Forestry Research Programme
Research Summary 003
Saving the fate of big-leaved mahogany
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*Despite legislation, mahogany is illegally logged in the Brazilian state of Para.
©Greenpeace/ Daniel Beltra*

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Mahogany has long been a status symbol of the rich. For more than 500 years, it has furnished stately homes in the West. Such exploitation has caused the commercial extinction of Caribbean and Pacific coast species and now threatens mahogany in the Amazon.

Saving the fate of big-leaved mahogany

Nearly all mahogany timber currently harvested is from big-leaved mahogany (*Swietenia macrophylla* King), which grows in forests from Mexico to the Amazon basin. Already this species is in decline, particularly in Brazil where mahogany exports fell by 61% between 1987 and 1995.[1] The question is, can mankind, with the benefit of hindsight, prevent big-leaved mahogany from meeting the same fate as its two commercially extinct relatives?

There are also wider problems to consider. The long roads needed to reach scattered clusters of mahogany pave the way for “slash and burn” clearance for agriculture, which is threatening the rainforest as a whole. And, most of the remaining stock of mahogany lies in indigenous reserves, where loggers have been accused of bringing social problems such as prostitution, drugs and the spread of disease.[2]

In 1996, the Brazilian government attempted to tackle these problems by enforcing a moratorium on the logging of mahogany. However, some commentators argue that, if managed responsibly, mahogany timber could be harvested to benefit local and indigenous Brazilian communities. The problem is that there is little technical information on how best to manage this precious resource.

In order to address the question of sustainable management, the UK Department for International Development’s (DFID) Forestry Research Programme (FRP) funded the Oxford Forestry Institute in partnership with the Brazilian research organisation, Embrapa Amazônia Oriental and the agricultural university of the state of Pará (FCAP), to improve understanding of the ecological principles underlying the growth and regeneration of big-leaved mahogany. This research complies directly with Target 9 of the UN Millennium Development Goals, which aims to "Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources".

Map to show the distribution of big-leaved mahogany 🟩 *and the location of the state of Pará* - - - *in Brazil.*

Rural population of Pará = 2.1 million

Source: The Brazilian Institute of Geography and Statistics Population Census 2000 and Lamb, F B (1966) Mahogany in tropical America: its ecology and management. University of Michigan Press, USA.

Examining the evidence and establishing forestry techniques

The FRP-funded research team, headed by Stephen Jennings and Nick Brown of the Oxford Forestry Institute, attempted to quantify the effect of logging on mahogany populations in the state of Pará, which produces 64% of all mahogany exported from Brazil.[3] The team developed an inventory of 1,200 hectares of forest[4] and carried out surveys to estimate the environmental conditions under which mahogany is most likely to regenerate, survive and grow successfully.[5]

> "If we are to encourage the regeneration of mahogany, we need to learn how to mimic nature."
>
> *Laura Snook, Center for International Forestry Research (CIFOR).*

The research team demonstrated that, contrary to popular belief, logging does not cause the local extinction of big-leaved mahogany. Instead, in conditions where the forest is fairly open and where there is sufficient moisture for rapid germination, mahogany trees regenerate relatively well. However, in the absence of management intervention, mahogany populations as a whole may not regenerate sufficiently for timber to be harvested sustainably in the future.

The spiny rat inhibits the successful regeneration of big-leaved mahogany by feeding on dormant seeds during the dry season. © Tom Clements

The problems the forest manager must address are twofold. Firstly, around two thirds of mahogany seed, which lies dormant on the forest floor throughout the dry season, is eaten by the spiny rat (*Proechimys* cf. *guyannensis*-group). Secondly, to regenerate successfully, mahogany seedlings require relatively high levels of light and are therefore inhibited by a dense forest canopy.

In order to overcome these constraints, forest workers should collect seed soon after it is dispersed in the dry season, store it until the onset of the rainy season and then re-sow into logging gaps in the forest. The wet conditions provided by the rainy season should encourage the seeds to germinate quickly and the clearance for logging would mimic the natural conditions of fires or floods that open up the canopy, allowing mahogany seedlings to flourish.

A seasonal stream bed is an ideal site for the successful regeneration of big-leaved mahogany.
© Nick Brown

Informing practitioners

The suggestions put forward by Jennings, Brown and the team mark a first step in the development of new sustainable techniques to manage mahogany and its rainforest habitat. Such scientifically grounded responsible management may prove to be more effective in protecting mahogany than the current trade requirements imposed by the Convention on International Trade in Endangered Species (CITES). This issue was publicly debated through a paper by Jennings and the team published in the journal *Nature*.[6]

The FRP-funded research team communicated their findings to other scientists and practitioners through workshops held in Belém and Oxford. The team worked closely with the association of timber exporters in Pará (AIMEX), Instituto Socioambiental, an NGO which works with the Xikrin tribe of Brazilian Indians, and the Danish timber company, NORDISK, which holds the licence to the Pataua Forest in the state of Pará. Several Brazilian foresters were trained in a range of sustainable forestry techniques, which Embrapa Amazônia-Oriental has begun to trial with the Xikrin Indians in a pilot experiment in the Cateté Reserve.

> “Mechanisms other than CITES need to be found to curb destructive logging in tropical rainforests.”
>
> *Stephen Jennings, Oxford Forestry Institute.*

The research team also suggested practical methods for maintaining and monitoring genetic diversity within tropical rainforests.[7] These methods represent an informed response to a variety of international agreements including the Tarapoto Process (which forms part of the Amazon Co-operation Treaty), the International Tropical Timber Organisation criteria and the Forest Stewardship Council principles and criteria, each of which call for clear measures of genetic diversity within tree stocks.

Recommended action for the successful regeneration of mahogany

- Collect and store mahogany seed during the dry season.
- Log mature mahogany trees during the dry season.
- Sow mahogany seed into large logging gaps during the wet season. Avoid compacted skid trails or roads.

Creating sustainable livelihoods

The research carried out by the Oxford Forestry Institute and Embrapa Amazônia Oriental complies with the six core principles of the Sustainable Livelihoods Approach (SLA) advocated by DFID. Firstly, the research is **people-centred**, working towards methodologies for responsible management of natural rainforest that provide long-term employment for local indigenous communities in Brazil.

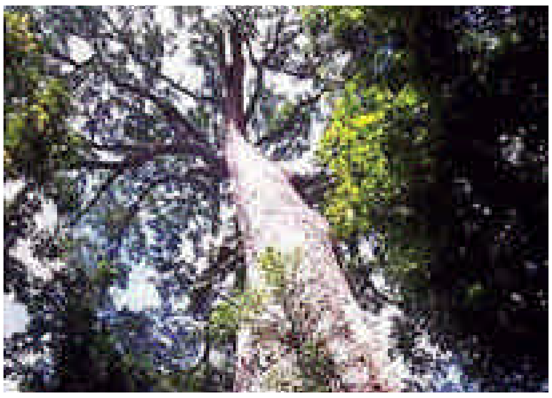
Secondly, the research is **responsive** to the concerns of the Brazilian authorities that current logging practices are having a detrimental effect on communities within indigenous reserves. It also responds to the global need for increased knowledge on mahogany ecology. This requirement has been stressed at conferences held over the past decade by the Linnean Society of London and the International Institute of Tropical Forestry in the United States Department of Agriculture.

Thirdly, the research emphasises the need for **participation** on the part of Brazilian Indian communities. The findings so far have been published in Portuguese and follow-up work carried out by Embrapa aims to involve indigenous communities in the development of sustainable forestry techniques.

Fourthly, the research takes a **multi-level** approach, providing information both to forest workers on the ground and to the Brazilian government. **Partnership** working was a key feature of this approach, which involved a range of relevant parties from Brazilian foresters and timber companies to environmental NGOs and policy makers.

The sixth core principle of **sustainability** is also central to the research, which provides a sound scientific basis for the sustainable harvesting of big-leaved mahogany. Such responsible management could provide important economic benefits, thereby offering a powerful incentive for the conservation of the rainforest as a whole.

Finally, the FRP-funded research is a **dynamic** response to the problems facing the Amazonian rainforest and its human inhabitants. It recognises the importance of developing new solutions that could both conserve environmental biodiversity and improve quality of life for Brazilian communities in the future.



Big-leaved mahogany grows as single trees within the Amazonian rainforest. ©Greenpeace/Alan Greig

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This research summary was written by
Becky Hayward.

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For further information on the
Forestry Research Programme contact:
The FRP Senior Administrator
Katelijne Rothschild-Van Look
Forestry Research Programme
NR International Ltd.
Park House, Bradbourne Lane,
Aylesford, Kent, ME20 6SN, UK
email: k.rothschild@nrint.co.uk
www.frp.uk.com