Partnership for good forest management

A joint initiative of researchers and timber industries in the Brazilian Amazon

J. Natalino M. Silva[1],
Benno Pokorny[2],
César Sabogal[3],
J. Olegário P. de Carvalho[4]
and
Johan Zweede[5]

[1]Researcher

Embrapa Amazônia Oriental

Belém, Pará, Brazil

Coordinator

ITTO project "Sustainable forest management of production forests at the commercial scale in the Brazilian Amazon"

natalino@cpatu.embrapa.br

[2]Assistant Professor

Faculty for Forestry and Environmental Sciences, University of Freiburg

Germany

Associated Researcher

Centre for International Forestry Research

benno.pokorny@waldbau.uni-freiburg.de

[3]Consultant and Associated Researcher

Centre for International Forestry Research

Belém, Pará, Brazil

c.sabogal@cgiar.org

[4]Researcher

Embrapa Amazônia Oriental

Belém, Pará, Brazil

olegario.carvalho@gmail.com

[5]Executive Director

Tropical Forest Institute

Belém, Pará, Brazil

zweede@fft.org.br

Low-impact cut: workers prepare to fell a tree in the project area. *Photo: IFT*

REDUCED IMPACT LOGGING (RIL) practices play a key role in achieving sustainable management of tropical forests. Cost-benefit studies (Barreto *et al.* 1998; Holmes *et al.* 2000) have shown that RIL can be financially competitive because improved planning guarantees the effective use of machines and reduces timber waste. In the Brazilian Amazon, demonstration areas were established during the 1990s by the Brazilian Organization for Agricultural Research (EMBRAPA), Amazon Institute of People and the Environment (IMAZON) and the Tropical Forest Foundation (Portuguese acronym FFT, now known as the Tropical Forest Institute or IFT). In recent years, the Forest Stewardship Council (FSC) certification program has also made considerable inroads into the Brazilian Amazon.

Nevertheless, more then ten years after the Rio Summit, timber harvesting in the Brazilian Amazon is still regarded by many as predatory (Greenpeace 2001; Amigos da Terra 2002). Timber enterprises interested in implementing RIL and other good forest management practices suffer from numerous barriers outside their scope of influence, such as ineffective law enforcement, poor infrastructure, deficiencies in education, corruption and land tenure conflicts (Embrapa 1997; Johns *et al.* 1996; Blate *et al.* 2001; Sabogal *et al.* 2005). In addition, they are confronted with a lack of adequate silvicultural and managerial tools (eg FFT 1998; Amaral *et al.* 1998; Silva 2001). Timber companies tend to consider available scientific knowledge as too theoretical and not relevant.

With the aim of addressing some of these problems, ITTO PROJECT PD 57/99 REV. (2) F: 'Sustainable forest management at the commercial scale in the Brazilian Amazon', has promoted scientific cooperation between EMBRAPA and the Center for International Forestry Research (CIFOR). The main objective of this project is to stimulate the adoption of good management practices among timber enterprises in the region. The project also involves IFT, the leading organization for forest management training in the Amazon, and two Brazilian timber companies, *Juruá Florestal Ltda.* and *Cikel Brasil Verde Ltda.*

This article describes progress to date under this project. It provides an outlook on the prospects for widespread adoption of good forest management practices by Amazonian timber enterprises, including the tools generated by the project, in particular: operational guidelines for RIL, monitoring of forest dynamics, volume equations, post-harvest silviculture, monitoring of enterprises' operational performance, control of production and costs, and governmental auditing of forest management projects.

Operational guidelines for RIL

The project commenced in 2000 with an international expert workshop to discuss guidelines for sustainable forest management (SFM) in the Brazilian Amazon. Based on a thorough review of existing codes of practice, the project partners published a set of technical guidelines for RIL in *terra firme* forests of the Brazilian Amazon (Sabogal *et al.* 2000), then used these in training courses for hundreds of forest managers and operators in the region. The timber enterprise partners in the project also used these guidelines to improve their forest operations, resulting in FSC certification of both companies in 2001. The degree to which the two project partner enterprises were able to comply with the RIL guidelines was assessed to learn the reasons contributing to or constraining the adoption of

the RIL guidelines, and also to identify specific areas for improvement (Pokorny *et al.* 2005). The results of this process led to a final comprehensive set of RIL guidelines (including aspects of planning, monitoring and social management), which have served as an essential input for the recent review of forest management in Brazil.

Monitoring forest dynamics

Until the beginning of the 1980s, little was known about growth and yield of tropical rainforests in the Brazilian Amazon. In 1981, EMBRAPA launched guidelines for establishing and measuring permanent sample plots of *terra firme* forests in the Eastern Amazon and developed software to process and analyse the collected data (Silva and Lopes 1984). Taking into account experiences gained with this system, the project created a simple tool for monitoring forest dynamics to be used by timber companies, as well as communities and researchers, consisting of guidelines (Silva *et al.* 2006) and corresponding computer software. The software, besides generating growth, mortality and recruitment information, also allows the user to carry out phytosociological studies and analyse data from temporary forest inventories. Currently, the Brazilian Institute for Environment and Renewable Natural Resources (IBAMA) is leading a consortium of ten organizations to establish a network of permanent sample plots in the Brazilian Amazon using a subset of this tool. Nearly all FSC-certified timber companies in the Amazon are already using the tool. The project also managed to re-measure more than 200 permanent sample plots established by EMBRAPA since 1981 in various regions in Pará and Amapá states. The analysis of these data and information from newly established permanent sample plots will significantly increase knowledge of forest dynamics in the Amazon.

Volume equations

Heinsdijk and Bastos (1963) determined a general form factor of 0.7 for the Brazilian Amazon to calculate the timber volume of trees to be harvested. Despite its general nature and many changes in harvested species, this form factor is still used today. This factor, together with errors from visual estimates of stem heights, leads to overestimation of volumes in forest inventories and consequently in the logging permits issued by IBAMA to timber producers. As a result, authorized harvest volumes normally exceed the companies' actual requirements and the surpluses are frequently commercialized in the black market, thereby 'legalizing' timber extracted in non-authorized forest areas. To overcome this problem, IBAMA has issued a regulation requiring all timber companies to develop local volume equations for harvested species, which resulted in an urgent demand for tools to support foresters and enterprises in this endeavour. To help meet this demand, the project team developed field guidelines to collect data during harvesting operations from sample trees and software (SMALIAN) to calculate stem volumes using the Smalian procedure. This

How it's done: forest management trainees learning about RIL in the forest. *Photo: IFT*

tool calculates individual tree volumes by species, and allows data export to Excel worksheets to simplify derivation of local volume equations for different forest types and species. Better estimates of harvestable volumes are expected from enterprises using this tool.

Post-harvest silviculture

Silvicultural treatments such as climber cutting and crown liberation thinning can improve the growth rates of potential crop trees in tropical forests (eg Silva 2001), while enrichment planting increases the general productivity and quality of the forests. Yet Amazonian timber enterprises still ignore these management options because existing knowledge about the specific effects of silvicultural interventions is still limited. In 2005, the project team established silvicultural experiments covering 2100 hectares of harvested *terra firme* primary forests in order to learn more about the ecological and financial aspects of silvicultural treatments. Seven treatment options are currently being tested, involving climber cutting, crown liberation thinning, enrichment planting and management of natural regeneration in gaps. The results of these experiments are expected to provide a basis for enterprises to decide on investments in silvicultural treatments and will allow the development of guidelines for post-harvest silviculture in *terra firme* forests of the Brazilian Amazon.

Monitoring enterprises' operational performance

Systematic, objective and continuous monitoring of forest operations is crucial to assure that the standards required by the forestry authority (or an independent certifier) are met. Such monitoring provides feedback on achievement

Roaded: proper construction of roads and skid trails is an essential component of RIL. *Photo: IFT*

the project's partner enterprises has already resulted in the first long-term financial analysis and documentation of commercial harvest operations in the Amazon. It is expected that monitoring their own forest management operations will increase the sensitivity and interest of forest companies in innovations necessary to increase operational efficiency and to reduce environmental damage. Such analyses also generate a unique source of empirical information on financial aspects of 'good forest management', which will facilitate a better understanding of the financial implications of implementing RIL and other SFM practices. Data generated by the project confirmed the competitiveness of RIL, and also the importance of effective utilization of heavy machines to compensate partly for lower productivities and additional costs for planning when implementing RIL. However, it became obvious that the successful implementation of RIL by Amazonian enterprises depends on the professionalism/training of staff and improved administrative and organizational procedures. Support for enterprises interested in implementing RIL should therefore concentrate on improving management capacities as well as any requirements for additional financial resources.

Auditing forest management projects

The expression 'auditing' here refers to activities carried out by government institutions to ensure compliance by timber enterprises with legal regulations concerning forest management. Auditing provides governmental institutions with information to decide if there is a need to either sanction poorly performing timber enterprises or to provide incentives for good performance. Effective auditing helps to counter-balance competitive disadvantages caused by illegality and predatory logging. In Brazil, several studies on the quality of forest management revealed that almost no forest management projects follow the prescriptions set out in relevant regulations (Embrapa 1997; Sabogal *et al.* 2005), indicating that current auditing practices are not comprehensive. The project revealed that this failure is mainly due to audits concentrating on the revision of documents in the office, with subjective interpretation of parameters that are inadequately measured in the field. IBAMA asked for support from the project to more effectively respond to the challenge of guaranteeing legality and quality of harvesting operations in the Amazon. A task force was established to adapt the above-mentioned monitoring tool to the specific demands of auditing procedures, and the auditing system is now being used by IBAMA after review in a sequence of workshops and field tests.

Social management

The management of forests, although usually perceived as an economic activity with environmental impacts, also has strong social implications. Employees involved in forest operations are affected by the difficult working conditions of the sector. For enterprises, employee satisfaction with work and working conditions directly influences motivation and, as a consequence, operational performance. People living inside or near harvesting areas are also affected by forest operations, and their well-being, in the long run, is essential to guarantee the integrity of forest management areas. The project has developed social indicators and methods to enable forest enterprises to better understand the social dimension of their activities and to demonstrate options for contributing to the well-being of forest workers and communities.

of enterprise objectives, helps detect problems and can be used to identify underutilized production potential. However, while most existing codes of practice point out the importance of regular monitoring, little information is given about how to do this effectively. To address this lack of adequate methodological guidance, the project developed a tool to monitor the operational performance of forest management operations based on a set of criteria and indicators (C&I) which were developed through national and international workshops, field tests and expert consultations. Software was developed to enable timber enterprises to adapt this C&I template to their specific requirements, generate field forms, process captured data and generate monitoring reports.

People living inside or near harvesting areas are also affected by forest operations, and their well-being, in the long run, is essential to guarantee the integrity of forest management areas.

Monitoring production and costs

Many argue that only a demonstrated financial surplus from improved practices like RIL will motivate timber companies to move towards SFM. However, very few enterprises in the Amazon know how to correctly collect and analyse information on production and costs as a basis for investment decisions, selection of technologies, operational planning, detection of difficulties and possibilities to improve their performance. Existing information (most of which is deficient and incomplete) consists mainly of rough estimates of production, chronological documentation of income and expenses, and an annual balance for tax purposes. Thus, although highly interested, companies often do not have good financial data or simply do not know how to adequately analyse financial parameters. To generate financial information and to strengthen managerial capacity, the project developed software to systematically monitor production and costs of forest management operations (Pokorny and Steinbrenner 2005; Pokorny *et al.* 2006). The application of this tool by

Outlook

The present status of forest management in the Brazilian Amazon is rather chaotic. It is estimated that only about 4% of the roughly 28 million m³ currently harvested in the Amazon every year comes from well-managed forests. Many government initiatives are on course to change this situation and promote the adoption of good forest management practices. This project supports government efforts to promote the adoption of good forest management in the Amazon in two ways: through a better understanding of how timber industries work and through a set of tools tailored to respond to the demands and capacities of the sector. Even though RIL is not necessarily cheaper than conventional logging, a number of factors may convince timber enterprises to adopt it, such as higher economic value of residual stands, market options for certified timber, social benefits (eg compliance with labour and forestry regulations, higher security standards, and regional employment) and improved public image. The silvicultural and managerial tools developed by the project will help interested enterprises make the transition to good forest management. But long-term success will depend principally on effective strategies to protect managed stands, including the establishment of working relationships with nearby communities. A second phase of this project will seek to build on the achievements outlined here, including effective transfer and implementation mechanisms for RIL/SFM practices, and intensive collaboration with interested timber enterprises throughout the Amazon, relevant non-governmental organizations, the government and communities.

References

Amaral, P., Veríssimo, A., Barreto, P. and Vidal, E. 1998. *Floresta para Sempre: Um Manual para a Produção de Madeira na Amazônia*. Imazon, Belém.

Amigos da Terra 2002. *Legalidade Predatória. O Novo Quadro da Exploração Madeireira na Amazônia*. Relatório. Amigos da Terra – Amazônia Brasileira, Manaus.

Barreto, P., Amaral, P., Vidal, E. and Uhl, C. 1998. Costs and benefits of forest management for timber production in eastern Amazonia. *Forest Ecology and Management* 108, 9–26.

Blate, G., Putz, F. and Zweede, J. 2001. *Progress towards RIL adoption in Brazil and Bolivia: driving forces and implementation successes*. Paper presented at the International Conference on RIL to Advance Sustainable Forest Management, 26 February–1 March 2001, Kuching, Malyasia. FAO, Bangkok.

Embrapa 1997. *Diagnóstico dos projetos de manejo florestal no estado do Pará – Fase Paragominas*. Report. Embrapa/CPATU, Belém.

FFT 1998. *Manual de Exploração de Impacto Reduzido*. Fundação Floresta Tropical, Belém.

Greenpeace 2001. *A exploração de madeira na Amazônia: a ilegalidade e destruição ainda predominam*. Technical Report. Greenpeace, Manaus.

Heinsdijk, D. and Bastos, A.M. 1963. Inventários florestais na Amazônia. Rio de Janeiro. *Serviço Florestal, Boletim* 6.

Holmes, T., Blate, G., Zweede, J., Pereira Jr., R., Barreto, P., Boltz, F. and Bauch, R. 2000. *Financial costs and benefits of reduced impact logging relative to conventional logging in the Eastern Amazon*. Tropical Forest Foundation, Washington, DC. Available from www.srs.fs.usda.gov/econ/pubs/misc/tph001.pdf

Johns, J., Barreto, P. and Uhl, C. 1996. Logging damage during planned and unplanned logging operations in eastern Amazon. *Forest Ecology and Management* 89, 59–77.

Pokorny, B., Sabogal, C., Silva, J.N.M., Bernardo, P., Souza, J. and Zweede, J. 2005. Compliance with reduced-impact harvesting guidelines by timber enterprises in terra firme forests of the Brazilian Amazon. *International Forestry Review* 7(1), 9–20.

Pokorny, B. and Steinbrenner, M. 2005. Collaborative monitoring of production and costs of timber harvest operations in the Brazilian Amazon. *Ecology and Society* 10(1): 3. Available from: www.ecologyandsociety.org/vol10/iss1/art3

Pokorny, B., Tavares, M. and Lelís, M. 2006. *Monitoramento econômico de operações florestais*. Manual. Embrapa Amazônia Oriental, Belém.

Sabogal, C., Silva, J.N.M., Zweede, J., Júnior, R.P., Barreto, P. and Guerreiro, C.A. 2000. Diretrizes técnicas para a exploração de impacto reduzido em operações florestais de terra firme na Amazônia Brasileira. *Documentos* 64. Embrapa, Belém.

Sabogal, C., Pokorny, B., Silva, N., Bernardo, P., Massih, F., Boscolo, M., Lentini, M., Sobral, L., and Veríssimo, A. 2005. *Manejo florestal empresarial na Amazônia brasileira. Restrições e oportunidades para a adoção de boas práticas de manejo*. Final Report. CIFOR/EMBRAPA, Belém.

Silva, J.N.M. 2001. *Manejo Florestal*. 3 ed. Embrapa Informação Tecnológica, Brasília.

Silva, J.N.M. and Lopes, J.C.A. 1984. Inventário florestal contínuo em florestas tropicais: a metodologia utilizada pela EMBRAPA-CPATU na Amazônia brasileira. *Documentos* 36. Embrapa-CPATU, Belém.

Silva, J.N.M., Lopes, J.C.A., Oliveira, L.C., Silva, S.M.A., Carvalho, J.O.P., Costa, D.H.M., Melo, M.S., Tavares, M.J.M., and de Barros, P.C. 2006. *Diretrizes para instalação e medição de parcelas permanentes em florestas naturais da Amazônia brasileira*. Embrapa Amazônia Oriental, Belém.

To the mill: logs produced using RIL under the project are transported out of the forest. *Photo: IFT*