

Status of amphibians

Amphibians are facing global threats and direct and indirect exploitation, in the face of rapid industrialisation and development. In the past decade, amphibian populations have declined drastically. Many of them have already disappeared, and others are on the verge of extinction. Some areas have witnessed local extinctions. There is pressure on the habitats of these animals. These are being degraded and converted into developmental and settlement sites. Wetlands, their main stronghold, are being changed into agriculture zones. Human alteration of landscapes has fragmented many habitats, which has resulted in direct area loss and reduced distributions of species. This patchiness impedes the movement of individual organisms among local populations, thereby increasing species loss.

The larval population is affected by the exposure of amphibian skin, which is extremely sensitive and permeable, to toxic chemicals and wastes released from industrial effluents.

Amphibians are also commercially used as food. Frog legs are consumed in many parts of the world.

Apart from such anthropogenic pressures, amphibians also face threats in the form of outbreaks of disease such as chitridiomycosis. These spread rapidly in the population, causing a high mortality rate, leading to malformation, deformities and even death of individuals.

Global warming may threaten frogs as well. Frogs rely on their environment to control the body temperature. Though some have adaptations to counter this, many do not and simply perish.

Their presence is greatly needed as they act as important predators and as prey in the food webs of many ecosystems. They are excellent indicators of the health of ecosystems. This has been attributed to their extreme sensitivity. Frogs secrete substances through their skin, some of which have been used to make new antibiotics and pain killers. We have in the past, successfully wiped out many powerful and large animals from this planet. It will be in no time that the gentle, miniature, weak and ill-fated amphibians also succumb to our increasing atrocities. The time has come for us to realise the significance of these tiny creatures and to take a small step ahead to make Earth a safer and better place for them to thrive in.

Natural Regeneration of Sandalwood (*Santalum album*) at the Nilgiri Biosphere Nature Park in Coimbatore, India

Bhuvanaragasamy Rathinasabapathy

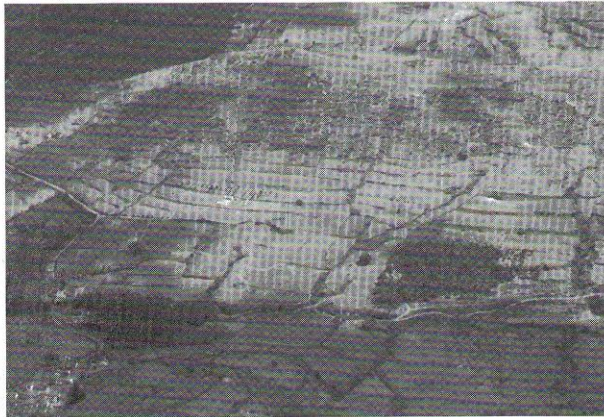
Sandalwood (*Santalum album*) is a medium sized evergreen tree found in dry forests tracts of the Decan Peninsula (Balasubramanian et.al., 2011). Although it is growing in small numbers in the Asia-Pacific region, India has a virtual monopoly over sandalwood production. Over 90 percent of India's sandalwood is grown in Karnataka and Tamil Nadu. Fire, grazing and exploitation of the wood for fine furniture, carving and oil are threatening the species. *S. album* is a Vulnerable (IUCN 2010) and threatened species in southern India (Ravikumar et al. 2000). A study was carried out in the Nilgiri Biosphere Nature Park (100 ha) at Anaikatt to assess the natural regeneration of sandalwood.

The Nilgiri Biosphere Nature Park (NBNP) is situated at Anaikatty (10°13' – 10°33' N Latitude and 76°49' – 77°21' E Longitude) 30 km west of Coimbatore city. NBNP established a Botanical Garden for the purpose of conserving the local fauna and flora of the Nilgiri Biosphere Reserve (NBR). The ecological restoration work was initiated in 1992 (Fig.1) with common species such as *Albizia amara*, *Dendrocalamus strictus*, *Carissa carandas*, *Ailanthus excels*, and *Erythrina variegata*. Since then year after year the planting activities has been increased and extended to around 40 hectares of land, which are in the middle of the hill slopes (Fig.2). Due to the continuous restoration activities in the last 19 years the soil PH 8 during 1992 has come down to 7 in 2007.

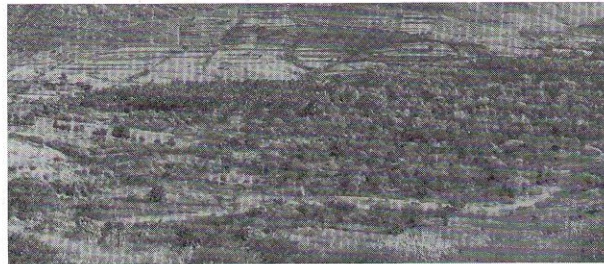
Restoration of deforested land will promote re-establishment of seed dispersal services across the landscape by facilitating animal movement and remnants provide a source of resources (Kanowski et.al., 2003).

The restoration project in 40 hectares has enhanced the seed dispersal from garden to forest and forest to garden. These provide a positive feedback through the dispersal of more seeds in the landscape and add to the species diversity by the immigration of species from neighboring natural forests. It is worthwhile to mention here that in the beginning there was no *Santalum album* at NBNP site. The survey was began in 2001 to enumerate

Blackbuck



Before initiating restoration (1992)
Photo courtesy: Mr. S. Karivaradhan



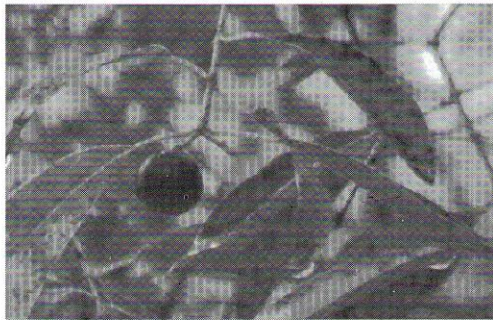
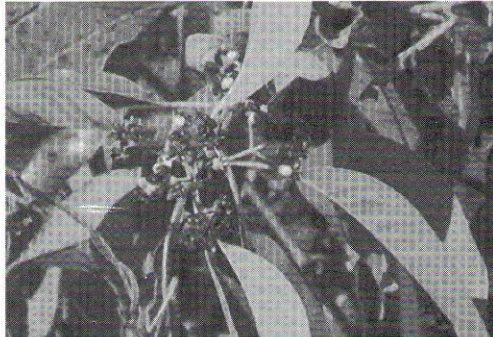
After restoration (2010)
Photo courtesy: Mr. K. Maruthachalam

Natural Regeneration of Sandalwood

the well grown sandalwood trees and the survey was repeated every year. The results shows an increase in population of *S. album* in the 100 hectares. The increase of *S. album* trees is due to the seed dispersal role of birds and small mammals (Rathinasabapathy, 2009, Balasubramanian et al 2011). Altogether a total of 720 *Santalum album* trees are marked in various girth class size is as follows above 20 cm 34 trees are matured individual, 10–20 cm 236 are immature trees, 1–9 cm 450 sapling and less than 1 cm are not taken in to the census.



A full grown *Santalum album* at the NBNP, Anaikatti



Flower and fruit of *Santalum album*

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