

An ITTO-sponsored project has supported a public-private partnership to promote the adoption of good forest management practices in the Brazilian Amazon

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Forestry 101: Training activity in project area *Photo: J. Carvalho*

Timber exploitation plays an important role in the economy of the Amazon region but also in the destructive processes affecting the region's forests. Much of the logging practiced widely in the Amazon today can be regarded as mining because it does not take into account the potential renewability of the natural resource. Although logging is usually highly selective, inadequate operational techniques often mean that significant damage is done to the remaining forest. Moreover, logged-over forests are often legally or illegally cleared, burnt out, and converted to agricultural land. In this process, many endemic animals and plants disappear (Embrapa/CIFOR 2000).

Sustainable forest management (SFM) based on the application of reduced impact logging practices has been promoted as an attractive mechanism by which the economic potential of the forests can be realized while maintaining their environmental and economic values. But, after more than 30 years of research in SFM, and even though several research projects conducted in the region have shown positive results, commercial loggers remain reluctant to adopt it. This has led to a paradoxical situation in which the SFM practices demonstrated by research have been incorporated into forest management regulations but, in practice, timber companies do not follow them (Embrapa/CIFOR 2000).

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In general, logging entrepreneurs do not believe in the benefits of introducing good management practices to their operations and therefore do not apply them. A diagnostic survey of forest management projects in the Paragominas region, conducted in 1995 by the Brazilian Agricultural Research Corporation (Embrapa), the Brazilian Institute for Environment and

Renewable Natural Resources (IBAMA), and other partners, revealed the need to establish SFM demonstration projects at the commercial scale with the active involvement of timber companies. This was deemed especially important in the eastern Amazon, the most important timber-producing region; such a project would complement an ongoing ITTO-sponsored project in the Tapajós Forest in the western part of Pará state (Embrapa 1997).

Accordingly, Embrapa, the Center for International Forestry Research (CIFOR) and other relevant institutions of the region decided to formulate ITTO Project PD 57/99 Rev.2 (F): *Sustainable management of production forests at the commercial scale in the Brazilian Amazon—Phase I*. This was to be an SFM demonstration project involving two local timber companies as partners (Silva *et al.* 2006). The project was approved and funded by ITTO in 1999, and its implementation by Embrapa and partners commenced in 2000. The project was completed in 2008.

Project strategy

The main idea of the project was to develop, test, evaluate and transfer a forest management system (FMS) for use by timber enterprises working under the production conditions typically found in *terra firme* forests in the Brazilian Amazon. The FMS consists of a set of tools designed to assist forest companies in the planning, implementation, evaluation and monitoring of their operations to achieve sustainable economic benefits under current and foreseeable environmental and social conditions. It comprises two areas of intervention: *silviculture*—the use of techniques and tools to improve the economic efficiency and working conditions of forest operations (pre-harvesting, harvesting and post-harvesting silviculture) and to reduce their negative environmental impacts; and *economic planning and control* of the enterprise's operations—an integrated



Located: Students use GPS in a project sample plot *Photo: J. Carvalho*

system for reporting and analysing production and financial movements to support efficient planning and control.

Two timber companies were selected as project partners: *Juruá Florestal Ltda* and *Cikel Brasil Verde Madeiras Ltda*. Both are representative of a large number of forest enterprises in the Amazon.

During the course of the project, many other timber enterprises affirmed their interest in the project and the tools that had been developed.

After the development of the silvicultural and managerial tools, both *Juruá* and *Cikel* tested and validated the FMS prototype (FMS-P) at an operational scale. A system to monitor the ecological, social and economic impacts of the FMS was also developed and tested.

The FMS prototype **Silvicultural tools**

As part of the FMS, the following silvicultural tools were developed:

Technical guidelines for reduced impact harvesting: a set of procedures regulating harvesting operations in order to: a) minimize environmental damage, conserve the potential for subsequent commercial harvesting, and maintain basic ecological services; b) reduce operational costs; and c) increase the efficiency of harvesting operations and reduce waste (Pokorny *et al.* 2005; Sabogal *et al.* 2000);

Technical guidelines for post-harvesting silviculture: a set of procedures regulating post-harvesting silvicultural interventions in order to: a) increase the growth rates of desired timber species, thus shortening the cutting cycle; b) estimate the occurrence of

desired regeneration; and c) increase the quality of future crops (Carvalho *et al.* 2006; Carvalho *et al.* 2008);

Software for planning harvesting and controlling forest production (PLANEJO): a computer program for improving forest management planning with the aim of increasing an enterprise's efficiency and viability and its control of forest operations (Silva *et al.* 2007b); and

Guidelines for the establishment of permanent sample plots and software for monitoring growth and yield: a tool for the implementation of a continuous forest inventory system using the *Monitoramento de Florestas* (MFT) software for managing permanent sample plot data. Its main outputs are stand tables and data on growth, mortality and recruitment (Silva *et al.* 2005; Silva *et al.* 2007a).

Managerial tools

The FMS prototype includes several managerial tools:

Manual for monitoring an enterprise's operational performance: a set of procedures linked to a computer-based software for recording, analysing and reporting the operational performance of an enterprise's operations in order to control quality and quantity and to support management decisions (Pokorny *et al.* 2008).

Manual for monitoring enterprises' economic operations: a manual and corresponding software for analysing the productivity and costs of forest operations (Pokorny *et al.* 2007); and

Manual for controlling and planning an enterprise's operations: an integrated, computer-based information system to assist enterprises in controlling and planning their operations through, for example, the calculation of costs and benefits, investment analyses, the documentation of production processes, and planning schemes (Pokorny *et al.* 2008).

Monitoring and evaluation system

The project developed a tool for monitoring the social, ecological and economic impacts of the FMS, including its impacts on local communities, and procedures for monitoring logging damage (Martins *et al.* 2007). ITTO's *Criteria and indicators for the sustainable management of tropical forests* (ITTO 2005) were applied in forest management units of *Cikel (Rio Capim)* and *Juruá (Arataú and Santa Marta)* and a manual for auditing forest management projects was developed in collaboration with IBAMA. These auditing procedures have been implemented successfully by IBAMA and the State Environment Agency of Pará (SEMA) for the analyses of forest management projects in the Amazon region in both public and private forests (Pokorny *et al.* 2006).

Training

The project's training program had three components. Silvicultural tools were introduced via an intensive training of forest engineers and practitioners at the Tropical Forest Institute (*Instituto Floresta Tropical—IFT*) training site in Cauaxi, followed by in-service training during the execution of forest management operations (pre-harvesting inventories, harvesting, etc); the quality of forest management operations was assessed over the course of project implementation. A more elaborate transfer mechanism was needed for the third component, which was the transfer of the

management tools: it involved the intense participation of enterprise staff in the development and testing process to ensure the feasibility and usefulness of the tools and their coverage of all enterprise activities.

Dissemination of FMS tools

The outcomes of various project components were documented in working papers, some of which have been published in international scientific journals. A number of publications targeted at different audiences was produced and distributed widely. The project also made extensive use of media such as newspapers, television, video, folders, and the internet; workshops, conferences and seminars were convened to present project findings and to help assess the progress made.

To ensure the dissemination of project findings to a wider group of clients, two field days were organized directed towards forest companies, loggers, decision-makers, policymakers, advisors, researchers and students. In addition, the project offered opportunities for researchers and graduate students to carry out relevant research.

Involvement of partners critical

As foreseen by the project strategy, the active involvement of two major timber companies in the development and validation of the various silvicultural and managerial tools contributed significantly to the validity and acceptance of the tools within the forest sector. Both companies contributed significant human and financial resources. During the course of the project, many other timber enterprises affirmed their interest in the project and the tools that had been developed. In numerous cases the project was able to support such companies in implementing good forest management practices. In particular, the collaboration with the IFT facilitated the dissemination of project outcomes to a wider range of stakeholders. The active involvement of IBAMA as the legal authority was also extremely positive, and enabled the project to make a direct contribution to improving the effectiveness and role of governmental organizations in promoting SFM in the region. Moreover it led to the decision of IBAMA, through the Brazilian Forest Service, to become an active partner in the second phase of the project.

Finally, an impressive number of scholars, experts and students were actively involved as partners or collaborators during the project; most of the project's outcomes were achieved with their cooperation and support. This contributed greatly to the quality of the project and to the effective dissemination of its results.

The wider uptake of the FMS

A strategy to transfer the FMS to timber enterprises has been designed for the project's second phase. The FMS tools will be disseminated widely to relevant stakeholders by building the capacity of training centres and universities in the Amazon region to transfer SFM tools to timber companies and the government environmental agencies responsible for forest management. The direct and indirect effects of transferring these tools will be evaluated with the aim of refining both the tools and the strategies for their dissemination.

To be implemented by Embrapa, the project's second phase will involve a wide range of partners, including the Ministry of Environment through the IBAMA and its Forest Management National Support Centre (CENAFLO), the Brazilian National Forest Program, the Brazilian Forest Service, and the IFT. CIFOR and the University of Freiburg will provide institutional support. A number of other governmental and non-governmental institutions in the region will participate in and benefit from the project.

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