

Changing Forestry Regimes in Vanuatu: Is Sustainable Management Possible?

Ralph Regenvanu, Stephen W Wyatt, and Luca Tacconi

The patterns of management of forest ecosystems in Vanuatu have been important for the lives and livelihood of local people from prehistoric times to the present. Through their regulation of the local climate, including water runoff and soil erosion, the forests make viable the local ecosystems that have sustained and shaped the human societies in these islands up to the present day. In addition, several islands of the archipelago are of ecological importance for the ecosystem of Oceania as a whole (Dahl 1986), although the archipelago's relative geological youth, isolation, and small land areas have meant that the forests here are not as extensive or biologically diverse as those of Papua New Guinea and the Solomon Islands. It is possible, therefore, that some lessons of international relevance regarding the sustainable management of tropical forest ecosystems may be derived from a detailed consideration of the Vanuatu situation. In this paper we attempt to stimulate better forest management in Vanuatu, and to be relevant to its neighboring countries in this endeavor, through a description of the development of regimes of forest ecosystem management in the country and a discussion of possible paths toward sustainable forest use.

Before proceeding in this analysis it is important to consider the concept of sustainability. Many definitions of the term have been offered (Pearce, Markandya, and Barbier 1989); however, that of Costanza and Patten is both recent and straightforward: "a sustainable system is one which survives or persists" (1995, 193). Sustainability may be regarded as a general principle guiding resource management, but the ability to apply the notion to a variety of systems at a number of levels, and the existence of multiple resources and stakeholders, precludes the possibility of devel-

oping a single all-inclusive definition of the term (Pretty 1994; Tacconi 1995a). For our purposes here, three interlinked notions of sustainability will be used: ecological sustainability, which centers on the conservation of biodiversity values; sustainable timber production, which concerns the ability of the forest ecosystem to produce timber in the long term (several hundreds of years); and sustainability in the broader sense of the ability of a society to reproduce its prevailing social order and underlying economic system in the long term. Many of the variables involved in measuring sustainability according to these definitions cannot be quantified, making it impossible to state definitively that a particular practice is sustainable. Whenever possible in this paper, we indicate whether sustainability in the defined senses seems to have been achieved, or whether we think it achievable.

We begin in the next section by considering the social and cultural setting for forest management regimes up to the present. We then analyze the current forest management situation in detail, and follow with the results of several studies of resource owners' views relating to the use of forest areas. In the final section we outline some options and opportunities that may be considered in the move toward the sustainable management of forest ecosystems, and draw some conclusions.

THE PRE-EUROPEAN SOCIAL CONTEXT

Archaeological and other evidence indicates that soon after Vanuatu's initial colonization about three thousand years ago, rapidly increasing populations led to the radical transformation of the landscapes and indigenous flora. This conclusion is supported by evidence of significant soil erosion and burning soon after first settlement on the islands of Erromango and Aneityum (Spriggs 1986) and a pollen sequence from Aneityum that shows a rapid progression in the same period from forest to more open vegetation accompanied by marked erosion and burning (Hope and Spriggs 1982). There is also evidence that by the beginning of the nineteenth century most of the habitable land areas of the archipelago were inhabited, often very densely, and that the population of these eighty or so islands was around five hundred thousand, compared with a current population of about one hundred sixty-five thousand (Spriggs *nd*). When the first European explorers arrived, large tracts of anthropomorphic grasslands and larger cultivated areas already existed. The archaeological

record suggests, however, that following the initial period of resource-depleting colonization, and possibly prompted by an ecologically induced social crisis, the societies of Vanuatu had become much more conservation-oriented or “sustainable” in their patterns and practices of resource use.

Many aspects of pre-European cultural practice and lore (what we will call “traditional”) continue to determine the way people use the land and its resources today. Although Vanuatu boasts significant variation in land tenure systems, the right to decide who may use a plot of land (a right that can be correlated with the notion of “ownership”) will generally accrue from a person’s position within a kinship group or, less commonly, from a person’s position in the sociopolitical structure. However, the distribution and use of land according to need was also a ubiquitous feature of traditional societies, and while the primary tenet of traditional land tenure remained a person’s kinship ties, “underlying the total structure was the implied notion of extreme flexibility, allowing for alternative solutions to almost any situation in which the overt rules of custom created undue obstruction for the individual in gaining access to the necessary land to enable him [or her] and his [her] family to meet their daily needs” (Van Trease 1987, 12).

Most traditional ni-Vanuatu societies practiced a form of shifting cultivation that required access to a significantly greater area of land than was actually being cultivated at any one time to allow for the adequate regeneration of a particular plot of land following its use. Although the length of the period of regeneration varied according to soil fertility, suitability for cultivation, and population density, in most areas of traditional Vanuatu much of the land allocated to cultivation would have been covered by secondary forest, often in quite mature tree stands. Arboriculture has always been an integral part of the traditional subsistence economy, and the first Melanesian colonizers brought with them the most valuable food trees, including the breadfruit (*Artocarpus altilis*), *nangai* (*Canarium* sp), and *navele* (*Barringtonia* sp). Many of the species today sought commercially for their timber were traditionally preserved as nut trees. However, most plants and trees were used in some fashion (whether for the wood, fruit, leaves, bark, or other parts), and for almost every imaginable purpose from food, medicine, and ritual objects to toys and ornaments.

In addition to land tenure conventions and subsistence agriculture and arboriculture, a conservation-oriented use of trees and forest areas was also ensured by other traditional customs. The traditional landscape was

replete with places or sites that were *tabu* (taboo) meaning that access to them—either physically or through oral narrative—was restricted in some way. In many cases the taboo meant that the area immediately surrounding a site was off-limits to almost everyone and, in a few cases, everyone. As a result, such sites would appear (and still do) as wooded groves, some of considerable size, within an environment of secondary forest. Individual trees outside such groves could also be declared taboo by virtue of their role in mythological accounts. Oral traditions indicate that large tracts of the landscape may have been declared off-limits at different times by such customs, effectively creating reserved areas. Taboos could also be declared over areas of forest and near-shore marine environments in order to allow for the regeneration or perpetuation of certain resources. Once it had been decided to protect an area, it would then be declared and marked, most famously by strategically placed branches of the *namele* tree. What would have developed, we can imagine, would have been an elaborate system of reserve areas within cultivated secondary forest, interspersed with dwellings and delineated by a variety of topographic barriers.

THE POST-EUROPEAN SOCIAL CONTEXT

The latter half of the nineteenth century was a period of profound social dislocation for the indigenous populations of Vanuatu and saw dramatic changes in the way the territory's forest ecosystems were managed. In the first instance, much of the traditional lore and many of the resource and land use practices just described were lost or discarded as part of the severe cultural dislocation that resulted from depopulation, missionization, and the labor trade. Knowledge of land ownership, the rights and principles of complex land tenure systems, and even of "place" was lost, as was much of the accrued cultural knowledge of thousands of years of living in these island environments. Instituted in 1906, colonial rule facilitated massive land alienation, compounding the breakdown in the knowledge of the way land was used and distributed traditionally and contributing to a massive escalation in disputes over land ownership once land was returned to customary tenure at independence in 1980.

Vanuatu's first commercial tree harvest began in 1825 with the cutting of sandalwood (*Santalum austro-caledonicum*) for export to China. The resource owners agreed to the extraction of wood and provided the labor

in exchange for western technology in the form of trade goods. This marked a new phase in the use of Vanuatu's forest ecosystems, when the wood of a single species was systematically extracted on a relatively large scale to be used far from the region. It also led to the exhaustion of sandalwood stocks on the main supply island of Erromango and the collapse of the sandalwood trade only forty years later. Subsequently, the commercial use of the forest ecosystems expanded with the logging and sawing of trees for timber. Large-scale clearance of forests for the establishment of pastures and coconut plantations had already occurred following land alienation, but the logging industry used timber from land still held by the traditional owners and also employed them in the industry. By the time of the appearance of the large-scale logging companies in the late 1980s, many of the easily accessible forests in Vanuatu had been exploited, sometimes for log export, but otherwise for sawmilling for domestic consumption or export.

THE CONTEMPORARY FORESTRY SITUATION

The Onset of Large-Scale Logging

In contrast to Papua New Guinea and the Solomon Islands, Vanuatu has been a relative latecomer to the large-scale harvesting of forests for the export of round logs. The first such export-logging operation was by a Taiwanese company that in 1989 planned to begin exporting 70,000 cubic meters per year from the island of Malekula. In late 1989, while the company continued to import equipment in preparation for its logging operations, a senior government official was charged and convicted of receiving bribes from company executives (Callister 1992, 29). Despite this and other evidence of the company's failure to comply with existing government procedure to acquire logging rights, operations were only finally halted by local landowners, following serious damage to taboo sites during the construction of log-handling facilities.

The next attempt to commence large-scale logging in Vanuatu was in early 1993, coinciding with a dramatic increase in the price of hardwood logs from Asia and the Pacific—the price of *taun* (*Pometia* sp) from Papua New Guinea (a market indicator) rose from US\$128 per cubic meter in October 1992 to US\$325 in June 1993 (ITTO 1993). Logging companies from Malaysia, China, Japan, and New Caledonia, including Rimbunan Hijau, the Malaysian firm with extensive holdings in the

Papua New Guinea logging industry, began seeking logging licenses in Vanuatu, gaining the support of government ministers and signing logging agreements with local resource owners on several of the major islands. By late 1993 these operations were reported to be proposing to log a total of 290,000 cubic meters per year, although it is unclear how much of this was actually licensed by the government (*Vanuascope*, 22 Dec 1993).

The proposed logging operations in Vanuatu have, almost without exception, not gone ahead. The period from 1993 to 1995 saw a number of changes in forestry administration and policy in Vanuatu, frequently with complete about-faces occurring. The first of these was in 1993 when the minister of forests reversed a national ban on log exports (initially imposed on all species in 1990), apparently to allow for the establishment of logging operations by a Malaysian firm. When the company arranged for logging equipment to be brought to Vanuatu in July 1993, the equipment was refused entry by the government amid great public controversy. In late 1993, the company again brought in equipment, this time without difficulty, and commenced logging on Erromango the following April. Then in July 1994, just as a ship arrived to collect the company's first shipment of logs, the prime minister abruptly reimposed the ban on log exports. During the second half of 1994 and throughout 1995, logging companies continued to construct roads and facilities on several islands of Vanuatu, and also purchased existing sawmills, but did not attempt to export logs again. However, the capacity of the facilities now established by logging companies is such that it would be relatively easy to recommence log exports if government policy were changed.

The Sustainability of Forest Harvesting: A Sustainable Timber Yield?

The proposed scale of the commercial forestry operations just mentioned raises the issue of the sustainability of forest harvesting in Vanuatu. The country's forest resources were quantified in the early 1990s with a National Forest Inventory, carried out with assistance from the Queensland Forest Service and the Commonwealth Scientific Industrial Research Organisation (Australia), and funded by the Australian International Development Assistance Bureau (AIDAB, now AusAID). This study found an estimated 117,000 hectares of natural forest covering about 10 percent of Vanuatu's land area, but noted that not all of this was suitable for commercial timber production (Baldwin, Hidson, Seibuhr,

and Pedro 1993). This resource is much smaller than those of Papua New Guinea and the Solomon Islands, which have commercially productive forests of approximately 7 million and 0.5 million hectares respectively (Duncan 1994). The inventory also enabled the calculation of a sustainable yield of timber from the natural forests of between 38,000 and 52,000 cubic meters per year (Incoll 1994). This estimation excluded forest land that was considered too steep, too close to watercourses, or otherwise unloggable, and assumed that forests would be able to be relogged after fifty years. It also excluded fruit and nut trees and land required for subsistence agriculture, and included allowances for future population growth.

However, this sustainable yield figure is very problematic. In the first instance, it is a national maximum based on the commitment of all forest areas in the country. This does not recognize that there will be resource owners who do not wish their forests to be logged, areas where disputes over land ownership will prevent logging taking place, and that some resource owners may want their forests logged as soon as possible and not to have to wait until close to the end of a sustainable-yield term of fifty years. More fundamentally, very little is known about the ability of Vanuatu's forests to regenerate after logging, with the only significant study to date finding that regeneration was reduced by damage during logging and the growth of vines afterward (Applegate 1992). While there is a need for further research to accurately ascertain the forests' capacity to regenerate after logging, recent changes in the forest industry, including a code of logging practice, specifically aim at reducing logging damage and promoting regeneration, and may be of much greater value in stimulating better long term management of the forest resource.

The Problem of Controlling Logging Activities

Although Vanuatu has been more fortunate in controlling large-scale logging activities than either Papua New Guinea or the Solomon Islands, events since 1989 have demonstrated the same difficulties in the control of the forestry sector as have been experienced by its neighbors (see other papers in this issue). Currently the country is at a crossroads in terms of the controlled management of the national forest resource. The national log export ban remains in place and a new government (installed in February 1996) has indicated its intention to control activities in the forestry sector more carefully. Simultaneously, the Department of Forests has been

developing new procedures and guidelines for both gaining access to the timber resource and for its use. Despite this, licenses currently issued to logging companies still total over 225,000 cubic meters, compared to a maximum sustainable yield of 52,000 cubic meters—although the volume actually cut in 1995 was only 31,857 cubic meters. The problems of achieving effective control indicated by this anomaly can be attributed to the possibility of corruption at the political and administrative levels and the shortage of staff, procedures, and other resources needed to implement control.

The Vanuatu Forestry Act gives the minister for forests the power to issue timber licenses for logging activities, but it is generally accepted that this power should be used on advice from the Department of Forests. During 1993 and 1994, however, it appears that the minister made a number of approvals without advice from the department. Several of these approvals did not follow the procedure required in the Act, and in one case two different companies were given exclusive rights to the same area. At this time the deputy prime minister publicly announced his concern that “senior officers in the Government, including some Government Ministers, First Secretaries and some Directors” were involved in breaches of the law with regard to the issuing of timber licenses (*Vanuatu Weekly*, 14 Aug 1993). Simultaneously, the prime minister said that ministers had to be tough when dealing with foreign investors, while the finance minister blamed the Ministry of Forestry for the confusion (*Vanuatu Weekly*, 14 Aug 1993). The minister of forests was subsequently replaced, and the prime minister took over responsibility for forestry matters.

This episode indicates that the significant problem of corruption in the forestry administration extensively documented in Papua New Guinea by the Barnett inquiry (Barnett 1989) is a concern in Vanuatu. To date, however, there has been only one proven case of corruption in relation to forestry in the country: that involving the Taiwanese company discussed earlier (Callister 1992). The susceptibility of the administration to corruption is nevertheless significant: the increasing tendency to view entering provincial or national politics as a key avenue for personal enrichment, the relative under-remuneration of the public servants who staff the departments involved, and the cultural practice of gift giving to solicit favors all facilitate the abuse of procedure.

An additional complicating factor in Vanuatu was the strike by the Vanuatu Public Service Association in November 1993. Nearly all the

professional staff of the Department of Forests joined the strike, which was never resolved and resulted in most strikers being terminated by the government in March 1994. This left the Department of Forests with no experienced field staff to supervise logging operations, and very few staff with the experience and skills to deal with logging applications by companies or to advise the minister. Although this situation was alleviated slightly in early 1994 by the return of several staff from universities in Australia and Papua New Guinea, administrative continuity had been disrupted and the department lacked the human resources, equipment, and skills necessary to effectively monitor logging operations (Duncan 1994).

Current Forest Policy and Administration

Some of the difficulties faced since 1993 can be attributed to the lack of clearly defined government policy and guidelines for the forestry sector in Vanuatu. Government policy is ambiguous, consisting of generalized statements of intent as part of the Five Yearly National Development Plans (the most recent being from 1992 to 1996) and the contents of the Forestry Act and the associated regulations. A significant consideration for the government is the tax revenue obtained from the forestry industry, although at only 0.4 percent of total government revenue in 1993 (Duncan 1994), this is quite small. Of greater significance, probably, is the establishment of infrastructure such as roads and wharf facilities, and sometimes schools, health clinics, or public buildings in areas where logging is occurring, and the employment provided in both the islands and the urban centers where processing facilities are located. This enables the government to be perceived as promoting "development," especially because those areas with the greatest forest resources of the country are usually the least developed in other respects. Recently, the provincial governments have also begun requiring licenses for logging activities, mainly as a means of earning revenue. However, a national timber license is still required in addition to a provincial license.

Several significant changes were made in 1995. A draft National Forest Policy was prepared, although at the time of writing it had not yet been released or publicly adopted. Furthermore, the Department of Forests is introducing new regulations, including a code of logging practice initially developed under the auspices of the South Pacific Forum. These developments will greatly assist the department in ensuring that the logging industry complies with government policies and regulations. In addition,

the department has been able to recruit more professional staff, and the skills and resources necessary for these staff are being provided by a large Australian-funded program of technical assistance to the department.

Conflicts Associated with Logging

The large-scale logging activities carried out since 1989 have led to a number of conflicts over the use of the forest resource. These conflicts have involved all the main stakeholders: the government, the landowners, and the logging companies themselves. Such conflicts are not easily resolved or correctly interpreted by those who are not directly involved, yet it is important to examine some of them in order to better understand their implications for the future management of Vanuatu's forests.

At a political level, corruption and divergent views on the desirability of a particular logging operation (often based on its location and the affected electoral constituency) have led to conflicts within the government, as in the case just cited that resulted in the replacement of the minister for forestry in 1993. Most forestry-related conflicts, however, have arisen between resource owners and logging companies.

The commencement of large-scale logging on an island with a predominantly traditional population creates a new situation in which issues of power, money, and the way land is used can become contested. On the island of Erromango, where different groups of resource owners have signed logging agreements with four separate logging companies, a number of conflicts have arisen based on traditional political rivalries between the resource-owner groups. One group of resource owners supporting one company sought a court injunction against another company to prevent road-building activities (Vanuatu Supreme Court Civil Case 29 of 1994), and in another part of the island, one logging operation was criticized by the chairman of the Island Council of Chiefs, who was himself a representative and shareholder of another company. As described earlier, the first attempt to begin large-scale logging in Vanuatu was unsuccessful because of the lack of recognition by the foreign company involved of the importance of cultural sites to ni-Vanuatu landowners. In April 1996 a number of Erromangan resource owners wrote to key government officials expressing their desire to withdraw from existing contracts with a foreign company because of damage to the environment and cultural sites. On the island of Espiritu Santo, two chiefs and other community leaders were arrested by the president of the provincial government fol-

lowing protests by local people against a logging company from New Caledonia, and in November 1995, landowners in the northern part of the island burned a bulldozer belonging to a subsidiary company of Rimbunan Hijau. These resource owners claimed that the company was operating on their land without their permission, and their claim was upheld in a precedent-setting decision by the Vanuatu Supreme Court (*Vanuatu Trading Post*, 17 Jan 1996).

The prevalence of disputes between resource owners and companies, and between the resource owners themselves, appears to result at least partly from misunderstandings in relation to the contractual nature of logging agreements, the real nature of the logging operations agreed to, and the implications of the identification of a specific set of resource owners in these agreements. A survey of resource owners who had signed logging agreements on the island of Erromango found that only 2 out of 57 respondents felt that the agreements had been explained clearly to them, and that none of them actually possessed copies of the agreements as required by the Forestry Act (Nalial and Wyatt 1995). A number of resource owners interviewed in Erromango had signed agreements with two different companies, or expressed their desire to “change” companies. This confusion is almost certainly related to the unfamiliarity of traditional resource owners with western-style legal contracts, and is in marked contrast with the “extreme flexibility” of traditional land tenure discussed earlier. It is likely that resource owners expect that agreements with logging companies are similarly flexible, or can be changed if they do not meet their needs or expectations.

RESOURCE OWNERS' PERSPECTIVES ON THE USES OF FORESTS

All too often resource owners' views are presumed, rather than actually sought, assessed, and factored into the decision-making process. We now provide an indication of the actual views of resource owners, based on two recent surveys conducted on the island of Erromango in November 1993 (Tacconi 1995a) and December 1994 and January 1995 (Nalial and Wyatt 1995).

Tacconi (1995a) questioned 75 resource owners, of whom 47 owned forests with merchantable timber and only 4 had had logging operations carried out on their land in the past. In two of the latter cases, logging had occurred when the respondents were young boys, while in the other

two cases, logging operations had taken place on a very limited part of the respondents' land. In all cases the income gained from logging was very small, and no new income-generating activities were started subsequent to logging.

Most resource owners had either signed a logging contract (78.7 percent) or were contemplating signing one (12.8 percent). Only four resource owners had not signed a logging contract because of their aversion to logging activities, and two of the resource owners who had signed indicated that they had reconsidered their decision and did not want logging to go ahead. A relatively large number of resource owners (19) did not have plans to use the land where logging was proposed to take place. This is probably because land is relatively plentiful in Erromango, and access to some areas, and to markets, is difficult. However, the majority of the resource owners indicated that they did have plans to use parts of the affected areas subsequent to logging, most popularly for smallholder cattle grazing and the replanting of trees. However, the resource owners did indicate that they hoped the company would be responsible for replanting, although logging agreements are usually unclear in this regard and little replanting actually occurs.

Resource owners appeared to have a reasonable degree of understanding of the potential positive and negative implications of logging activities, partly due to their direct or indirect experience of previous logging operations on the island. However, this seemed to be more weighted toward the positive aspects, in particular the income-generating potential of logging and the expectation that the logging company would build a road. Currently, the majority of villages on Erromango do not have road access, and pack animals are not used. The most important negative aspects identified were river pollution and damage to trees that were not to be logged, although potential damage to cultural sites and soil compaction were also cited.

Many of the issues of income generation, environmental damage, and responsibility for replanting are addressed in the standard logging agreement prepared by the government for use by resource owners and logging companies. As discussed previously, Nalial and Wyatt (1995) surveyed Erromangan resource owners in relation to their understanding of the content of the logging agreements they had signed. Through their village meetings and interviews, they found that "landowners do not feel that

they have enough information about the Logging Agreements that they have signed” (Nalial and Wyatt 1995, 13). The report of their survey recommended that the Department of Forests should devote more resources to a more detailed explanation for resource owners when logging agreements were being signed. However, the fact that the resource owners did not have enough knowledge about the logging agreements does not imply that they have a limited understanding of the issues concerning logging activities.

Traditional Uses and Collection of Wood and Non-Timber Forest Products

Community uses of wood for house construction and fuel have been considered by a statistical study (Lillesø, Chanel, and Pedro 1992) and by a rapid rural appraisal study carried out on Espiritu Santo (Thistlethwaite nd). Lillesø, Chanel, and Pedro found that the majority of the most preferred species are derived from secondary forests, with only a few species being collected in primary forests (1992). The Thistlethwaite study, which is more specific about vegetation types, reported that the bulk of wood used by the surveyed communities comes from garden areas (currently cultivated or under fallow). Thistlethwaite also remarked that wood is generally collected in an area within thirty to sixty minutes' walking distance from the village and that the species used are mainly noncommercial ones (nd). The results of this study are influenced by the fact that only two of the six villages included in the sample had significant forest resources within a radius of three kilometers from the village.

In Erromango, similarly, Tacconi (1995a) found that respondents only made sporadic use of primary forest for the purposes of collecting non-timber forest products (including medicinal leaves, firewood, fruits, and nuts). Those who did collect such products in the forest usually only did so while there for other purposes such as hunting wild cattle and pigs and fishing for freshwater prawns and fish. The explanation for this behavior, provided by several respondents as answers to the questionnaire and in informal interviews, is that non-timber forest products are normally available (wild or planted) in garden areas or in secondary vegetation near the villages. These findings imply that if logging operations were carried out in primary forest areas, the availability of such products would not be significantly reduced.

Attitudes toward Conservation and the Needs of Future Generations

In the Erromango questionnaire, Tacconi (1995a) also sought to identify the importance attached by resource owners to the conservation of forest areas. Out of 71 responses, 28.2 percent indicated an interest in conserving part of the forest, both for its directly beneficial value (for example as a source of timber and as land for the future cultivation of subsistence gardens) and for its indirect value (for the protection of watercourses, for example). A similar percentage expressed interest in conserving the forest purely to maintain environmental values: respondents noted, for example, "It is good to protect the forest in order to look after the birds" and "I like the forest the way it is." A further 32.4 percent expressed an interest in conserving forest areas in terms of their importance for their cultural heritage and for the benefit of their children. Together, the last two groups show that a majority of the respondents (about 60.6 percent) support the conservation of part of the forest on the basis of concern for the environment and for the benefit of future generations.

When specifically asked about a proposal to establish a protected area on Erromango to preserve a forest of kauri (*Agathis macrophylla*) trees, more than 80 percent of the respondents supported the proposal. Their reasons included: the potential income generation for the resource owners (particularly from tourist development), the conservation of trees to be planted in the future, the conservation of cultural heritage, and the provision of the opportunity for their children to see the kauri trees. That allowing their children to see the kauri forest was cited by resource owners as a reason for its conservation indicates the importance accorded by current resource owners to the needs of future generations. In response to a further question specifically concerning the importance of the reserve as a way of enabling the children to see the big trees, 80 percent of respondents felt that this was "important" or "very important."

WHICH WAY TOWARD SUSTAINABLE MANAGEMENT?

Our analysis of resource owners' views indicates that ni-Vanuatu want to manage their forests for a number of ends: to generate needed cash incomes, to maintain the viability of agroforestry systems, to ensure the forests' conservation for their own benefit and for that of their children, and for the benefit of the environment itself. Whether these multiple uses

of the forest can be achieved depends to a large degree on how this can be done, and the social, economic, and environmental sustainability of the various options for using the forest resource. We now look at some of these options, and offer comments on their practical relevance and some possible ways of implementing them.

Large-Scale Forest Harvesting

Large-scale forest harvesting, under appropriate controls, is currently the most discussed option for the sustainable use of Vanuatu's forest resource. This sustainability, however, will be reliant on the effectiveness of controls, such as the new Code of Logging Practice and other regulations being developed by the Department of Forests, and better monitoring. Even so, many reviewers contend that no logging systems have been *proven* to be ecologically sustainable (Aplet, Johnson, Olson, and Sample 1993; Keto, Scott, and Olsen 1990; Poore 1989; Vanclay, Rudder, Dale, and Blake 1991), and this is certainly the case in Vanuatu.

Although the current level of log harvesting in Vanuatu is below the estimated sustainable yield, this does not mean that the current level of harvesting is sustainable. A fundamental factor affecting the sustainability of timber yields is the maintenance of a range of forest tree species and sizes, both by minimizing damage to remaining stems and by ensuring regeneration. Existing logging systems in Vanuatu frequently entail extensive damage to remaining trees and create conditions that are detrimental to the regeneration of forest tree species (see Applegate 1992). As Incoll concluded, "On these bases alone, regardless of volume cut, forestry in Vanuatu is currently not sustainable" (1994, 8). The regeneration of forest ecosystems may be enhanced by an improvement in harvesting practices and by undertaking enrichment planting. These changes may be achieved by control instruments, such as the Code of Logging Practice, and by economic incentives, such as reduced fees or fee exemptions for those companies that adopt harvesting practices that facilitate forest regeneration.

A further issue to be considered in relation to sustainable yield harvesting is the contribution of individual species to the total harvest. Currently, about 50 percent of the total log harvest is derived from only one species, *Endospermum medullosum* (Tacconi 1995b). This heavy reliance on a single species is not sustainable from either ecological or economic perspectives.

The issue of land tenure and of resource owner involvement in the planning and control of logging is also important. Conventional long-term forest harvesting strategies aim to log a roughly equivalent timber volume or forest area each year over a "harvesting cycle" or "return period," which is currently assumed to be fifty years for Vanuatu (Baldwin, Hidson, Siebuhr, and Pedro 1993; Incoll 1994). Such planning is difficult in Vanuatu, where all forest resources are controlled by resource owners who have their own needs and who may wish to see their forest logged as soon as possible or not at all. Recent activities by several government and nongovernment agencies are now involving resource owners and communities in planning logging operations on their land, and it is hoped that this will lead to more effective ways of planning for sustainable logging.

Portable Sawmills

As in other Melanesian countries, portable sawmills have been promoted in Vanuatu as an alternative to conventional large-scale logging on environmental, social, and economic grounds. Also known as *wokabaot somils*, portable sawmills (discussed further in Sargent and Burgess 1988 and Wyatt 1993) are generally classified as having a purchase price of under about US\$15,000 and being transportable by humans alone, without the use of vehicles or animals. Currently there are more than 350 portable sawmills in Papua New Guinea (FSP-NFA 1995) and between 20 and 30 in Vanuatu.

A major benefit of portable sawmills is that they are perceived as having less environmental impact than conventional log-harvesting systems. In most portable sawmill operations, the sawmill is transported to the site of the tree, which is felled and sawn in place rather than being transported, using heavy machinery, to a centrally located sawmill or export facility. This vastly reduces the forest disturbance usually associated with conventional logging in Vanuatu (Applegate 1992). In addition, nongovernment organizations, which have taken the lead in promoting portable sawmills in Vanuatu as in other parts of Melanesia, conduct integrated programs that include training in techniques to minimize environmental impact (VDT 1994).

The major social benefit of portable sawmills is their ability to be used according to traditional land use principles, which is related to the affordability of such mills for resource owners. As customary landowners are

both the traditional and legal managers of the forests, portable sawmills are a way in which resource owners can harvest their own forests without relying on an outside party such as a foreign-owned logging company. Ownership and control of the harvesting equipment allows resource owners to control the conduct of forest harvesting operations—control that can minimize damage to the environment and cultural sites and accommodate the “flexibility” in land tenure discussed earlier, thereby minimizing intracommunity conflicts. However, like most new technologies, the introduction of a portable sawmill can also change existing structures of power and wealth within a community, thereby creating new conflicts.

Portable sawmills are often claimed to provide greater economic returns to resource owners than those received through large-scale logging operations, although this claim has not been conclusively proved. In Vanuatu, as in the rest of Melanesia, a number of factors reduce the profitability of portable sawmills, including poor business management, low operator-skill levels, inadequate quality control, and difficulty of marketing. Several portable sawmill operations in Vanuatu have been unable to repay bank loans because of insufficient operating turnovers, with the result that the sawmills have had to be repossessed or sold. However, a significant number of noncash values are also associated with portable sawmills, such as other forest products, local employment and business generation, and other social contributions. There remains a need for further research to accurately determine the significance of this technology.

Conservation Areas, Protected Areas, and Reserves

Conservation areas, protected areas, and other forms of reserves are becoming an important component of any strategy for the sustainable management of forests. A number of such areas are now established either formally or informally in Vanuatu, and although their precise form may vary, their common intention is to prevent certain forms of land use activity (such as large-scale logging) while maintaining traditional uses of the forest ecosystem.

On the island of Erromango, a protected area has been established with the objective of conserving a forest of kauri trees while still allowing resource owners access for traditional subsistence activities. To establish this reserve it was necessary to compensate the resource owners, ostensibly for the potential royalties on timber that they would have to forego, but also because of an expectation of compensation that had been gener-

ated among the resource owners by over twenty years of attempts to create this reserve, including two separate feasibility studies. This compensation took the form of a lease agreement between the resource owners and the government, signed in 1995. Compensation was also deemed necessary because of a socioeconomic assessment study which established that there was no economic interest by the resource owners in conserving the area (Tacconi and Bennett 1995).

The Big Bay National Park on Espiritu Santo (also known as the Vatthe Conservation Area) is the first reserve area to be protected under Vanuatu's recently legislated National Parks Act. This area was identified for protection by the national government's Environment Unit, which then approached the traditional resource owners for their agreement and participation. The establishment of this area has not required a formal lease, but has involved extensive consultation and input by the landowning communities and their continued participation in the management of the park. It is expected that tourist activities and nut harvesting will provide revenue to the community to offset any foregone revenue or costs of the national park.

Protected areas with a less formal level of protection have been created on the island of Malekula. Here areas were identified, assessed, and established consistent with local people's needs and wants in relation to ecosystem conservation and without the requirement of compensation of any sort (Tacconi 1995b). These protected areas have been given formal backing under a provincial government by-law, and at least one of these "new" protected areas is a traditionally taboo place, providing an example of new legislation supporting traditional customs for conservation purposes.

Publicity associated with the establishment of these reserves during recent years, combined with grassroots environmental awareness-raising programs by government and nongovernment agencies, is now resulting in resource owners in many parts of Vanuatu declaring their own protected areas or conservation sites. The government's Environment Unit is having to undertake studies to gauge the significance of proposed reserves to identify an order of priority to cope with the inundation of requests. This indicates the general support for conservation among ni-Vanuatu throughout the country, but also perhaps a lack of understanding about what the declaration of a reserve may imply for future land management. Further work and assistance by government and nongovernment agencies

will be important if these local reserves are to be integrated into national planning for a sustainable forestry sector.

Key to the success and long-term sustainability of these reserve areas is a participatory approach that ensures they are consistent with local people's needs and wants in relation to ecosystem conservation and resource use. With both the Erromango Kauri Reserve and the Big Bay National Park, the reserve concept was initiated by interested parties from outside the concerned area. In the Erromango case, this has necessitated the lease of the protected area for an initial period of five years, after which the perpetuation of the protected status of the area is by no means ensured. Reserve areas established by resource owners themselves, on the other hand (as has occurred on Malekula and is increasingly occurring at present), demonstrate a commitment that is more likely to translate into a longer term sustainability, which will be crucial in contributing to both a sustainable forestry sector and a sustainable society.

Other Income-Generating Activities

The generation of a cash income from forests without exploitation of the timber resource is often seen as the means to ensure the sustainability of protected areas. In Vanuatu two principal approaches are being taken: the use of non-timber forest products (in particular nuts), and the development of ecotourism.

Nut harvesting for domestic consumption (as a foodstuff) and for export (principally for oil) is being encouraged by both the government and interested private companies, and product lines of locally harvested nuts are already available for purchase in the main commercial centers in Vanuatu. Trees sought after for nuts include *tamanu* (*Calophyllum* sp), *nangai*, and *navele*, all species that occur naturally as part of Vanuatu's forest ecosystems. Other forest-tree products being developed include fruit jams and confectioneries. Promoters of the domestic non-timber forest product industry have been urging resource owners to not only harvest but also plant the appropriate species. As most of these species are already part of the traditional aboriculture regime, the development of a commercial industry is unlikely to result in significant changes in existing traditional forest management systems.

A new and potentially significant market for non-timber forest products may be realized from the growing demand for new pharmaceuticals developed from plant species found in tropical rainforests. In 1993 alone,

pharmaceutical companies earned an estimated US\$43 billion worldwide from products developed using plant species, 75 percent of which were identified using the traditional knowledge of indigenous peoples (RAFI 1995). However, a negligible proportion of these earnings has been returned to the countries and people who provided this knowledge. It remains to be seen, therefore, whether this most lucrative use of the forest ecosystem can be of any benefit to ni-Vanuatu resource owners.

The conservation of forest areas through the marketing of their aesthetic and "environmental" value does have some potential as part of the growing international "ecotourism" industry. This is already being realized in Vanuatu, based on both cultural and environmental attractions, including village visits, custom ceremonies (the *naghol* on Pentecost and the *nekowiar* on Tanna, for example), bush walks, and river tours. In addition, both the Big Bay National Park and the Erromango Kauri Reserve are developing nature trails for visitors as self-supporting income-generating activities. However, the recently prepared Vanuatu Tourism Master Plan describes ecotourism as having only minor potential (UNDP & WTO 1995).

Although these are options for the generation of a non-timber income from the forests of Vanuatu, they are all in the very early stages of development. In the short term none of them will be able to provide a significant alternative to the incomes generated through logging.

CONCLUSION

The way Vanuatu's forests have been used over time has changed quite significantly. As we have demonstrated, the first human populations in these islands were highly exploitative of the endemic environments they encountered, but were subsequently able to adapt to these environments and develop customs and lore that provided for seemingly sustainable controls over the way the land's resources were used. The intrusion of western society introduced new and often divergent imperatives for the use of these resources and also changed the way in which decisions about the use of forests were made.

The development of a large-scale logging industry in Melanesia in the 1980s and 1990s has the potential to most radically transform the way Vanuatu's forests are managed. In addition to raising new and significant issues for ni-Vanuatu society and the way decisions regarding forest use

are made, the sustainability of this latest development, as described here, has been questioned on many grounds. Current timber license levels are well above the national sustainable timber yield, and the ability of the forest ecosystems to recover after logging is unknown, even given the recent promise of effective control of the industry.

The future development of a sustainable forestry management regime for Vanuatu, therefore, must include a number of options apart from large-scale logging. While many people consider the latter to be sustainable under appropriate conditions, it is the focus of many of the problems we have discussed. The other modern options for forest use briefly summarized here (portable sawmills, conservation reserves, and other income-generating activities) are also fairly recent and their long-term sustainability still undetermined. It is likely that the sustainable management of Vanuatu's forests will need to include several of these options, rather than just one or two.

A key factor for the future sustainability of the forestry sector will be the role of the traditional owners and managers of the forests. A number of the problems associated with current forestry operations appear to arise from the gulf between traditional patterns of forest use and the modern systems now in place. It is also becoming clear that the more accommodating the modern systems are of traditional land use principles, the more potential they have for being a part of the forestry sector in the longer term. Unless the future management of Vanuatu's forests can incorporate the views of the resource owners, and acknowledge the still-existing importance of traditional customary lore, then this management will almost certainly be unsustainable.

References

- Aplet, G H, N Johnson, J T Olson, and V A Sample, editors
1993 *Defining Sustainable Forestry*. Covelo: Island Press.
- Applegate, Grahame
1992 *Rainforest Regeneration Study in Vanuatu*. Technical report, Vanuatu National Forest Resource Inventory Project. Atherton, QLD: AIDAB.
- Baldwin Peter, Japeth Hidson, Jane Siebuhr, and Feke Pedro
1993 *Forest Resources of Vanuatu: A Summary of the Forest Resources of Vanuatu Derived from the National Forest Inventory*. Brisbane: AIDAB and Queensland Department of Primary Industries.

Barnett, Tos E

- 1989 *The Barnett Report. A Summary of the Report of the Commission of Inquiry into Aspects of the Timber Industry in Papua New Guinea*, edited by G Marshall. Hobart: Asia-Pacific Action Group.

Callister, Debra J

- 1992 *Illegal Tropical Timber Trade: Asia Pacific*. A TRAFFIC Network Report. Cambridge: TRAFFIC International.

Costanza, R, and B C Patten

- 1995 Defining and Predicting Sustainability. *Ecological Economics* 15 (3): 193-196.

Dahl, Arthur L

- 1986 *Review of the Protected Area System in Oceania*. Gland: UNEP, IUCN.

Duncan, Ron C

- 1994 *Melanesian Forestry Sector Study*. Report prepared for the Australian International Development Assistance Bureau. Canberra: Australian National University.

FSP-NFA, Foundation for the Peoples of the South Pacific and National Forest Authority

- 1995 *The 1993 Papua New Guinea Portable Sawmill Survey*. Boroko: Foundation for the Peoples of the South Pacific, PNG, and National Forest Authority.

Hope, G S, and Matthew Spriggs

- 1982 A Preliminary Pollen Sequence from Aneityum Island, Southern Vanuatu. *Indo-Pacific Prehistory Association Bulletin* 3: 88-94.

Incoll, William D

- 1994 *Reassessment of Sustainable Yield for the Forests of Vanuatu*. Report prepared for Australian International Development Assistance Bureau. Indooroopilly, QLD: CSIRO.

ITTO, International Tropical Timber Organisation

- 1993 Market Forces Affect Asia-Pacific Log Prices. *Tropical Forest Update* 3 (5): 10.

Keto, A, K Scott, and M Olsen

- 1990 Sustainable Harvesting of Tropical Rainforests: A Reassessment. Paper presented to eighth session of International Tropical Timber Council, Bali, Indonesia, 16-23 May 1990.

Lillesø, J P B, Sam Chanel, and Feke Pedro

- 1992 *Report of a Survey of Local Use of Wood in Vanuatu*. Working Paper 4, South Pacific Forestry Development Programme. Port Vila: FAO.

Nalial, Edward, and Stephen Wyatt

- 1995 *Land Owners and Logging Agreements in Erromango: Draft Report*. Port Vila: Vanuatu Association of Non-Government Organisations (VANGO), Foundation for the Peoples of the South Pacific, and Department of Forests.

- Pearce, D W, A Markandya, and E B Barbier
1989 *Blueprint for a Green Economy*. London: Earthscan Publications.
- Poore, Duncan
1989 *No Timber without Trees: Sustainability in the Tropical Forest*. London: Earthscan Publications.
- Pretty, J N
1994 Alternative Systems of Inquiry for a Sustainable Agriculture. *IDS Bulletin* 25 (2): 37-48.
- RAFI, Rural Advancement Foundation International
1995 An Overview of Biopiracy. South Pacific Consultation on Indigenous Peoples' Knowledge and Intellectual Property Rights, Suva, Fiji, 24-27 April 1995.
- Sargent, Caroline, and Peter Burgess
1988 *The "Wokabout Somil": Some Issues in Small-Scale Sawmilling in Papua New Guinea*. London: IIED.
- Spriggs, Matthew
1986 Landscape, Land Use and Political Transformations in Southern Melanesia. In *Island Societies: Archaeological Approaches to Evolution and Transformation*, edited by Patrick V Kirch, 6-19. Cambridge: Cambridge University Press.
nd *The Island Melanesians*. Oxford: Blackwell. In press.
- Tacconi, Luca
1995a The Process of Forest Conservation in Vanuatu: A Study in Ecological Economics. PhD dissertation, University of New South Wales, Sydney.
1995b *Participatory Conservation in Malekula Island, Vanuatu*. Vanuatu Forest Conservation Research Reports, 10. Canberra: Department of Economics and Management, University College, University of New South Wales.
- Tacconi, Luca, and Jeff Bennett
1995 Biodiversity Conservation: The Process of Economic Assessment and Establishment of a Protected Area in Vanuatu. *Development and Change* 26 (1): 89-110.
- Thistlethwaite, Robert J
nd Report on Phase 1 of an Assignment on Community Forestry for the National Forest Resource Inventory in Vanuatu. Draft report to the Australian International Development Assistance Bureau.
- UNDP & WTO, United Nations Development Program and World Tourism Organisation
1995 *Tourism Development Master Plan: Final Report*. Port Vila: United Nations Development Program and World Tourism Organisation, for National Tourism Office.

Vanclay, J K, E J Rudder, G Dale, and G A Blake

- 1991 Sustainable Harvesting of Tropical Rainforests: Reply to Keto, Scott and Olsen. *Journal of Environmental Management* 33 (4): 379–394.

Van Trease, Howard

- 1987 *The Politics of Land in Vanuatu: From Colony to Independence*. Suva: Institute of Pacific Studies, University of the South Pacific.

Vanuastope

- var Weekly newspaper. Port Vila. No longer published.

Vanuatu Supreme Court

- 1994 Civil Case 29. Injunction Order: Kent J in unreported matter of Daniel Epsi and others v Parklane Industries Limited. Injunction Order: d'Imecourt CJ in unreported matter of Daniel Epsi and others v Parklane Industries Limited. Port Vila.

Vanuatu Trading Post

- var Weekly newspaper. Port Vila. (Now twice weekly.)

Vanuatu Weekly Hebdomadaire

- var Newspaper. Port Vila.

VDT, Village Development Trust

- 1994 *Training and Reference Manual: A Training Manual for Small Scale Sawmilling in Papua New Guinea*. Lae: Village Development Trust.

Wyatt, Stephen

- 1993 Can Small Sawmills Save the Forests? A Vanuatu Case Study. *Pacific Economic Bulletin* 8 (2): 61–66.

Abstract

We look at how Vanuatu's forests have been used or "managed" over time. Traditional lore concerning resource use continues to meaningfully affect contemporary patterns of forest use, including the most dramatic use to date, large-scale logging. Aspects of traditional practices were generally sustainable, but current large-scale logging activities cannot be considered sustainable on social, ecological, or even timber-yield grounds. In light of this, several options and considerations for future sustainable forest management are presented, but the role of customary resource owners, and their traditional lore, is of primary importance in all of them.

KEYWORDS: forestry, land use, logging, sustainable development, Vanuatu