

# Using traditional knowledge in forest restoration

**Indigenous people in Chiapas, Mexico, have a tried-and-true system for restoring forests involving balsa, a valuable timber species**

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**Breaking through:** One year old balsa trees tower over *petatilla* ferns. Photo: S. Levy-Tacher

In less than five decades, the Lacandon tropical rainforest—the last remaining high tropical evergreen forest in Mexico and North America—has lost 50% of its forest cover (Mendoza and Dirzo 1999; Mas et al. 2004). The original vegetation has been replaced by extensive pasturelands and a mosaic of man-induced environments, frequently dominated by ferns and other invasive plant species that prevent their use for agricultural or cattle-raising activities and hampers their natural regeneration (Levy-Tacher and Aguirre 2005). In view of this, it is essential to identify strategies that will curb the ecological deterioration of the region. This could be achieved by the restoration of natural capital through the use of traditional Mayan techniques (Aronson et al. 2007).

## Tropical forest rehabilitation with balsawood species

In Mexico's state of Chiapas, the Lacandon people, a Mayan group, have a detailed traditional knowledge of regional flora and ecology and have long managed their tropical forests without destroying them (Nations and Night 1980; Marion 1991; De Vos 1988).

The Lacandon people use a special technique to ensure the accelerated rehabilitation of tropical forest areas after they have subjected them to agricultural use. The technique involves the use of *Ochroma pyramidale* (balsa) trees, a native tree species of commercial value that is found widely throughout the Americas (Longwood 1962; Ascer 1975). This fast-growing species can enrich soils that have been depleted by agricultural and cattle-raising activities and can also rehabilitate areas that have been degraded by prolonged land-use practices based on frequent burning (Levy and Duncan 2004). The Lacandon people have been

using balsa since ancient times as a key species in their agricultural use of the rainforest because it allows them to shorten fallow periods, promote the restoration of organic matter in the soil, and control the growth of invasive plants in crop fields.

Balsa thrives in secondary-growth vegetation and tropical forest gaps (Whitmore 1968). The timber of this species ('balsawood') is of great economic value and is used in commercial and industrial products, ranging from the construction of ultra-light planes to the manufacturing of wind turbine blades. Mexico currently imports all the balsawood it consumes.

## Checking the effectiveness of balsa

The ecological properties of balsa, and its economic potential, prompted a group of researchers at the Colegio de la Frontera Sur (ECOSUR), under the leadership of Dr Samuel Levy, to test simple and low-cost techniques for the rapid rehabilitation of degraded and marginal lands.

In 2004 it was demonstrated that balsa trees substantially accelerate the functionality of tropical forest ecosystems. An increase of 5% of organic matter was identified in soils under the cover of dense populations of this species, compared with areas covered by other native species

Subsequently, experimental plots of two types were established: a block of land that had been under intense agricultural use; and an area dominated by *Pteridium aquilinum* ferns, commonly known in the region as *petatilla*. *Petatilla* invades large areas in the Lacandon tropical forest, making them unusable for agricultural or cattle-raising activities and preventing natural regeneration processes (Levy and Aguirre, 2005).

The results of these trials showed that, under both conditions, the survival rate of balsa was very high—80% for transplanted seedlings and 67% for direct seeding. Height growth was impressive: in the agricultural plot, the average growth of transplanted seedlings in the first year was almost 7 m, while in the *petatilla* plot, the average growth was slightly over 5 m in the same period (Douterlungne et al. 2010).

Another important aspect was that canopies started to overlap between 6 and 12 months after planting, creating shading that prevented the growth of the *P. aquilinum* rhizomes, which, as a result, disappeared completely from the experimental plot. After one year, the soils of the rehabilitated plots were covered by a dense litter layer; seed-dispersing wildlife such as bats and birds started to appear; and there was natural recruitment of woody vegetation (Douterlungne 2005; Douterlungne et al. 2010).

These encouraging results reaffirm the possibility that this technique may facilitate the long-term restoration of natural capital in these tropical forest ecosystems. The use of balsa is a viable option for the farmers in the region with which to rehabilitate lands that have traditionally been considered lost to agriculture, using a tree species with economic value.

### Outlook

Balsa has the potential to become a very important species for the rehabilitation of degraded tropical forest soils in Mexico and potentially elsewhere, as well as for commercial use. However, few efforts have been made to date to use balsa in forest restoration, and there is a lack of public policies and investment to encourage such use.

In an era in which the genetic modification of species and the modernization of agricultural technologies are widely viewed as keys to increased productivity, simple strategies derived from traditional practices offer an alternative. The recent history of the Lacandon tropical forest has been difficult, particularly for the Lacandon people, due to problems like encroachment and illegal forest activities. Among other things, greater appreciation of the traditional knowledge of the Lacandon people and the benefits of their traditional agricultural practices would help avert the serious risk that the Lacandon people will lose their cultural identity, along with their traditional knowledge.

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