 of 2007 which covers disposal of dangerous waste products.

Civil society's perspective

It is apparent that civil society organisations that work in the area of ICT for development need to take more active involvement in e-waste management issues. The immediate roles they could play could be to raise awareness on the critical issues of e-waste and hold discussions with local authorities involved in waste disposal. As an example, e-Knowledge for Women in Southern Africa recently held a two-day workshop for local councillors and business leaders in Masvingo city to discuss gender and ICT issues in the ICT bill. Issues on e-waste were raised and were received very enthusiastically as evidenced by the formation of the "Masvingo Citizens' ICT Task Force" made up of nine representatives from the business sector, government departments, local councillors, female informal trade leaders, women's group leaders, girls' group representatives and young men and women with ICT skills. The purpose of the task force is to follow up on ICT issues at a local level and strategise for local coordinated actions for the sustainable use and appropriation of ICTs. This is just one example of how civil society organisations can conduct advocacy and educate public authorities, ICT industry leaders and even work with legislators for the promotion of environmentally sustainable e-waste management and related processes at the local level.

Action steps

- Issues of e-waste need to be discussed and addressed in the review of the ICT Policy Framework which is currently underway.
- The ICT bill that is also under discussion should address issues of e-waste.
- Civil society organisations involved in ICT for development should get involved in the reviews of the ICT policy and the ICT bill and ensure that e-waste is adequately addressed.
- Private companies and even civil society organisations should be encouraged to engage in e-waste programmes and activities at the local level.
- Centres that encourage the general public to bring in non-functional mobile phones, chargers and other related discarded electronic goods should be set up in strategic places around the country, and package the e-waste in bulk containers for export to countries that specialise in e-waste disposal.
- NGOs could assist with the logistics of cost-effectively moving e-waste to collection centres.
- E-waste management content should be disseminated to the public (including youth and businesses) through various forums and networking platforms to raise awareness levels and collective action at local levels.
- NGOs could also work with the government to identify and strengthen electronic repair companies and encourage them to develop into effective electronic recyclers that understand e-waste issues.

This research actually became an awareness-raising activity that agitated for the need for action in the area of e-waste. However, a lot of work still needs to be done, as Zimbabweans collectively endeavour to find ways of consuming, disposing, recycling and discarding ICTs in environmentally friendly ways. ■

GLOBAL INFORMATION SOCIETY WATCH 2010

GLOBAL INFORMATION SOCIETY WATCH 2010 investigates the impact that information and communications technologies (ICTs) have on the environment – both good and bad.

Written from a civil society perspective, **GISWatch 2010** covers some 50 countries and six regions, with the key issues of ICTs and environmental sustainability, including climate change response and electronic waste (e-waste), explored in seven expert thematic reports. It also contains an institutional overview and a consideration of green indicators, as well as a mapping section offering a comparative analysis of "green" media spheres on the web.

While supporting the positive role that technology can play in sustaining the environment, many of these reports challenge the perception that ICTs will automatically be a panacea for critical issues such as climate change – and argue that for technology to really benefit everyone, consumption and production patterns have to change. In order to build a sustainable future, it cannot be "business as usual".

GISWatch 2010 is a rallying cry to electronics producers and consumers, policy makers and development organisations to pay urgent attention to the sustainability of the environment. It spells out the impact that the production, consumption and disposal of computers, mobile phones and other technology are having on the earth's natural resources, on political conflict and social rights, and the massive global carbon footprint produced.

GISWatch 2010 is the fourth in a series of yearly reports critically covering the state of the information society from the perspectives of civil society organisations across the world.

GISWatch is a joint initiative of the Association for Progressive Communications (APC) and the Humanist Institute for Cooperation with Developing Countries (Hivos).

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