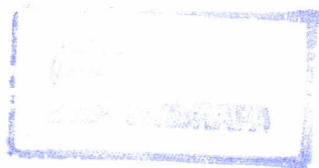


Planning to Reduce Damage

This ITTO project plans to use low impact logging practices as part of a strategy to integrate logging and traditional activities in the Brazilian Amazon

by Evaldo Muñoz-Braz and
Marcus V.N. d'Oliveira

Technology Foundation of Acre State
(FUNTAC), Rio Branco, Acre State, Brazil; Fax
55-68-226 4310



About 80 (poor) families live in the 55,000 hectare Antimari State Forest in the Amazonian state of Acre in north-western Brazil. Since migrating to the area last century, most of these people have earned their living through the extraction of rubber (*Hevea brasiliensis*) latex and Brazil nuts. With recent declines in the value of natural rubber on world markets, however, incomes have declined and the people have expressed a desire to increase their standard of living by other means.

This led to the development in 1990 of an ITTO-funded project (PD 94/90 Rev. 3: 'Integrated sustainable development of the Western Amazon based on forest resources'), the objective of which is to promote forest-based sustainable development in the western Amazon by developing strategies that foster the sustainable use of forest products to promote the economic and social well-being of forest inhabitants. Implemented by the Technology Foundation of Acre State (FUNTAC), the project has organised the families into a local association and has been assisting them in the planning of sound economic development activities,

including improved collection and local processing of rubber and Brazil nuts, and forest management for timber production on a sustainable basis.

Reduced impact logging (RIL) is an essential element of sustainable timber harvesting. A prerequisite for the achievement of RIL is adequate planning of forest operations, yet this is given little consideration in current management plans in the region (Braz 1992). This article examines the planning undertaken within the context of PD 94/90 with a view to achieving low impact and sustainable timber harvesting operations by and for the benefit of the local people.

The Forest Management Plan

The inhabitants of Antimari State Forest have traditionally been extractors of non-wood forest products and have little prior experience with timber exploitation. If timber exploitation is to be used to boost their incomes, techniques are required that are not only readily understood by them but which also do not reduce the productivity of the forest for other economic materials.

One of the main activities carried out to date by the project has been the formulation of the Antimari State Forest Management Plan (see Figure 1) which addresses this fundamental concern. Initially, based on interpretation of satellite images, the forest was divided into three types which then became management zones: (i) dense forest; (ii) dense forest of floodable land ('varzea' forests); and (iii) open forest with bamboo. The area of each management zone is shown in Table 1.

Table 1: Forest management zones according to forest type and area (hectares)

Zone	Forest type	Area
1	Dense forest	12 597
2	Dense forest of floodable land (<i>varzea</i>)	17 904
3	Open forest with bamboo	34 751
Total area		55 252

Of these, zone 3 is not currently being considered for timber harvesting operations. For the harvesting of the two remaining zones, three harvesting alternatives have been considered in the management plan, ranging from a simple model where extraction requires a low level of inputs and technologies (level 1), through a traditional log harvesting method

adapted to the management of 'terra firma' forests (level 2) to a model requiring relatively complex technology and higher investments (level 3). More detailed inventory work (see *TFU 6:2* for background) and growth and yield data from elsewhere were used to calculate sustainable yields in these forest types.

Level 1 Harvesting

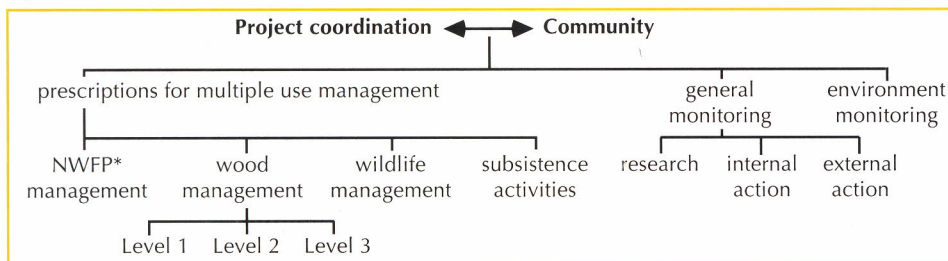
The traditional method used by river-dwelling people in the states of Amazonas and Pará for logging the *varzea* forests takes advantage of the inundation of the rivers for the extraction and floating of trunks of traded species without requiring heavy machines. As currently practiced, this system is generally unplanned and opportunistic: RIL is not employed, annual allowable cuts are not calculated, and post-logging treatments are not carried out (Oliveira 1992). According to Higuchi (1994), the method is generally unsustainable in its present form.

Under level 1 harvesting proposed in the Antimari State Forest Management Plan, the basic form of extraction (flotation) of the traditional systems will be used because it causes minimal vegetation and soil damage to the *varzea* forest, but in accordance with the above-mentioned concepts of sustainable forest management.

Other problems of extraction and planning must be considered. The *varzea* forests are used by forest inhabitants for rubber latex and Brazil nut extraction activities. On the banks of the Antimari River and its tributaries, each family controls an average of about 300 hectares of this forest, which they access by means of narrow paths. The irregular structure and density of the rubber latex paths, and the distribution of the Brazil nut trees and other useful food and medicinal plants, do not favour compartmentalisation, as practiced in traditional forestry, or an elaborate system of roads and shipyards. This kind of planning, disrespecting the actual economy of the rubber latex extractor, would be counter-productive to the introduction of forest management. In addition to all these factors, the rubber latex extractors do not have experience in collective work.

Thus, it was decided to consider, as a starting point, the rubber extraction plots as the basic units of forest management. All planning has therefore been made at this level, centralising the activities of secondary transportation and

Figure 1: Basic structure of the management plan



*Non wood forest products

conversion 'downstream' in facilities owned and operated by the local community association, with training provided through the project.

Production units and compartments

The minimum harvesting cycle has been set at 15 years, based on a low rate of exploitation (3–5 m³/hectare/cycle). Due to the need for protection areas, only 50 per cent of the plot area will be considered for management, which means, on average, that 150 hectares of useful area is available per plot. Thus, ten hectares per plot will be harvested for timber each year, amounting to an average of 30–50 m³ of wood/year/plot, provided that each family is able to cope with the amount of work involved.

'In one way, the different levels are equivalent to community learning phases, while in another they are the only possible systems that will work within existing social, economic and ecological constraints.'

For demarcation of the coupes within the plot, 15 equidistant base lines will be used between the lateral limits. The starting point for the demarcation of the lines will be the river edge so as to facilitate the flowing of the wood to the river. Best logging practice according to suggestions contained in ITTO (1990) and Oliveira and Braz (1995) will be carried out. Training in forest harvesting techniques is being provided to the local community through the project.

Primary transportation (ie to the banks of the Antimari River) will be done by floating logs down tributaries. In the case of the very heavy woods it will be necessary to carry out the primary processing of the log at the site of felling. In this case the large planks will be hauled by animals.

Secondary transportation will be by river, using a system of rafts with towboat according to the 'espinha de peixe', 'pente' and 'cabeça' systems (Higuchi 1994).

As determined by trials and permanent sample plots, liana cutting, post-logging treatments, loppings and other treatments will be carried out.

Level 2 Harvesting

This proposed harvesting technique will be employed in 'terra firma' forests with similar rubber latex (and other product) extraction practices to those existing in *varzea* forests. The rubber latex extraction plots will again be used to define 'compartments' for planning purposes. Primary processing of logs into large planks within the forest will be undertaken. Animals will be used to extract the planks in accordance with practices recommended by the Model Code of Forest Harvesting Practice (FAO 1995). A road system connecting plots to a sectoral processing centre will be used for secondary transportation by motorised vehicles. It is estimated that these forests can support a timber harvesting intensity of 10–15 m³ per hectare per cycle.

Level 3 Harvesting

This level of harvesting can be performed in large tracts of forest where population density is low. It is envisaged that potential operators at this level will be drawn from those forest dwellers who have been trained in logging practices through level 1 or 2 operations and have demonstrated the ability to work cooperatively. Extraction will be mechanised (ie using tractors and log trucks) but an increased level of planning will help ensure that the least possible damage is done to the forest. An annual plan will be required for all operations, considering such aspects as: 1) principal and secondary road planning; 2) shipyards planning and distribution; 3) felling planning; and 4) analysis of ideal skid parameters (Braz & Oliveira 1995).

The compartments will be 300–500 hectares in size with an exploitation rate of 30–40 m³ per hectare. The annual allowable cut will be calculated by a method defined for the Antimari State Forest in accordance with ecological parameters (eg distribution and regeneration requirements of tradeable species), bearing in mind that highly mechanised harvesting may only become financially worthwhile at a given minimum volume.

Conclusion

The three levels of harvesting proposed in the Antimari State Forest Management Plan allow the introduction of timber harvesting adapted to local conditions. Local people will acquire skills in carrying out harvesting at levels 1 and 2 that will prepare them to consider the logistical, technical, social and economic implications of level 3 harvesting. In one way, the different levels are equivalent to community learning phases, while in another they are the only possible systems that will work within existing social, economic and ecological constraints.

This management plan is already serving as a model for other projects linked to extractivist forests and is being discussed with IBAMA as a possible model for similar situations. For project PD 94/90, the proof of the management system will be in its implementation, which will commence in 1997. But, undoubtedly, its objective of reduced impact logging is more likely to be reached because of the forethought that has gone into achieving it.

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