

## 1 Introduction<sup>1</sup>

In international discussions, the Republic of Trinidad and Tobago has acquired a rare reputation for the sustainability of its natural forest management in the government forest reserves in which most high forest is held (Synnott 1989). This rests partly on its 'Periodic Block System' (PBS): a 'blueprint' system for selective logging in demarcated forest blocks on a 25–30-year cycle. In this article we examine the co-evolution of this system with forest administration, use and ecology, and the science/policy practices that it involves.

The PBS is both a timber production system, and a management system regulating forest exploitation by artisanal loggers (known locally as woodworkers) and others. We explore how science and regulation/policy have mutually informed each other in the development and operation of the system. While practices formalised as research have been important to the legitimacy of the PBS and to the national Forestry Division's culture of scientific professionalism, inquiry, creativity and adaptation by local forestry field staff ('field-level bureaucrats') have been significant in shaping the evolution of actual land management practices.

Moreover, while definitions, criteria and indicators of sustainability used both internationally, and in Trinidad's PBS are premised on ecological and social predictability – that forests and people will respond to rational management in rational, predictable and known ways – management practices have been responding continually to unpredicted ecological developments (failures of regeneration, fire events and so on) as well as socio-economic and political instabilities. Recent perspectives in forest ecology and climate history cast new light on these dynamics and unpredictable responses, but have notably not been taken up within the science/policy practices of the PBS. Rather, national foresters and their international sponsors continue to represent the system as stable, sustainable and productive. A major theme of this article is how and why it is that science/policy practices – in their particular political and institutional contexts – serve to maintain an image of stability in the face of uncertainty.

# 'Sustainable' Timber Production and Science/Policy Processes in Trinidad

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## 2 The emergence of the periodic block system

Timber on the island of Trinidad currently derives from a range of sources and land types: state forest reserves; plantations on reserved and unreserved state land; forest regrowth on abandoned private agricultural land; private areas of natural forest, and new planting on private land. The Periodic Block System (PBS) has developed and been applied within state forest reserves in the south-east, a highly-forested region dominated in parts by an astonishingly gregarious natural forest tree, *Mora excelsa*. This species accounts for 60–80 per cent of plants, and still more of the upper canopy. Mora is a high quality timber, used for shipbuilding in the 1800s and subsequently in building, bridge construction and as railway sleepers (Forest Department 1933).

In the nineteenth and early twentieth centuries, Trinidad imported much of its timber. While the original impetus to establish forest reserves derived from concerns over climate and soils, discussions in the 1920s instigated a shift towards managing state forests for timber production to offset imports and generate exports (Marshall 1925; Troup 1926; Robinson 1926). The greatest timber resources lay in the two big Mora forests in Mayaro and Matura. These were hardly used until the establishment of Trinidad's first major sawmill in the south-east, whereupon it became the most heavily cut timber in the colony (Trinidad and Tobago 1934a: 58), although nothing approaching the estimated potential annual production. From 1918, the colonial Forest Department developed and applied a succession of management systems. First 'selection felling', and then the 'open range system' (ORS) proved unsatisfactory. It was difficult for foresters to police felling over scattered areas, so in practice, loggers creamed the best trees with little regard to regeneration (Marshall 1925: 11; Synnott 1989: 93).

While the ORS remains operational to this day in certain reserves, the earliest foresters were proposing improved systems, frequently adapting practices in use elsewhere in the tropics. Marshall (1925), for example, suggested a 'Periodic system' – similar to those long in use in India and Burma (Troup 1926: 3) – through which a mixed wood of uneven-aged trees would be converted into even-aged woods of a pure crop. To achieve this, felling

by licensees would be limited to annual coupes within a given block for a 20-year period, with all timber disposed of. In theory, a block of even aged timber would regenerate (Marshall 1925: 11). A variant of this system was introduced in 1929 into Trinidad's Arena forest reserve. The cutting cycle was also reduced from an expected 60-year monocycle to a 30-year polycycle.<sup>2</sup> It is the 'polycyclic' selection system, which became referred to locally as the Periodic Block System (PBS).

It was not until the 1960s – following a series of internationally-influenced, and ultimately unsuccessful, experiments with clearfelling and pine plantation (Chalmers 1981, citing Bell 1969/71) – that the PBS was applied to Trinidad's Mora forests. In the south-eastern Victoria Mayaro reserve where it was first introduced, timber management is now almost completely under the PBS – although only 20 per cent of the land there is managed for production, with the rest set aside within on-shore oil concessions, a wildlife sanctuary (Trinity Hills), or as a strategic timber reserve.

## 3 Science, research and management practices in the PBS

The PBS emerged as a set of practices attempting to integrate the control of Mora forest ecology with the regulation of timber users. At first it was not such a radical departure from the open range system, involving a similar practice of maintaining 'replacement' trees ('take one, seize one'), although felling was confined to and monitored within annually-demarked blocks. In the early 1970s, an important innovation occurred in the introduction of 'silvicultural marking'. In theory:

...stems are selected for sale by a team of highly skilled markers who go through the block systematically and physically mark trees that should be removed. In principle, the trees that are marked are those which in the next 30 years would not do as well as others that they are shading, or competing with. They may either be mature, or faulty or likely to become so (Clubbe and Jhilmitt 1992: 5).

Marked trees were sold to licensed woodworkers, who had to buy licences permitting them to fell 500 ft<sup>3</sup> of timber over a two-year period, after

which the block would be closed from sales and allowed to regenerate for the cutting cycle of 30 years. In principle, one or two blocks (each of 200 ha) is opened each year.

According to those now working in silvicultural marking, it was local forestry staff who were behind its introduction, exemplifying a case of science/policy innovation by field-level bureaucrats. They relate how senior foresters were at first reluctant to recognise an innovation from a junior and stalled the introduction of the practice by, for example, refusing to supply the necessary marking paint.<sup>3</sup> Nevertheless, within a few years, silvicultural marking became an established part of the PBS and was taken over by a separate specialist branch of the Forestry Division – the Forest Resource Inventory and Management section (FRIM).

With the shift to silvicultural marking, the PBS became directed not only towards sustainable extraction from the Mora forest, but also to more active ecological management and shaping of it. The Mora tree is often so dominant as to constitute an almost-pure stand. The intent is to harvest the increment from each 25-year period, and to increase quality up to about 80 per cent sound trees.

‘Opening a block’ involves several operations. First, FRIM conducts an inventory of all species above 20 cm diameter, and commercial species above 10 cm, recording basal area and estimated volume of timber in each block. In practice this is not always done, as foresters consider themselves able to gauge the likely content of a block by comparison with any neighbouring blocks that have been opened recently.<sup>4</sup> Second, FRIM staff cut vines at their base, so they will not pull down the crowns of neighbours when their tree is felled. The block is then compartmentalised, and trees marked for felling by two FRIM officers, each accompanied by a daily paid worker. After marking, FRIM makes a logging operation plan detailing vehicle routes and collection points, recalling those from earlier cutting cycles. FRIM then hands over a master list of the marked trees to the local forestry staff who work as sales officers, allocating and selling trees to licensees.

Trees are marked on the basis of whether they would be better felled now, or in 25 years time.

‘Better’ refers to the balance of a number of criteria in a process that FRIM officers describe more as an art than a strict science: one where personal judgement and experience count.<sup>5</sup> Criteria include crown form and position; tree size in relation to the officer’s knowledge of the species; indicators of decay (e.g. hollow echo when tapped or active low branching); location (even an unsound or mature tree may be left standing on a river bank or steep slope); form of bole; species rarity; and diversity of valuable timber species. Further selection criteria balance timber production with wildlife conservation: trees that are sheltering burrows or nests, certain fruit trees for food, and vines for animal shelter are left unmarked. A key aim is to avoid opening up the forest too much to let in pioneer species that would impoverish the forest.

The knowledge and skills involved in silvicultural marking are seen by forest officers as acquired through experience and practice. Thus while students in the Trinidad-based regional forestry training school (ECIAF) might learn silvicultural management techniques, ‘they only learn the basics: real learning is by apprenticeship, once posted to FRIM’.<sup>6</sup> It is now Division policy for all forest officers to pass through FRIM, where they initially work alongside experienced officers, and then with daily paid workers whose deep knowledge base is sustained since ‘forest officers come and go, but workers are always there’.<sup>7</sup> Local officers see the need to create a handbook for silvicultural marking, to ensure maintenance of these accumulated skills. In some senses, then, those working as markers in FRIM have little respect for the Forestry Division’s usual strict hierarchy of ranked forest officers (3, 2, 1). Nevertheless, the officers appreciate the need to follow instruction from their seniors and the ‘Division Bible’, the *Forestry Handbook* (see, e.g. Forestry Division 1992), without interpreting these for themselves; otherwise it would ‘defeat the purpose of the system’.

Compared with the importance of judgement by those on the ground, ‘formal’ research seems to have been rather peripheral to the development of PBS practices. For example, in 1983 a system of Permanent Sample Plots (PSP) was established as part of a ‘statistically designed sampling programme for forest management’, unique in

Tropical America (Synnott 1989: 92). Yet while data on species composition and size are regularly collected from the plot, they are not analysed by the Forestry Division, at least partly because of the overstretched staff and limited resources of the central FRIM office. Designed for management use, the only use to which the data have been put is for academic research at the University of the West Indies.<sup>8</sup> Yet the PSP becomes significant to forest management through informal practice, as forest officers remark on and discuss the ecology and evolution of trees while collecting plot data.<sup>9</sup> Thus although the data sit unanalysed in offices, the experience of gathering them feeds valuably into the 'art' of silvicultural marking.

The importance local foresters attribute to knowledge-through-experience in the PBS fuels their cynicism concerning higher-level education in forestry science. Senior staff – those of the Assistant Conservator rank or above – must be graduates in forestry, but with no degree course available in the Caribbean, they are trained in North American or European universities and inevitably acquire a temperate or Mediterranean bias. A common quip among lower ranking foresters, as well as other critics of the Forestry Division is that such graduates become 'office foresters', not forest officers, increasingly divorced, by their qualifications and the locus of their work, from the everyday realities of Trinidad's forests and their field-level management. This cynicism extends further into international forestry culture, with those graduates who continue field-based work concerned that those they meet with PhDs in the increasingly international world of natural forest management know so little of field-level realities. But while somewhat disdainful of the way formal forestry science is conducted, then, local foresters are also concerned that their own inputs to it – as data collectors – go largely unacknowledged. And while local foresters may consider themselves to be doing the 'real', on-the-ground research in their daily work, this is neither encouraged nor recompensed. Their field science, as they see it, is increasingly divorced from the 'hard' science of the 'office foresters'.

The formality and 'trappings' of hard science are nevertheless important for policy influence and change, and in maintaining the external reputation of the Forestry Division. For example, some FRIM

staff would like the PBS applied in *Carapa guayanensis* (Crappo) forest, have an idea of the approximate rotation age for Crappo – 40 years – and feel they could develop appropriate practices on the ground through experimentation. Yet they recognise that formal research would be needed in order to gain legitimacy and permission from the Director of Forestry and the Minister to move ahead. In other words, changing the system needs formal scientific justification.<sup>10</sup>

#### **4 Woodworkers, sawmillers and the PBS**

The woodworkers, whose livelihoods depend on the allocation of timber in the reserves, have a very different perspective on the PBS. In particular, they critique its practice in the context of national political economy (in which they are disadvantaged), and question the balancing of priorities within the system, especially the trade-off between future quality and current production.

Woodworkers have developed their perspectives and critiques not only in relation to the Forestry Division, but also to sawmillers, within a changing political-economic context. Sawmillers in south-east Trinidad range from small operators working niche markets (e.g. sawing lowest grade timber for disposable pallets) to large-scale lumber industrialists who import timber from Guyana and distribute it throughout the country. Although assorted forms of vertical integration between woodworkers and sawmillers exist, woodworkers remain a distinct interest group in Trinidad's south-eastern forests, not least because they have organised themselves.

In 1964 licensed woodworkers formed the Nariva-Mayaro Woodworkers' Association which now works both as a lobbying organisation for woodworkers' rights and interests, and a partner with the Forestry Division in allocating licences within a list of 72 licensed woodworkers. The order in which licensees feature on the list – strictly by length of licenseship – is crucial, dictating which woodworkers can enter the block first to choose the trees they will fell; frequently, those after No. 20 on the list will obtain little wood of value.

Representatives of the Woodworkers' Association have a generally positive view of the PBS, with which

their organisation has co-evolved. The Forestry Division has a history of protecting woodworkers' rights as part of social policy, and of protecting the forest. As the Association's president put it: 'Without the PBS the whole area would become savanna and our children would not see forest. The PBS is good for both the small man and the state'.<sup>11</sup> Purchasing wood under licence from the Forestry Division is extremely profitable. The low price at which the state sells timber in effect subsidises the woodworkers. It is not surprising that woodworkers seek as much state licensed timber as possible, and that as we shall see, sawmillers attempt to cash in on the profits to be made.

Nevertheless, woodworkers critique the actual practice of the PBS on several grounds. First, they critique the ways that foresters balance what to fell and what to leave, complaining that the quality of timber made available to them is very low. This is accentuated by instances where certain sawmillers have gained priority access to blocks, 'creaming' the best timber before the block is opened to woodworkers. Once sawmillers have the wood they require, woodworkers have no market for theirs. Sawmillers frequently gain such access through direct orders from government departments for construction timber, allowing sawmillers to purchase timber directly from the state, without having to buy it from the licensees. Woodworkers see these 'government orders' as a mechanism by which certain sawmillers with high-level political connections can subvert the authority and market control of the Woodworker's Association.<sup>12</sup> Moreover, while woodworkers once enjoyed good relations with smaller sawmillers, these have increasingly been pushed out of business by a handful of lumber industrialists, which are the main beneficiaries of privileged state timber access. These 'big boys', as woodworkers understand it, are also close to the powers of the present government, which is relatively unsympathetic to woodworkers. The government, in turn, is supported by international consultants who have recommended a rationalisation of sawmillers for economic efficiency, and to reduce over capacity (Chalmers and Faizool 1992).

Second, woodworkers complain about delays and time-lags in Forestry Division bureaucracy. Licensees are required to pay their licence fees up-

front, but the Division is then frequently slow to open the block. Woodworkers sometimes have to provide free labour to ensure that blocks are opened. Even once the trees are felled, it can take a year before paperwork and measuring by forest officers is complete and the woodworkers are free to remove the trees. During delays such as these, woodworkers' money is tied up, and they are frequently left indebted. Furthermore, felled trees become hard to find as they have become buried in undergrowth.

A third area of complaint refers to radical changes in procedure following forest fires. The major ramifications of these for woodworkers and their livelihoods will be discussed after considering the broader questions of sustainability raised by these fires, and their implications for how Mora ecological dynamics might be understood.

## **5 Ecological dynamics in the PBS: equilibrial and non-equilibrial perspectives on Mora forest**

The management of Mora forest under the PBS is geared towards maintaining a stable state productive forest: a kind of equilibrium. Yet a major shock – in the form of extensive forest fires in 1987 – forced system adaptation. The fires, linked to a particularly deep and prolonged dry season, burnt about 20,000 ha of good forest, 10,000 ha under PBS.<sup>13</sup> In response, the Forestry Division re-planned block rotations, promoting the productive use of the fire-burned blocks through 'salvage cuts', and holding back the opening of what came to be called 'green' blocks.

When explaining the fire event, foresters image it as a one-off external variable to an otherwise stable system over the longer term. Such explanations and management practices are configured in accordance with equilibrium ecology. Yet Trinidad experiences very high inter-annual variability of rainfall and dry season length, and in this context one could expect major fire risks to occur several times in the course of a century, as indeed forestry records reveal. Moreover, recent scientific perspectives – embracing non-equilibrial dynamics, and increased attention to climate variation and the legacy of historic land use – would question such

equilibrial views. In contextualising fire events as part of a path-dependent history of forest disturbance, in effect as part of the system, they question both the premise of stability in Mora forests, and the management implications that flow from this.

The studies of early ecological scientists in Trinidad themselves suggested that over a long timescale, Trinidad's vegetation was not usefully understood in relation to equilibrium. Marshall (1934, 1939), for example, noted that Mora was an invasive tree, while the failure of Mora boundaries to correspond to obvious soil or physical features, and the presence of saplings in neighbouring associations, suggested its progressive march into these (Beard 1946: 181). Beard deduced from present distribution and rates of natural advance that Mora arrived 30–50,000 years ago.

Studies of climate history and palaeo-archaeology in mainland tropical America, however, suggest that non-equilibrium conditions may also apply over much shorter timescales, linked to a major dry phase 4–6,000 years ago, recovery since 2000 BP and unstable climatic conditions since then. Furthermore, recent research on Amerindian population history and land use, minimised in earlier studies of Trinidad, where Carib and Arawak Indians were all but eliminated following fifteenth century European conquest, suggests that this may significantly have influenced the evolution of vegetation. Historical studies now suggest that relatively large Amerindian populations were shifting cultivators of bitter cassava, sweet potatoes, cotton and a great variety of other crops, in an economy locked into wide reaching water-borne trade networks, which stimulated the settlement of major river valleys, as well as the coast (Boomert pers.comm. 1984).

These recent perspectives might lead to an interpretation of Trinidad's forest vegetation as a scar tissue, two or three generations of trees old, following sixteenth century Amerindian depopulation, building on a pre-Columbian vegetation history of a complex of anthropogenic management and vegetation response to climate rehumidification from c. 2,000 years ago. The formations found today may not be as long-lived and stable as assumed, and, more importantly, may

respond very unpredictably to major disturbance. Quite plausibly, the apparent difficulty Mora has in regenerating following fire could be interpreted as a manifestation of this.

Notably, though, the archaeological studies, which would be required to verify population estimates and the anecdotal evidence of dense inland settlements have not been carried out (Newson 1976; Boomert 1984: 144–5); nor have the vegetation histories and paleo-ecological studies which would provide actual data on pre-Columbian vegetation. The absence of focused study of long-term vegetation patterns in Trinidad, and the related absence (or minimisation) of non-equilibrial perspectives on ecology, in turn relates, at least in part, to the powerful co-production of science, policy and management around views of stability.

In the meantime, ad hoc management changes to cope with unpredictability have been among the factors provoking tension between woodworkers and the Forestry Division.

## **6 Socio-political dynamics in the PBS: relations between woodworkers and the Forestry Division**

Woodworkers argue that they have borne the brunt of changes in PBS management in response to ecological dynamics, geared ever more towards restoration and improvement following the fires. They complain that the Forestry Division has not kept to its stated policy of opening up two blocks per year. Moreover, long delays of up to 12 years have occurred between the burning (in 1987) and the opening of fire-burned blocks. As a result, much of the timber is rotten, with larger trunk-hollows.

FRIM officers are well aware of these critiques.<sup>14</sup> They acknowledge that more, 'virgin' blocks could be brought into the system, but argue that the licensees cannot be satisfied; to give them a little more would be the thin end of a wedge of expanding, insatiable demand. Given this perception, forest officers feel that it would be inappropriate to attempt to close the gap between demand and supply. This in turn allows them to

operate on the precautionary principle in forest management and conservation, taking a highly cautious approach to the release of new blocks and guarding large areas of Mora forest unexploited.

Unpredictable ecological events also affect the course of the forester's work, and in interaction with the exigencies of labour and resource availability this places further demands on woodworkers. Demands to perform unexpected timely operations such as surveying fire-burned areas, and substituting for absent labourers, interrupts the normal flow of forestry work. Foresters' performance varies with the weather, and the equally fickle availability of workmen and surveyors. In this context, forest officers see the current Forestry Division system of performance-related salaries and promotions linked to a pre-agreed work programme as invidious. It fails to acknowledge the day-to-day and year-to-year flexibility required to respond to ecological and social contingencies, and the initiative foresters must frequently take to cope with unpredictable field conditions. Foresters' responses frequently create extra delays, and place extra calls on the labour of woodworkers who must assist forest officers in their own work.

At the same time, there is a sense of common purpose between local representatives of the Forestry Division and the woodworkers, a relationship concretised in the organisation of the PBS. This is partly because local forestry staff feel sympathetic to woodworkers' plight with large sawmillers, and indeed vulnerable to the same political-economic processes themselves. Concerned about large sawmillers' links with politicians and the difficulties of controlling their activities, their current push to be granted forestry concessions of several hundred hectares, and the implications for the sustainability of timber production given the profit orientation of big business, many see support to the woodworkers as important for maintaining the integrity of the forest and PBS.

Yet other remarks and instances suggest persistent tensions between woodworkers and forest officers. Foresters are suspicious that woodworkers set the 1987 fires, for example. Woodworkers question the motives of foresters, perceiving their arguments about conservation and sustainability as a

'greenwash' to hide their real political-economic interests; interests which both local and national forest officials are seen to have in developing good relationships with large sawmill operators, from which they benefit economically or politically. For example, the slow opening of blocks, justified on grounds of fire damage and sustainability, is seen by woodworkers as an excuse for foresters who want to 'weed the licensees out of the system' and build up their relationships with the 'big boys'.<sup>15</sup> Thus woodworkers critique aspects of PBS science and its local praxis on the grounds that it is politically motivated.

Thus, in the Woodworkers Association-Forestry Division relationship some degree of alliance coexists with considerable and mutual lack of trust. To a certain extent, each side blames problems in the operation of the PBS on the other side's supposed links with politicians, and sees its claims about inappropriate PBS scientific practice as masks for 'unreasonable', individualistic profit-seeking behaviour.

While at one level, the PBS can appear as a 'blueprint' system of science and management – the image given in Trinidad's *Forestry Handbook*, and the image around which the Forestry Division has partially constructed its own image of scientific professionalism in forestry – it is at the same time a field of social and political struggle. In this, actual management practices (which trees are marked, when and how; which blocks are opened, when and how) may be responses to the more day-to-day dilemmas forest officers face in dealing with woodworkers, sawmillers and politicians, as well as with the exigencies of ecology. The 'system' as it emerges on the ground is partially an unintended product of these socio-political practices, even while national foresters continue to portray it as a pre-designed, rational blueprint.

## 7 Conclusions

Science and policy as co-produced within the development of the PBS have drawn on and reproduced framings of stability, in social and ecological systems. The premise of stability is important to the institutions involved in forest policy in a number of ways. First, it iconises a form of scientific professionalism in forestry, which has

long been central to the Forestry Division's image and claims to institutional authority, and is increasingly so as multiplying conservation-focused institutions compete for national and international funds and attention. Second, the system is a means to justify the continued use of state forest reserves for timber production against critical NGOs and others who would prefer them devoted to other uses, such as biodiversity protection. Third, the relationship with artisanal loggers can be cast as a form of 'community forestry' – useful to the department's image with NGOs and international donors – without implying a loss of state resource control.

Sustaining this image has depended on several processes less openly acknowledged by national foresters. The dependence of the artisanal community means they absorb much of the work resulting from the unforeseen externalities of the system. The system has also received, and may owe its economic viability to, heavy state subsidisation from Trinidad's oil and gas-rich revenue base. That forestry has not had to be financially autonomous

has enabled its science and practice to continue in particular ways, such as intensive PBS management over a relatively small area, and has allowed Trinidad to maintain a culture of scientific and sustainable forestry as opposed to economic forestry.

In contrast, both foresters working at field-level, and artisanal loggers, acknowledge the ecological and social unpredictabilities of the system. They make flexible adaptations to felling practices and agreements that continually subvert the system's 'rules', yet are necessary for it to work. These practices of adaptive management remain unformalised and unacknowledged within the larger forestry bureaucracy, as the latter's required image of scientific professionalism intersects with its strongly hierarchical authority structures, which tend to discourage initiative-taking by local staff. The co-production of science and management around notions of stability, and the importance of this to powerful national institutions, thus serve to exclude non-equilibrium alternatives from being seriously countenanced.

## Notes

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2. Most SFM employ polycyclic felling; the term polycyclic refers to the fact that only larger trees are cut during the initial harvest so that smaller trees may provide another crop in 25–40 years.
3. Interview, FRIM forest officer, Rio Claro, 28 June 1999.
4. Ibid.
5. Group discussion with FRIM staff and local forest officers, Victoria Mayaro Reserve, 30 June 1999.
6. Interview, FRIM forest officer, Rio Claro, 28 June 1999.
7. Ibid.
8. Interview, university-based forest ecologist, St Augustine, 4 May 1999.
9. Group discussion with FRIM staff and local forest officers, Victoria Mayaro Reserve, 30 June 1999.
10. Interview, senior forester, Victoria Mayaro Reserve, 30 June 1999.
11. Interview, President of Woodworker's Association, Rio Claro, 29 June 1999.
12. Group discussion, Woodworker's Association, Rio Claro, 5 July 1999.
13. Interview, FRIM forest officer, Rio Claro, 28 June 1999.
14. Group discussion with FRIM staff and local forest officers, Victoria Mayaro Reserve, 30 June 1999.
15. Interview, President of Woodworker's Association, Rio Claro, 5 July 1999.



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