NAKAVU FOREST: RESEARCH MAKES THE DIFFERENCE

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Name of forest: Nakavu Forest
Location: Namosi Province, Viti Levu Island
Area (hectares): 315
Managing entity: Fiji Forestry Department and Nakavu villagers
Mgt. objectives: Sustainable timber production model, collaborative research
Country: Fiji

"Nakavu Village holds a special place in the national effort to develop sustainable management of natural forests in the country," said Laiakini Jiko, Fiji’s Conservator of Forests.

He knows what he is talking about. After all, in 1991 he was the Head of the Forestry Department’s Silviculture Research Division, which was directly responsible for research activities on sustainable forest management, under the Fiji-German Forestry Project. Villagers in Nakavu are the landowners of the forests of the Tavusa Nabukebuke in the interior of Namosi Province. “Their cooperation, goodwill and trust in our request to lease part of their communally-owned forests for applied research into the complex issue of sustainable forest management will be long remembered in the history of the Forestry Department,” Jiko added.

Land tenure in Fiji, and particularly issues perceived to be affecting Fijian native land, has been the subject of keen national debate over the years and has been a contentious issue during the recent national political elections. Differing views on the land issue, coupled with deliberate misinformation by certain politicians and interest groups, were among the causes of past political unrest, which led to the downfall of two elected Labour governments via military and civilian coup d’états in 1987 and 2000, respectively.
In search of excellence

The British established the land tenure system in Fiji in the 1800s, during the period of colonial rule. Fiji is unlike most countries of the Pacific where the land was alienated or sold off by the native owners. Fiji had a Scottish governor, Sir Arthur Gordon, who was familiar with the system of land ownership because it was similar to the system in his native Scotland. Against the desires of early European settlers, he strongly supported the protection of indigenous ownership of land. He introduced a system that allowed Fijians to own the land outright, a system maintained to this day. The basis of the ownership is that land is owned by the mataqali (landowning unit or clan). It is not owned individually, but communally.

Fiji’s Native Land Trust Act of 1940 established the Native Land Trust Board, a statutory authority, and gave it control of all native land to be managed for the benefit of indigenous Fijian owners.

“The sanctity of the trusteeship role given to the Native Land Trust Board by the indigenous landowners is unequalled in our time.” Thus spoke the great Fijian politician, Ratu Sir Lala Sukuna, during the 1940 debate on the Native Land Trust Bill, and his words still ring true. The indigenous landowners unconditionally put their faith in the organization when they entrusted the administration of their land to the board. It is the board’s duty to protect that trust and it plays the dual role of trustee and landlord in the development of native land in Fiji.

In Fiji, there are three classes of land ownership, namely:

- native land;
- Crown grants (commonly known as “freeholds”); and
- state lands.

The term “native land” is defined as land above the high water mark, not being freehold or owned by the state in accordance with the provisions of the Crown Lands Act (Cap. 135). Native land — which comprises 1,487,581 hectares or 84 percent of Fiji’s total land area — is owned by indigenous Fijians in their collective groupings according to custom and tradition.

Both the government and the Native Land Trust Board are aware of the importance of the land issue to the indigenous Fijian population. The board has undergone major changes in the past few years to make it more commercial and customer-orientated in its outlook. In simple terms, the board’s revised policy now focuses on maximizing revenues for indigenous Fijian landowners, promoting sound relationships with all stakeholders and securing benefits to the national economy.

Important economic contributions from forestry

The government’s 2003 budget describes forestry as a “growth sector” in the economy. It has contributed, on average, about 0.9 percent to the gross domestic
product (GDP) over the last five years. At present, it ranks as Fiji’s fifth most important export industry, after garments, sugar, gold and fish. Earnings from forest products (sawntimber, plywood, veneer and pine woodchips) are greatly influenced by the price of exports, production and weather patterns.

“The forestry sector is increasingly becoming a significant part of Fiji’s economy as it encompasses the entire range of production processes from harvesting, milling and value-added operations, to production inputs in construction and other industries,” announced the Minister of Finance, Ratu Jone Kubuabola, during his 2003 budget speech in parliament in November 2002. “Ensuring sustainability of the industry is therefore of paramount importance, whilst providing assistance and building the capacity of indigenous resource owners, thus, facilitating their participation in the industry,” he added.

**Harvesting of natural forests and landowners’ involvement**

Forestry development represents an area where indigenous Fijian landowners can widely and meaningfully participate in commercial business activities. The provision of seed funding in 2002 under the government’s Affirmative Action Plan, has encouraged landowners to increase their involvement in the timber industry and to maximize the potential benefits accruable to them. In fact, the government believes that the immense potential of forestry, including that of the country’s extensive pine and mahogany plantations, may be harnessed effectively only by dealing with landowners’ desires and expectations successfully.

Landowner involvement in the activities related to the country’s natural forests has, to date, been limited due to lack of capital, expertise and business acumen. The industry has been dominated by Indo-Fijian family businesses, which operate a number of small- to medium-sized sawmilling operations and a large veneer/plywood processing mill on the second largest island of Vanua Levu.

The involvement of landowners in the plantation-based pine industry is much more structured and more developed. However, there are also certain underlying factors that landowners still need to address if their own companies and the forest industry are to be successful in the future. These include changes in attitudes and perceptions about the forestry business, differentiation between ownership and management, competition, transparency and accountability, and capacity building.
In search of excellence

The case for sustainable forest management

Over the years, there has been growing support for the sustainable management of Fiji’s 740,000 hectares of natural forests. This point is now specifically spelled out in the current forestry and environmental policies of both the government and the Native Land Trust Board.

Fiji is fortunate in having substantial high-value natural timber resources, but in the past, forest exploitation has not been conducted sustainably. Now, however, the country is in the enviable position of being able to move towards sustainable management of its remaining natural forests, by relying more heavily on its extensive plantations of pine and mahogany. Almost five decades ago, the government invested substantial sums to establish industrial plantations of both softwood (pine) and hardwood (mahogany). Plantations now cover approximately 90,000 hectares on the two main islands of Viti Levu and Vanua Levu.

The current challenge is finding a workable mechanism for incorporating sustainable forest management guidelines into Fijian forest management — in a way that also satisfies the needs of the indigenous Fijian resource owners, the timber industry and government interests.

As part of the International Tropical Timber Organization’s (ITTO) ongoing programme to promote the conservation and sustainable management of tropical forests, the following conditions have been identified as essential for sustainable timber production:

- long-term security of forestry operations;
- operational control;
- a suitable financial environment; and
- adequate information.

Furthermore, ITTO’s efforts to promote and support sustainable forest management — to which Fiji subscribes — have shown that successful sustained yield management of natural tropical forests can only be achieved if management systems incorporate:

- protection of the forests;
- realistic assessments of annual harvests;
- orderly arrangement and demarcation of annual cutting coupes;
- preharvest inventory and allocation of silvicultural systems;
- marking of trees for retention or for felling;
- exploitation of harvesting coupes within acceptable damage limits;
- postfelling inventories;
- checks of annual coupes to ensure damage is kept within acceptable limits; and
- silvicultural treatments of residual stands, as needed.
“In Fiji’s case, the official government approach towards the management of the nation’s natural forests has improved considerably during the last decade,” Jiko observed. “The introduction of the National Code of Logging Practice in June 1990, together with related training (for both Forestry Department officers and private timber industry operators) and field monitoring activities have led to a substantial improvement in the technical standard of the planning and implementation of logging,” he added. The Australian Government-sponsored Fiji Forest Resource Tactical Planning Project (1993–1996) made important contributions towards strengthening capacities.

Nevertheless, until recently the silvicultural aspects of natural forest logging received little attention. There is still inadequate scientific data on the growth of Fiji’s main commercial natural timber species. This is due to the lack of emphasis, in the past, by the Forestry Department on this area of silvicultural research.

**The Natural Forest Management Pilot Project (NFMPP)**

Seeking management prescriptions that would ensure sustainable yields of natural forest resources, the Forestry Department — with funding and technical support from the Government of the Federal Republic of Germany through the German Agency for Technical Cooperation (GTZ) — implemented a research programme on 315 hectares of natural forests in Nakavu, Namosi Province. The project’s field activities, which ran from March 1991 to December 1994, were implemented by the Forestry Department’s Silviculture Research Division, with support from the Fiji-German Forestry Project.

The research programme, entitled *Natural Forest Management Pilot Project* (NFMPP), was tasked with “developing improved silvicultural guidelines for natural forest management within the Fijian context of communal forest ownership and the need to involve forest owners more in management decisions and practices.”

**The “Nakavu Model”: a new management approach**

The resultant sustainable forest management guidelines, or prescriptions for management (commonly referred to as the “Nakavu Model”) can, after due evaluation and refinement in larger scale operational trials under real commercial conditions, be adopted by the Forestry Department and the Native Land Trust Board for application throughout Fiji’s natural forests.

The NFMPP embarked on research and testing to support nine operations under the Nakavu Model namely:

- demarcation of the logging area and compartments;
- implementation of a preharvest inventory;
- development of a “Diameter Limits Table;”
decisions on logging and logging intensity;
- selection and marking of trees for controlled selection logging;
- design of appropriate road systems;
- preparation of the logging/management plan;
- implementation of controlled selection logging; and
- supervision and compartment closure after harvesting operations.

With this overall approach, a number of other specific technical outputs were expected from the NFMPP. These were related to:

- obtaining information on costs and benefits of harvest planning and controlled selection logging;
- assessing increment, mortality and regeneration behaviour of natural tree species under different logging intensities;
- developing accurate tree volume functions;
- determining optimal roading density and planning procedures;
- training Forestry Department staff and landowners in natural regeneration practices; and
- establishing a demonstration area available to the Forestry Department for continuing research throughout the 50-year duration of the lease.

“Selection logging” refers to harvesting whereby only a portion of the total merchantable volume is removed, and whereby emphasis is placed on the condition and structure of the remaining stand. Emphasis is given to natural regeneration and future timber production, as opposed to the immediate removal of the best quality timber trees. “Controlled selection logging” refers to the deliberate harvest of a predetermined volume of timber — normally much less than what would be taken using conventional logging practices.

**Nakavu Forest project site**

The Nakavu project site was selected by the Forestry Department and the Fiji-German Forestry Project team from a number of potential sites, on the basis of its forest characteristics, and sociocultural and accessibility factors. The area is located about 9 kilometres northwest of the small township of Navua, which is 45 kilometres from the capital Suva on the southeast coast of Viti Levu, the largest island in Fiji.

Nakavu Forest is on communally-owned native land belonging to members of the Yavusa Nabukebuke tribe, which comprises six distinct clans residing in nearby Nakavu Village. Being native land, negotiations were conducted with the Native Land Trust Board and the landowners, enabling the Forestry Department to formally acquire a 50-year lease over the 315-hectare project site — effective
from January 1991 — with provision for review of the lease agreement at 10-year intervals.

Nakavu Forest is a dense mixed-evergreen rain forest with an upper canopy height of about 27 metres. Dominant commercial tree species include kaudamu (*Myristica* spp.), yasiyasi (*Syzygium/Cleistocalyx* spp.), sacau (*Palaquim* spp.), damanu (*Calophyllum* spp.), laubu (*Garcinia* spp.), kaunicina (*Canarium* spp.), kaunigai (*Haplolobus* spp.) and mavota (*Gonystylus* spp.). Nakavu Forest is representative of the mixed-evergreen forest type found throughout much of Fiji.

The Natural Forest Management Pilot Project required a suitable tract of representative natural forest and landowners willing to cooperate with the project. The project also required the participation of a logging contractor and sawmiller prepared to be trained, and to work under supervision, in following the proposed sustainable forest management harvesting guidelines. The Forestry Department Research Division was designated to manage the project, with support from the Fiji-German Forestry Project.

Apart from consenting to the leasing of part of their forest for the project, the Nakavu landowners were firm in their acceptance and belief in the sustainable forest management concept throughout the four-year duration of the project’s field activities.

“The landowners played a pivotal role in ensuring the entire project activities were implemented smoothly as planned and completed successfully,” said Principal Forestry Officer Tevita Evo, who was then the Research Division officer directly in charge of the National Forest Management Pilot Project.

**Project field activities**

As part of the project’s objectives, 12 landowners were selected and employed on a full-time basis. They were led by Mosese Mocewa and Kasiano Duikoro, both of whom were appointed “charge-hands” (supervisors) of the landowner workforce, because of their supervisory capabilities, knowledge of local forest conditions and the respect they commanded. Following training, they were directly involved in undertaking various project field activities including:

- **Compartment demarcation.** The area was subdivided into 12 management units, averaging 26 hectares in size (ranging from 13 to 38 hectares). Boundaries followed natural features and cleared straight lines, and were marked clearly on maps and in the field.

- **Preharvest inventory.** A strip sampling system was used, with 25-metre-wide strips inventoried to determine numbers of trees, basal areas and standing volumes and for various diameter classes.
**Development of diameter limit tables.** The inventory data was used to develop species-specific diameter limit tables for the different treatments (or logging intensities) used, and the selection of trees to be harvested under each treatment. Three levels of harvesting intensities were established:

- light logging, or removal of 15 percent of the total standing volume of trees (≥35 centimetres diameter at breast height (dbh));
- medium logging, or removal of 33 percent of total standing volume; and
- heavy logging, or removal of 60 percent of the total standing volume.

In addition, a fourth treatment called “conventional” logging was included, whereby all commercial trees (≥35 centimetres dbh) were removed. This made it possible to compare the modified logging intensities with normal practices.

**Permanent sample plots.** In each of the 12 compartments, four permanently demarcated sample plots were established — with an area of 2 500 m² each — in a systematic pattern following the slope. Tree diameters and height measurements were recorded, and a regeneration seedling count was conducted.

**Tree selection.** Trees to be felled were selected and marked in the field prior to the start of harvesting operations, thus enabling strict control of harvesting intensities and improving planning and silviculture.

**Logging planning.** Careful planning was carried out to achieve the objectives of controlled selection logging in an efficient, safe and environmentally sound manner.

**Controlled selection logging.** Techniques were developed to implement the required logging intensities in line with the National Code of Logging Practice and sustainable forest management guidelines. The objective was to provide income to landowners and to the contractor, while at the same time minimizing damage to the residual forest and creating favourable, controlled conditions for forest growth, regeneration and further sustainable management.

**Postfelling damage assessment.** The impacts of the various degrees of controlled selection felling were assessed in terms of numbers of damaged or dead trees, and remaining basal areas and volumes.

“The landowner employees were instrumental in promoting the sustainable forest management concept through ‘Nakavu Day’ — an annual celebration and fundraising event organized by the Nakavu landowners and surrounding communities. They also conducted landowner-awareness training for other forest owners interested in sustainable forest management including, for example, the Drava landowners of Wailevu West, Vanua Levu,” explained Tevita Evo.
Under the National Forest Management Pilot Project, Nur Ahmed & Company Ltd was selected as the logging contractor from a list of 10 interested parties. The company was selected because of its favourable location, the company’s satisfactory harvesting record, and because its harvesting operations were integrated with a medium-sized sawmill at Yarawa (about 18 kilometres from Nakavu).

“The project’s harvesting operation was a learning experience for our company, particularly in working with the three different logging intensities and following the approved logging plan,” reported Tahir Ali, one of the logging company’s directors.

The modified logging intensities, particularly the medium- and heavy-logging treatments, were not necessarily more expensive than conventional methods. In fact, cost comparisons indicated that the medium and heavy treatments were actually US$1.50 per cubic metre less than conventional logging costs (estimated at an average of US$42.50 per cubic metre in 1995).

Advanced tree selection was extremely important, enabling accurate forecasting of species’ composition, volumes and location within the logging coupe or compartment. This resulted in better planning, and improved overall efficiency. “Thinking back, there were certainly some real benefits to us — most notably the overall lower costs at the end of the day,” Tahir Ali smiled.

The modified logging intensities lead to higher average diameters of the timber felled, which lead to more efficient processing and increased profits. “Both the sawmilling and rotary veneer recovery rates are very much a function of the log diameter and form; the larger the log with good round cylindrical form, the better the recovery rates achieved,” indicated Lepani Moce Sogovale, Resource Manager for Fiji Forest Industries Ltd, a pioneering institution in Fiji’s timber industry, and an important sawmiller and veneer/plywood manufacturer.

Fijian landowners whose forests are being harvested by outside logging contractors or companies are presently awarded the following benefits:

- a standard log royalty payable directly to the Native Land Trust Board — ranging from US$20 per cubic metre for prime Class 1 logs down to US$4.65 per cubic metre for lower Class 3 logs — from which the Native Land Trust Board deducts 10 percent for administrative costs prior to distribution to landowners;
- negotiated average log premiums of around US$5–7 per cubic metre payable directly to landowners; and
- access to supplies of sawntimber at reduced concession prices.

However, the current harvesting system in Fiji allows for the removal of all trees greater than 35 centimetres dbh, which significantly alters the forest structure and composition, and is unsustainable in the long term.
Increased benefits from the Nakavu Model

The “Nakavu Model” has several advantages for the landowners. Key among these, as pointed out in the project’s final report, is that landowners will have “a more stable income from royalties, logging jobs, and management jobs over shorter felling cycles.”

“The Nakavu villagers have certainly benefited from their involvement in the project,” related Tevita Evo. “Financial and other benefits have played a large part in raising the general living standard in the village. It has facilitated a regular electricity power supply and the construction of a community hall. The project was a ‘unifying force’ and galvanized the villagers into working together, and now they have a different and greater appreciation of their forests. And through all this, they still see their forests out there — without the major damage typical of areas where uncontrolled harvesting has taken place — regenerating and growing.”

The project’s final report adds: “Apart from the financial advantages, the active participation in the preharvest inventory, tree selection and logging, leads to an increased awareness about sustainable forest management and the activities required for achieving it. Landowners will only be prepared to protect their own forest if they perceive that it has value.”

Important, the reduced volumes removed at the time of the first harvest and the improved silvicultural practices leave the original structure, composition and biodiversity of the forest intact. This in turn leads to improved supplies of culturally important non-timber forest products and to improved quality of streams and other water supplies.

Other advantages arising from the Nakavu Model include ensuring log supply security over time and potentially better export market access for timber products coming from sustainably managed forests. A recent consultants’ report examining the issue of Fiji’s efforts to improve forest management and move towards forest certification noted that:

“Log supply is guaranteed for the long term due to the fact that you are managing your forests in a truly sustainable manner. Implementation of the ‘Nakavu Sustainable Forest Management Model’ is a major step towards getting the forest certified.... While there is little or no pressure from Fiji’s current timber export markets for certification and labeling of forest products generally, access to certain offshore markets (e.g. in Europe and the USA) is becoming dependent on being certified. Current international experience has been that price premiums may not result from certification and labeling; rather the prime motivation for undergoing what can be an expensive process is to obtain and protect market access.”
The benefits to the government from the Nakavu Model can be seen from the perspective of the Forestry Department as the implementing agency, and from the perspective of the nation as a whole:

- The project-provided training, skills' development and equipment will enable the Forestry Department and its local counterpart officers to vastly improve forest management.

- Increased landowner involvement and awareness will ultimately lead to enhanced protection and conservation of Fiji's remaining natural forest resources. A more sustainable supply of timber for industry will help guarantee its long-term survival, continuing national economic benefits in the form of jobs, rural employment and foreign exchange earnings.

- Fiji will move closer toward fulfilling its international commitments related to sustainable forest management.

The development of the Nakavu Model has been a significant milestone in the effort to improve management of Fiji's remaining natural forest resources. “The Forestry Department Silvicultural Research Division continues to undertake regular monitoring of the Nakavu permanent sample plots, recording valuable tree-growth data every two years. We also see the value of Nakavu as a demonstration site, with increasing popularity for visits by university researchers, students and overseas visitors. Recently, we have started a number of studies on phenology and forest succession after logging on site,” noted Inoke Wainiqolo, Principal Silviculturist of the Division.

The Nakavu Model is now in the process of being implemented on a larger operational scale, under commercial conditions, in a 6,500-hectare forest belonging to the Drawa landowners of Wailevu West on the island of Vunua Levu. This operation is expected to allay remaining scepticism Harboured by the timber industry. Key local staff employed in the Nakavu project have participated in the initial training sessions for Drawa landowners.

The refined sustainable forest management guidelines resulting from this process have established a model and basis for nationwide adoption and implementation. A senior Forestry Department official explained: “Landowners are becoming more knowledgeable of the need for good forest management and are increasingly concerned about bad forest practices. This concern is motivating the Forestry Department to review the National Code of Logging Practice and to strengthen measures to enforce it. There is also an enhanced desire by landowners to become involved in decision making related to their forest resources, but many lack experience in dealing with the commercial sector. In the past, tensions and disputes have often ensued when expectations between landowners and commercial operators have not been met. The experience in Nakavu has demonstrated that such problems can be averted through careful planning, consultation with local people and management that makes long-term benefits to landowners a priority. Many people argue that if sustainable forest management
is to be implemented widely, it must be seen as beneficial to everyone involved or affected. In other words, the answer to the question ‘what is in it for me or us?’ must be positive for everyone concerned.”

These are the underlying issues that are being addressed through the Nakavu Model, and the process of fine-tuning the model through the larger scale operational trials under actual commercial conditions.

**Bibliography**


**Ministry of Fisheries & Forests.** 2002. *Seed capital revolving fund (SCARF) forestry scheme.*


**About the author**

Lemeki Lenoa is a forester with over 22 years of experience in all aspects of Fijian forestry covering the government, timber industry and lately as an independent forestry consultant dealing with Fiji and other Pacific Island region countries. He graduated with a B.Sc. (Forestry) from the Australian National University in 1979 and entered government service under the Fiji Forestry Department in 1980. He spent the initial 13 years of his career with the government. In 1993, he resigned and joined the private timber sector as the Manager, Resource & Transport, of Fiji Forest Industries Ltd (FFI), Fiji’s largest natural timber processor and exporter.