

## HIGHLAND FORESTS

*By David Blakesley and Stephen Elliott*

Destruction of tropical forests is widely acknowledged as one of Earth's most serious environmental problems. The consequences of this on-going environmental disaster, including degraded water catchments, losses of biodiversity and worsening rural poverty have been well documented. Particularly at risk are the seasonally dry forests of Southeast Asia's highlands. Despite levels of biodiversity, which often match those of many tropical rain forests, the seasonally dry tropical forests of Southeast Asia's monsoonal belt are thought to be more endangered than equatorial rainforests. In response to this problem, several countries in the region have banned or restricted commercial logging in remaining areas of primary forest and added former logging concessions to their already extensive protected areas systems. Now, the problem is that even these so-called "protected" forests are often too degraded to meet the need for healthy, natural forest that is capable of supporting viable populations of wildlife. It is becoming increasingly apparent that attempts to protect remaining forest are not enough. To save Southeast Asia's tropical forests, destruction must not merely be halted, but actually reversed.

Restoration of highland forests is urgently needed across the region to ensure a sustainable future for both wildlife and local people and to fulfil national policies and international commitments to maintain the diversity of life on our planet. Ecological restoration is rapidly becoming an important tool in conservation biology, to conserve biodiversity, restore environmental services (e.g. water supply, biological control and so on) and to provide benefits for people (e.g. food, firewood, medicinal plants and so on). WWF and IUCN have proposed the

all-encompassing concept of 'Forest Landscape Restoration', which aims to re-establish ecological integrity and enhance human wellbeing in degraded forest landscapes. In order to be successful, such an approach requires an effective technique to rapidly restore forest ecosystems to degraded areas.

In response to these issues, the Forest Restoration Research Unit (FORRU) of Northern Thailand's Chiang Mai University, in collaboration with Britain's Horticulture Research International (HRI), has been adapting the 'framework species method', to restore seasonally dry forests to degraded watershed sites in the mountains of Northern Thailand. This method was first conceived in the wet tropical lowland rainforest of Queensland, Australia (Goosem and Tucker 1995). The basic structure and functioning of forest ecosystems are rapidly re-established by planting mixtures of 20-30 carefully selected native forest tree species (both pioneer and climax simultaneously). Subsequently, biodiversity is restored by the planted trees attracting seed-dispersing animals into planted sites. The essential characteristics of framework tree species are therefore: high field performance (survival and growth rate) in degraded sites; dense, spreading, crowns that shade out herbaceous weeds and provision of resources that attract seed-dispersing wildlife (e.g. fruits, nectar, nesting sites and so on) at an early age. In areas susceptible to wildfires during the dry season, an additional consideration, is resistance to burning or recovery after fire such as coppicing ability etc.

Framework species should also be easy to propagate in nurseries by local people with simple technologies. They should have reliable seed availability; preferably rapid and synchronous germination and rapid growth of seedlings to a plantable size (50-60 cm) in less than a year. High quality seedlings are important, as they have the best chance of surviving in hostile deforested environments.

Consequently it is essential that good horticultural practices are adopted.

Selecting candidate framework species for FORRU's field trials required extensive background studies. Germination trials and monitoring of early seedling growth were carried out on 400 tree species indigenous to Doi Suthep-Pui National Park (DSPNP). A detailed study was carried out of tree flowering and fruiting phenology, involving 100 tree species and descriptions, drawings and photographs have been made of fruits and seedlings of potential framework species. An herbarium collection of dried seedling specimens was established, along with computer databases of seed, fruit and seedling morphology. Germination was tested and seedling performance was monitored in the nursery and after planting out in degraded areas. This enabled compilation of species production schedules. DSPNP is itself a location of recognised conservation importance, due to its high diversity of tree species. With more than 600 tree species suited to a wide range of soil and climate conditions, DSPNP could provide a valuable seed source for forest restoration projects outside of the park.

Planting trials in 1995-1997 enabled identification of some species likely to perform well in degraded sites. Without such basic background information, it would have been very difficult to make sensible choices as to elect candidate framework species for more extensive field trials. Based on all these studies, framework species have been planted in field plots annually since 1997 in partnership with an Hmong hill-tribe community resident within DSPNP. FORRU helped the villagers to establish their own community tree nursery to test the practicability of the new nursery methods developed in the research nursery, in a village environment. The planting trials were designed to provide a quantitative assessment of the degree to which various tree species meet framework species criteria

and helped to establish appropriate standards for the selection of tree species for forest restoration. Canopy closure can now be achieved within 2-3 years after planting. Weeds have largely been replaced with a carpet of leaf litter and wild pigs, deer and other wildlife have been observed in the planted sites.

Our core research program is sponsored by the Biodiversity Research and Training Program (a Thailand Government fund) and Britain's Eden Project. Demand for the information generated by FORRU has become overwhelming. New knowledge arising from the research is being disseminated to a wide range of groups/individuals involved in forest restoration, by a complementary project "Education and training for restoring tropical forest biodiversity" funded by Britain's Darwin Initiative. Through our forest restoration newsletter, we are able to reach people across Southeast Asia. We feel optimistic about the future of forest restoration and efforts to reverse the decline of Earth's tropical forests.

#### **References**

Goosem, S. and Tucker, N. 1995. Repairing the Rainforest. Cassowary Publications, Cairns, Australia.

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