Issue Bulletin

Initial Report of The Water Quality Working Group

United States Department of Agriculture
Second Quarter FY 1990

In the first third of the century, when the American public was barely aware of the importance of water quality, the U.S. Department of Agriculture (USDA) began to discover some of the relationships between the way we utilize land and the stability of water supplies. This led to concerted efforts in conservation. Later, as research in that area led to knowledge about what happens to water—how it travels above and below ground, what it carries with it, how its composition changes as it moves—water quality began to emerge as a key priority for USDA. Since the 1980's, USDA has taken a leadership role in forging cooperative efforts for water quality among its own agencies and with other government organizations, with the private sector, the academic community, and neighboring countries. USDA is working at the local, state, federal, and international levels, in both rural and urban environments, to correct conditions and practices that threaten our water supply. Not only does the department work with farmers and the food industry, providing educational and practical assistance; in addition many of the materials developed by USDA teach urban and suburban citizens about pollution from pet waste and excessive use of lawn fertilizers. Researching new methods of biological control of weeds and insects (reducing use of chemicals) is fundamentally important to USDA leadership in water quality, as is soil conservation, measurement, analysis and continuing development of ever more sophisticated methods.

USDA has an obvious interest in protecting the viability of the water supply as an agricultural resource. So too, farmers themselves have a vital interest in water quality -- the land they live on and will pass on to future generations can only be farmed if safe, dependable water is available. Similarly, farmers and their families are consumers, concerned about the food they eat and the water they drink. Agriculture depends on water more than on any other element. If our water supply were ruined, so would be our food supply.

In recent years emphasis on water quality has continued to grow, and, in fact, the President has put forward a Water Quality Initiative as one of his priorities for the 1990's. This report, the first of a series by the USDA Working Group on Water Quality, will describe actions currently underway to address water quality issues now and in coming years. It will also provide a review of past activities that have led up to the current USDA emphasis on water quality.

1990 and Beyond

USDA's response to President Bush's Water Quality Initiative is articulated in the department's aggressive strategic 5-year plan, with a goal of implementation beginning in 1990. Secretary of Agriculture Clayton Yeutter gave significant emphasis to the mission in naming Dr. Harry Mussman as chairman of the USDA Working Group on Water Quality. Dr. Mussman is deputy assistant secretary for science and education.

Under his leadership, USDA will implement the three major components of the President's initiative: 1) research, 2) data base improvement, and 3) education and technical assistance.

As agricultural priorities shift in response to increased environmental knowledge, understanding, sensitivity, and demand, USDA has a responsibility to assist the American farmer to adjust. American farmers have contributed in a constant, dependable manner to the well-being of their fellow Americans. Our country owes a great debt of gratitude to these dedicated producers of our life sustenance. Flexibility to respond appropriately and voluntarily to the need for change will be one of the most important aspects of implementing that change.

The farmer's most important need is information about what to do to protect ground water quality. That information, as well as education and assistance to help put it in place, is the basic thrust of the USDA Water Quality Plan.

Research, education, and voluntary cooperative efforts in testing, evaluation, planning, and decision making are key components in creating our future. From the farmer to the consumer, Americans have the right to expect responsible agricultural practices which are ecologically sound while also productive and profitable. That reasonable expectation is integral to USDA's mission.

All 50 states now have completed water quality action plans for both FY 1989 and 1990. Educational programs addressing soils, nutrients, pesticides, and water quality, as well as safe drinking water and water quality assessment will be evaluated and reported to the department, the executive branch, and the Congress.

A multiple-agency team will implement eight proposed demonstration projects and document the rate and extent of adoption of recommended practices with impact on water quality.

Another multi-agency team will develop and implement 37 non-point source hydrologic unit projects in FY 1990 and begin planning for an additional 37 projects in FY 1991.

Building on needs assessment conducted in FY 1989, staff are updating the USDA Technical Guides, working cooperatively with EPA to train federal and state staffs on water quality issues.

USDA is engaged in a cooperative project with EPA and the U.S. Geological Survey to develop pesticide use databases. These will be established for crops associated with major pesticide usage and will be updated on a 5-year cycle. Another cooperative USDA effort extends from government into the private sector to develop and deliver nationally materials in support of National Safe Drinking Water Week. Regional initiatives, also cooperative, include the Midwest Initiative, the Chesapeake Bay project, and programs in the Great Lakes, the Gulf of Mexico, the Colorado River, and Puget Sound.

Approaching publication in 1990 is the third installment of USDA's strategic groundwater research plan. Introduced in 1988, the first two parts deal with pesticide and nitrate contamination of groundwater. The new release will address salinity and toxic trace elements. A fourth installment, on biological pest control, is in development. This plan seeks to guide research leading to the continued safe and economical use of chemicals in agricultural production while diminishing negative impact on water quality. The challenge of the present is to ensure the future with environmentally sound and economically feasible agricultural management practices that minimize the movement of agricultural chemicals to ground water, while maintaining farm profitability — a balance vital to the economic stability of our nation as well as to the health of our people.

Bringing to bear a wide range of knowledge in this task, USDA will need to cooperate ever more closely with state research systems and agricultural experiment stations, with the Environmental Protection Agency and Department of the Interior, drawing upon expertise in agronomy, biology, engineering, economics, entomology, geology, hydraulics, hydrology, and a range of other scientific disciplines. Communication then becomes the key to making use of new knowledge.

An important cooperative effort resulted, in 1989, in the USDA Water Quality Program plan, in effect the department's road map for developing the science and technology needed to maintain or improve water quality in the years ahead. The plan has three major goals:

- Determine the precise relationship between agricultural activities and groundwater quality.
- Develop and transfer new technology and management practices that farmers and resource managers can use.
- Develop comprehensive, consistent, periodic national data on agricultural chemicals, related farm practices, and links with the physical environment.

USDA will first concentrate on the Midwest — the largest producing area in the country for corn and soybeans, both chemical-intensive crops in conventional production. Research will particularly focus on

five objectives:

1. Identify groundwater contaminants, find the starting point, and determine how they travel.
2. Develop water analysis methods to quickly and accurately ascertain contamination.
3. Develop production systems and pesticide disposal systems for onfarm use.
4. Enhance computerized decision models for farmers and technical specialists.
5. Evaluate economic and social effects of proposed changes.

USDA agencies, in cooperation with other federal agencies and the state agricultural experiment stations, will accelerate their activities through a repetitive cycle of research, development, education, and technical assistance. The goal: rapid development of scientifically based technology and rapid transfer of that technology into farm use. The time has come to translate on-shelf research knowledge into new management alternatives that farmers can use immediately. This will be done through demonstration projects already in the early stages. At the same time, continuing research is needed to develop improved science and technology — circling back through continuing education, technology transfer, and technical assistance to ensure that new developments can become the basis for enduring resource protection.

In very simple terms, USDA must offer the landowner reasonable alternatives for solving water resource concerns, must help farmers and ranchers understand and comply with federal, state, and local regulations, and must help nonagricultural people understand the agricultural perspective, in order to foster the most productive cooperation between all interested groups and individual American citizens.

The greater the flexibility allowed in the approach of the department and the food and agriculture industry to solving agricultural problems, the greater the potential for leadership and creativity in discovering the best answers and implementing them.

To understand the productive relationship of government and the industry in solving problems related to water quality, it can be helpful to trace its development backwards from the present.

USDA Initiatives in the 1980's

A shift began to occur in the 1970's, as USDA moved from flood prevention and drainage to water quality management. In 1982, the USDA National Conservation Program established water quality improvement as a national concern of the U.S. Department of Agriculture. Assessing the state of water quality had become part of six major long-term USDA priorities for the decade. The program included a goal of "...zero-level discharge of toxic pollutants as soon as possible" and set policy giving "highest priority to areas where the threat to human health and safety is greatest...."

The Conservation Reserve Program authorized under the Food Security Act of 1985 protects about 400,000 acres of wetlands. Over 6,000 miles of filter strips have been installed. Soil erosion is being reduced by over 675 million tons per year on the 34 million acres under 10-year contracts.

Also beginning in 1985, a department-wide survey of past hazardous waste disposal practices assessed the scope of those problems of a persistent nature. Then, in 1988, the department embarked on a multiyear program to remedy the problems uncovered in the survey.

From 1986 to 1988, as water quality and quantity became top priorities in USDA's 1988-98 National Conservation Program, the department developed comprehensive policy on nonpoint source pollution and on ground water quality, as well as creating strategies for training and technology development. Technical training accelerated in 1988, with regional workshops conducted in conjunction with a range of government, private, and academic institutions. The workshops laid the groundwork for field office training and for state action plans integrating water quality and quantity in field office technical guides.

Department policy developed in 1987 positions USDA in the proactive mode of taking responsible, appropriate, timely action to restore, preserve, and protect water quality in ways that preclude the need to regulate use of those chemicals essential to agricultural production.

In 1988, a USDA working group established by the secretary of agriculture set out to review USDA policy on agricultural chemicals and to develop strategies for management of these chemicals. Out of this effort grew the current USDA Working Group on Water Quality. Concurrently, funded for the first time in 1988 was the Sustainable Agriculture Program designed to enhance the long-term sustainability, profitability, and competitiveness of U.S. agriculture while reducing pollution of water supplies and hazards

to human health associated with excessive use of synthetic chemical pesticides and fertilizers. The Sustainable Agriculture program in 1989 included a total of 76 demonstration and research projects across the nation. Reduction of agrichemical use is a major component of each project.

Research continues on improved ways of reducing nitrogen contamination through improving the timing and amounts of fertilizer applications, accounting for "nitrogen credits" in the soil from the previous crop, and developing computer models as decision aids for farmers. One computer model, Water Erosion Prediction Project (WEPP), will help soil conservationists and farmers predict how much erosion will occur under various conditions of soil type and farm management. In the summer of 1989, field testing of WEPP began.

Continuing the Agricultural Conservation Program (ACP), with regular practices such as development of animal waste control facilities and water management control systems, an additional 53 water quality special projects have been funded just since 1988.

Early USDA Efforts

The American food supply is affordable, abundant, safe, and nutritious. Americans spend less of their income on food than almost any other society. Agricultural research, education, and technology in the United States make it possible for the 2 percent of the population who are farmers to feed the entire nation as well as many others. In some countries, as much as 60 percent of the population are engaged in farming and are unable to adequately feed the people. Reaching that level of efficiency in America resulted in part from reduction in crop loss through development of chemical pest and weed controls.

As chemicals became more vital to agriculture, USDA was given responsibility for enforcing the Federal Insecticide, Fungicide, and Rodenticide Act (providing registration of pesticides for agricultural and other use), until the early 1970's when the Environmental Protection Agency (EPA) was established.

Over the last 20 years, USDA has been working to develop alternatives to these chemical controls, because the department, in the forefront on water sampling, measuring, and evaluation, found that some of these chemicals were showing up in water resources along with pollution by non-agricultural contaminants such as construction, mining, and urban runoff, and industrial waste.

Even earlier, in taking on the challenge of conservation under the department's congressionally authorized Agricultural Conservation Program (ACP) in 1936, USDA began work in an area that eventually would have a profound relationship to water quality. The department formed a farmer-government partnership to ensure the present and future of our agricultural resources, providing cost-sharing assistance to farmers and ranchers to solve water resource problems, including both water saving and water quality enhancement practices.

Many of the earliest voluntary initiatives by USDA were designed to preserve the water supply and did not directly address water quality. Fortunately, these ongoing programs have had significant influence on water quality, such as the erosion control effort begun by the department in the 1930's, which not only helped with soil productivity and flood control but also reduced sedimentation and other water contaminants. Then, in the early 1960's, USDA launched a four-state study in the South, to assess farmer use of **conservation plans,** mainly terracing and crop rotation, to reduce soil erosion and manage water runoff. The results suggested that conservation plans were reducing soil erosion by about 132 million tons a year, contributing significantly to reduction of sedimentation of southern waterways.

Other USDA initiatives have addressed water quality over the years:

- upstream flood protection reducing sedimentation **(Small Watershed Program)**
- assessment of watershed conditions affecting water quality and quantity and wildlife habitat conditions **(River Basin Survey and Investigations Program)**
- reduction of water pollution in National Forests by monitoring condition of sanitary facilities (1970)
- preservation and improvement of major wetlands, including their water quality, as habitat for migratory waterfowl and wildlife (1972 **Water Bank Program**)
- a cooperative training program for pesticide applicators developed and implemented by USDA and the Cooperative Extension System (CES) to reduce excessive pesticide use and teach responsible and

environmentally safe application and disposal, reaching more than 1.5 million chemical applicators (**Pesticide Applicator Training,** PAT)

• educational efforts in every state to discourage indiscriminate pesticide spraying and help farmers shift to biological controls, with careful monitoring of pest populations and well-timed, precise application of agricultural chemicals (**Integrated Pest Management** program in the 1970's)

• a joint program in 1977 by seven USDA agencies and a division of EPA to evaluate several alternatives developed by states for water quality management, with voluntary farmer participation (**Model Implementation Program,** 1978-82)

• cooperative assistance to rural communities (**Resource Conservation and Development Program**)

• a snowmelt-runoff monitoring program for managers of streams, reservoirs, and lakes plus farmers and ranchers concerned about irrigation and stock water management, salinity control, and water conservation (**Snow Survey and Water Supply Forecasting Program**)

• resource protection for ranchers and farmers in 518 counties (**Great Plains Conservation Program**)

• joint USDA and U.S. Department of the Interior efforts (**Colorado River Salinity Control Program**)

• cooperative efforts with state and local agencies to provide soil maps and technical data needed in solving water quality problems (**Soil Survey Program**)

• the nation's most comprehensive study available on the condition and trends of soil, water, and related resources (**National Resources Inventory**)

• conservation and development of unreclaimed surface mines (**Rural Abandoned Mines Program**)

• an experimental cooperative effort between farmers and USDA in 21 watersheds to protect lakes, streams, and ground water in a practical manner (**Rural Clean Water Program**)

• an innovative, ambitious effort involving one-on-one technical assistance to landowners to provide farmers and ranchers information and detailed plans for conservation of their resources and improvement in water quality (**Conservation Technical Assistance** to individual landowners), with accelerated on-farm conservation planning.

USDA research, often in cooperation with state agricultural experiment stations, likewise has focused on water quality for some time. Accomplishments include control devices to trap sediment in streams, practical filters for reducing movement of feedlot nitrogen to surface waters, erosion control practices that reduce the movement of sediment and attached chemicals into surface waters, precision applicators and other nutrient management devices and practices that can greatly reduce amounts of nitrogen applied to crops, effective biological alternatives to synthetic pest control, environmentally safe methods of composting organic waste and disposing of sewage sludge, discovery of natural predators to control weeds, computer models for estimating environmental impact of alternative farm management practices, for example, CREAMS (Chemicals, Runoff, and Erosion from Agricultural Management Systems) and GLEAMS (Groundwater Loading Effects of Agricultural Management Systems), both developed by USDA and in extensive use internationally.

Educational efforts also have proven particularly effective. In 1975, USDA and EPA jointly published the manual "Control of Water Pollution from Cropland", which provides farmers and environmental planners with necessary information on the sources, causes, and potentials of various agricultural water contaminants. Prepared primarily by USDA scientists, it was the first in-depth treatise on these problems and remains a primary source of information and treatment methods.

Annually, more than three million farmers, homeowners, and gardeners use soil sample testing in order to avoid unnecessary application of fertilizers. USDA staff work with local public officials in rural communities to understand the relationship between water quality and local land use and to develop effective community strategies to protect water resources. Educating the food industry, USDA has been able to help food processors revise procedures and reduce discharge of wastes into community water systems. Educating the consumer and homeowner, USDA has focused primarily on safe drinking water, well-water testing, water use and conservation, safe disposal of household chemicals and pesticides, and waste and trash recycling, with emphasis on the potential impact of individual decisions on water quality. Many agricultural producers have been trained by USDA and have adopted Best Management Practices (BMP's), that is, the most effective practical means for preventing or reducing pollutants from nonpoint sources.

USDA's vigorous programs of education and technical assistance have helped farmers and ranchers apply these and other conservation and resource management practices in millions of acres of farm and ranch land across the nation.

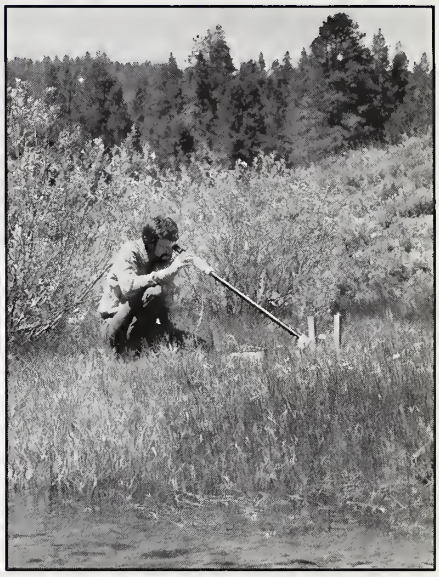
Epilogue

Through the years, USDA and the food and agriculture industry slowly and carefully have built a responsible, interactive, comprehensive effort toward protection of water quality. Those cooperative efforts are beginning to be reflected in measurable results. A tradition of voluntary compliance with USDA suggested conservation methods gradually has been established as educational efforts and technical assistance by USDA have permeated the industry. When the department was created, USDA's congressional mandate was to provide education to the agricultural community. That mandate is as pertinent today as it was in the 19th century. There is an ongoing need for knowledge. Now that we have reached the high level of agricultural productivity that our nation enjoys, we must continue to research and disseminate methods of production and distribution which are compatible with our relatively new knowledge about the fragility of our environment and which support the conservation of that environment.

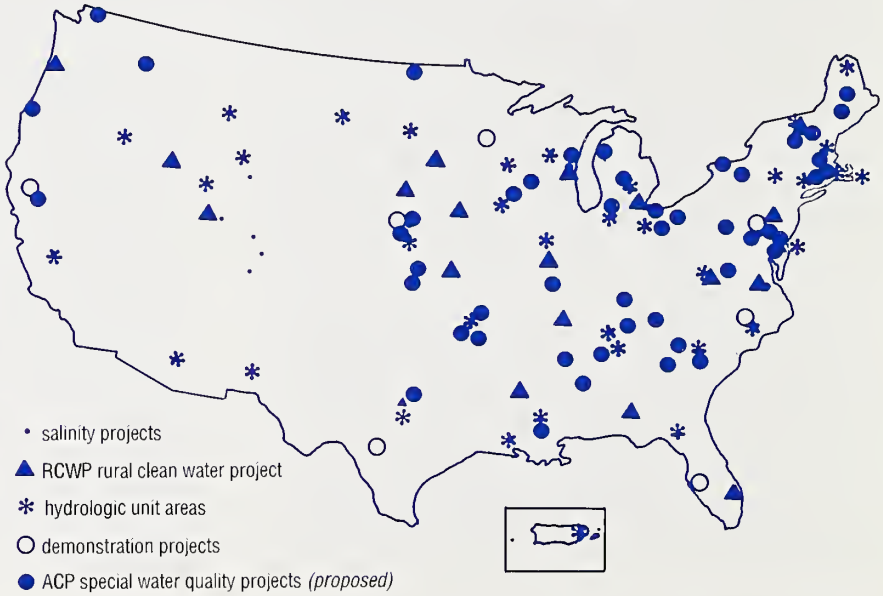
These are examples of biological controls that reduce levels of pesticides needed. From top: A sevenspotted lady beetle captures a pea aphid, one of its favorite dinners. (0678X780-17) A Mexican bean beetle larva becomes a meal for the spined soldier bug. (0484W406-3) The parasitic wasp Microplitis croceipes lays her eggs in a tobacco budworm. (88BW0705-14)

By combining two crops with different growth cycles in the same field, water and fertilizer requirements are reduced while maintaining economically attractive production levels. This is an example of a reduced input/sustainable agriculture practice. (KS-2053-32)

Pesticide-degrading bacteria on the surface of a grain of sand at Plains, Georgia. Original magnification of 5,000. (88BW1165)



Livestock grazing, logging, mining, road building, and recreational uses can harm streambank ecology. Without the plants needed to stabilize them, soil eroding from streambanks sends sediment down to clog drinking water reservoirs, reduce fish populations, and block hydroelectric dams. Tony Svejcar of USDA works on streamside root growth. (89BW1021-31).



Published by the Office of Public Affairs
(202) 447-8005

United States Department of Agriculture
Washington, DC 20250