

Eden

helps restore

Thailand's

tropical forests

Eden's new overseas partnership project works with hill-tribe communities in northern Thailand to realise the dream that destruction of Earth's tropical forest can be reversed. As human populations increase, it seems inevitable that tropical forests will continue to be destroyed to meet the growing needs of humankind.

by **Stephen Elliott** and **David Blakesley**

The consequence is that much of Earth's biodiversity will also disappear, since more than half the world's plant and animal species depend on tropical forest habitats. Perhaps the outlook need not be so bleak, however. The Eden Project is now supporting a small group of researchers in Thailand who believe that tropical deforestation can be reversed.

Chiang Mai University's Forest Restoration Unit (FORRU), in collaboration with Britain's Horticulture Research International (HRI), is developing techniques to restore tropical forest to degraded areas in mountainous northern Thailand. Most remarkable, the project is achieving success within a small valley, containing a rapidly growing human population.

Mae Sa Mai village, in the Mae Sa valley of Doi Suthep-Pui National Park, is the largest Hmong hill-tribe community in northern Thailand. The village's expanding population is



The village of Mae Sa Mai nestles below the last patch of original forest in the valley. This forest protects the village's water source.

bringing enormous pressure to bear on the valley's natural resources, yet in collaboration with FORRU, the community has actually increased forest cover in the valley since 1996.

In the past, the Hmong cultivated opium poppies, which had low ecological impact. Because the crop had such high value, only small forest plots needed to be cleared to generate sufficient income. However, the social costs of drug addiction meant that this way of life could not continue. In the 1980s, drug suppression programs promoted alternative, but lower-value crops. The Hmong had to clear most of the remaining forest to earn the same income, leaving only tiny patches on steep slopes. Deforestation caused the village's water supply to dry up, so the community had to shift their settlement down the valley, where three streams still flowed from a surviving forest fragment. They realised that conserving this tiny watershed forest was vital for survival of their community. In 1981 the valley was declared part of Doi Suthep-Pui National Park. National park law states that people cannot occupy national park land, so to avoid relocation, the villagers would have to prove to the authorities that they could take care of the environment.

A few villagers formed the Mae Sa Mai Natural Resources Conservation Group, which gradually persuaded most villagers to cease cultivating the upper slopes of the watershed. Lychee orchards in the valley bottom were expanded and intensified, to raise average



Weeding and fertiliser application are necessary to accelerate tree growth.



A shaman gives thanks to the spirit world for a successful forest fire prevention program.



One of FORRU's researchers monitors seedling growth in the nursery.

incomes to 100 baht/person/day (about GBP 1.50), whilst the upper watershed was planted with forest trees. Initially tree planting was unsuccessful, so when the villagers heard about FORRU through the national park authority, they asked the unit to help.

FORRU was founded in 1994 to develop methods of restoring forest to degraded sites, for wildlife conservation and environmental protection. Initially, the unit carried out basic ecological studies of many of Doi Suthep's more than 680 indigenous tree species. Seasonal flowering and fruiting cycles of 100 species were recorded and germination tests carried out on more than 400 species. Nursery experiments determined the most effective container types, potting media and fertiliser treatments to raise seedlings, in the belief that good horticultural practices were vital for successful forest restoration.

Collaborating with Australian ecologist, Nigel Tucker, FORRU started to adapt the 'framework species' method of forest restoration (first developed in Queensland) to the ecological and socio-economic conditions of northern Thailand. Framework tree species are those that accelerate natural forest regeneration when planted out on degraded sites. They must survive and grow rapidly under harsh conditions and must rapidly shade out weeds. The planted trees re-establish forest structure and function. They also accelerate biodiversity recovery, by producing, at an early age, foods, nesting sites or other

resources, which attract seed-dispersing wildlife. Plants that grow from seeds, dispersed by wildlife, gradually restore the original plant species composition of the forest. FORRU's next step was to find field sites where candidate framework tree species could be tested. So, when the park authority asked FORRU to help the villagers of Mae Sa Mai reforest their upper watershed, FORRU seized the opportunity to combine the needs of science with those of a local community. The villagers asked FORRU to help them establish their own tree nursery, so FORRU sponsored construction of the village nursery and trained two of the villagers to test the feasibility of the propagation techniques developed in FORRU's research nursery.

By 1997, the project was ready to start field trials. Each year, with the support of Thailand's Biodiversity Research and Training Program, and now with sponsorship from Eden, plots are planted to test various mixtures of candidate framework tree species and their responses to different weed control, fertiliser application and mulching treatments. The biggest threat to the planted trees is fire in the dry season, so in mid-January, the villagers cut firebreaks around the plots and organise fire-lookouts until the monsoon rains begin. They also join with FORRU staff to monitor the planted trees and recovery of biodiversity.

Forest canopy closure can now be achieved within 2–3 years after tree planting and some of the species planted achieve mean heights of up to 7m, just 18 months after planting. Weeds



Villagers dress up for the Hmong New Year celebration, when boys and girls get to know one another by playing catch with decorated velvet balls.



Top: A blackened tree stump symbolises former forest destruction in the Mae Sa valley. Nine months after planting, the trees are just beginning to grow. The tall tree in the foreground is *Hovenia dulcis*.

Above: The same site 8 months later, after a second rainy season's growth, and the tree stump is almost obscured by the rapidly growing trees.

have largely been replaced with a thick carpet of leaf litter and wild pigs, deer and other wildlife have returned to the planted sites.

The project's success has won wide acclaim, but much remains to be done and Eden's support will be vital for FORRU's development. In the nursery, many propagation techniques have yet to be tested, including inoculating seedlings with mycorrhizal fungi and vegetative propagation of species that cannot be grown from seed. If the framework species method is to be used on a wide scale, seed storage and

training college, transferring forest restoration techniques to Agriculture Faculty students, who will become tomorrow's agricultural extension workers.

All this research is of no value unless the results are spread to all those involved in restoring Thailand's forests. In 2002 FORRU and HRI successfully obtained funding from Britain's Darwin Initiative to do just that. A full-time education team will provide weekly activities for schools and visits for schoolchildren and their teachers to FORRU's

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distribution methods must be devised.

However, perhaps the most important question is, can FORRU's success in the Mae Sa Valley be reproduced elsewhere? So far, FORRU has concentrated on evergreen forest sites at upper elevations, mostly because such areas support the highest biodiversity. However, demand for restoration of deciduous forests, at lower elevations, is growing. The tree species composition of such forests is very different from that of evergreen forestland. Eden's support is now enabling FORRU to establish deciduous forest plots within the campus of the local teacher

nurseries and field sites. Community groups, NGOs and government organisations will receive training in forest restoration techniques at bi-monthly workshops.

FORRU and Eden share similar goals. Both projects educate people about the vital links between humankind and the plants with which we share our world, and both are concerned with developing horticultural techniques to grow tropical forests under challenging conditions. Working together, perhaps Eden and FORRU can turn the pipedream of reversing the decline of Earth's tropical forests into a reality.