

FOREST MANAGEMENT IN DEVELOPING COUNTRIES — EXPERIENCES OF A NEW ZEALAND FORESTER IN WESTERN SAMOA

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ABSTRACT

Forestry development in Western Samoa typifies that of many other developing island nations in the South Pacific. Assessment of forest resources provides the basis of management, and in Samoa a national forest survey has recently been completed.

Ecological understanding of the forest must be acquired, and basic knowledge is required on the properties and uses of local wood. Lack of roads, mapping, power, port development and shipping services, together with shortages in skilled staff, hinder forest utilisation and management.

The Samoan Government is taking measures to overcome these problems: a reforestation programme has been commenced, an extension project is explaining forest values to the people, and forest reserves have been set aside for future generations. In providing training and management assistance New Zealand is playing an important role.

INTRODUCTION AND BACKGROUND

Samoa's Islands and Population

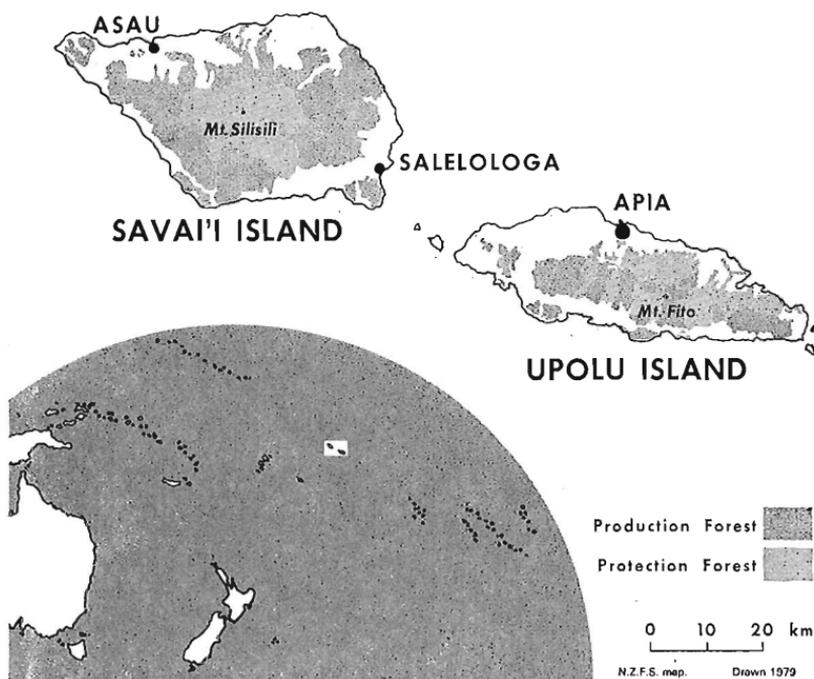
Western Samoa consists of two main islands, Upolu (1100 km²) and Savaii (1800 km²) and six smaller islands, of which only two are inhabited. The population is predominantly Polynesian and has built up from around 30 000 in 1895 to over 152 000 in 1976. The people live mainly around the coastal areas and depend on fishing and small crop farming for food. This has always been adequate for local demand, and has also provided a small surplus for export.

Climate

The climate is characterised by high and even temperatures and heavy rainfall, the latter increasing sharply with altitude and exposure to the south. Mean annual temperature is around 26°C. Seasonal changes in temperature are insignificant

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although there is substantial seasonal variation in rainfall, with the wet season being from November to February. South-east trade winds blow the greater part of the year, especially during the dry season.

Forests

The pattern of forest vegetation is determined largely by elevation. It can roughly be divided as follows: lowland forest, 0 to 230 m, dominated largely by tava (*Pometia pinnata*) and mamalava (*Planchonella torricellensis*), with maota (*Dysoxylum huntii*) an important secondary species; foothill forests, 230 to 550 m, characterised by tamanu (*Calophyllum samoensis*) as the dominant, with asi (*Syzygium* spp.), mamalava and a'amatia (*Amoora* spp.) as important secondary species; upland forest, 550+ m, where asi and a'amatia are dominants, with mamala (*Dysoxylum* spp.) an important secondary species. The highest point on Upolu lies around 1000 m, and on Savai'i 2000 m. In addition, there are now 1500 ha of exotic forest plantations, predominantly concentrated on the north-west of Savai'i. Early plantings concentrated on mahogany

(*Swietenia macrophylla*), *Toona ciliata*, *Cedrella olerata* and teak (*Tectona grandis*). More recently, emphasis has moved towards faster-growing utility hardwoods, including *Eucalyptus deglupta*, *Anthocephalus chinensis* and *Terminalia* spp.

Little lowland forest remains in its original condition. A considerable proportion of what now exists may be comparatively recent in origin, modified by natural disasters and human activity. Shifting cultivation, a normal practice of the local small farmers, has had a detrimental effect on the country's vast forest vegetation. Over the past century, forests with a high potential timber yield were being indiscriminately cleared, while at the same time the country was importing about 75% of its timber requirement from Canada, New Zealand, Australia, and other countries.

Forest Industries

In the 20 years before 1968 there were about five small, circular-saw-equipped mills with an annual sawn timber output of less than 1200 m³. These small mills have all ceased operating. In 1968 a joint ownership (Samoan-Japanese) company commenced production, equipped largely with second-hand machinery, and this was later expanded for the production of shooks for cases and furniture. Annual sawn production of this mill has averaged around 3500 m³ cut from a log intake averaging 6500 m³.

A subsidiary of an American corporation commenced production on Savaii in 1971 using a plant designed to cut North American softwoods and produce 35 400 m³ of sawn timber a year, with the eventual intention of expanding to over three times this capacity. The mill initially included a veneer slicing plant aimed to take 10% of production, but difficulties of marketing the product in the USA closed this part of the operation in 1974. About 95% of the timber produced by the mill is kiln-dried before being dressed. Log intake has fluctuated between 45 000 and 56 000 m³ to give an annual sawn timber production of between 23 000 and 28 000 m³. Following difficulties with production and marketing, this corporation was taken over in 1977. It is at present operated jointly by the Samoan Government and an Australian sawmilling and merchandising firm, with the Government holding a substantial majority of the shares. It was intended that 45% of production of the new company would be exported to Australia and other Pacific islands, but this level has not been achieved because of buoyant domestic demand.

MANAGEMENT PROBLEMS

Public Attitudes to Forestry

Probably the major problem in utilising and conserving forest resources in Western Samoa is the public attitude to forestry management. There is little appreciation of the forests as a major renewable resource, whether as protective covering of steep land or as timber resources — this despite collective experience going back many generations in the use of land for agriculture and the benefits of agricultural crops, including tree crops, for local use or export, or both.

Forests are seen as waste land which must gradually be cleared to make way for agriculture. To a large extent the rural communities practise shifting cultivation, where the forest is cleared for the main food crops of taro and tamu, followed perhaps by bananas. Generally, after the harvest of these crops, part of the land reverts to poor forest while part may be planted to plantation crops such as coconuts, cocoa and coffee.

The low image of forests and forest management is emphasised by the land tenure system. In this it might loosely be said that forest land is seen as a "waste" land bank, held under the custodianship of major chiefs, to be allocated for family use only when a decision has been made to win soil for agriculture by virtually subduing the forest.

Land grasping during early European settlement created a consciousness of the value of land, so that any matter involving land is treated with suspicion. The awarding of government access to customary land is seen as the first step in a process likely to lead to the loss of land to the Government.

A consequence of these attitudes is that people who work in forests at the management level are regarded as being very much lower in social status, even though they may be professionally qualified, than those occupying traditional white-collar positions.

With this public outlook it is difficult to persuade the Government of the potential of the nation's forest.

Assessing Forest Resources

A fundamental first step in managing and using any forest resource is to have some idea of its size and extent, with a description in a form which will interest potential forest industry developers, usually from outside the developing country. In Western Samoa an assessment of forest resources was the first major step undertaken when some form of organised forest management was set up by the Government

in 1968. This proved difficult, and despite broader intentions to conduct a national survey, only Savaii, the larger of the two main islands, was surveyed. Difficulties were encountered in consistent identification and classification of the species by the relatively unskilled staff then available, and in the field management of the survey where access, equipment, provision of supplies and leadership were weak. Furthermore, the size of the potential resource is clearly insufficient to justify the use of high-cost aids such as helicopters or orthophotography. It is difficult to know in what depth to assess the forest resource, particularly in terms of describing it by potential products and in aiming for various degrees of statistical reliability. In Samoa there have been the following surveys:

- 1969 A survey of Savaii, mainly for sawlogs.
- 1972 A survey of Upolo assessed sawlogs, poles, and regeneration.
- 1975 A survey of north-west Savaii for sawlogs, to check possible errors in the 1969 survey.
- 1976 Consultants' verification of the 1975 survey.
- 1977 A national forest survey of both islands, assessing sawlogs, pulpwood, and fuel wood.

The undertaking of these assessments by different experts and organisations may have provided a necessary check, but the vast differences of data collected have not helped the planning of industrial development or the forest management required to support present and future industrial developments.

Potential Wood Uses

In developing countries of the tropics there are frequently large numbers of species about which little is known, unless there are close affinities with those of other countries where such information is available. To overcome this, timber testing is required. In Samoa this was done for major species by an overseas corporation interested in setting up in Savaii, and by a forest products laboratory, the New Zealand Forest Research Institute. In most other Pacific countries it is done by the Australian CSIRO. Once technical testing data are provided, there is still difficulty in translating these into meaningful information for the layman's use. This last stage has not been done well in Samoa and much of the basic information is not available for less important minor species which, with the possible future shortages of wood, should be considered for improved utilisation including the application of other products or processes.

Ecology of the Forest

To encourage the successful regeneration of logged areas and evolve management techniques to improve the quantity and quality of products in the future, it is necessary to understand the ecological relationships of the various forest species. Unfortunately, such work has not yet been done, although there are sufficient indications of the difficulties with regeneration and the slow rates of growth of many indigenous compared with introduced species, that use of the former appears almost precluded from major industrial plantations.

Marketing and Shipping

The marketing of relatively small quantities of timber and veneer from unknown species proved difficult for the North American corporation that began large-scale utilisation of forest resources on Savaii in 1971. This, associated with poor shipping services to potential markets, was the major contributing factor to the decline of that company prior to its takeover by the Government in 1977. The poor inward shipping service also necessitated the mill carrying a large inventory of stock, stores and spare parts to ensure continued maintenance of its machinery. Experience has shown that the susceptibility of tropical hardwoods to insect attack, especially by *Lyctus* borer, is a major constraint on marketing; and some difficulty has been met with in organising preservative treatments.

These problems are heightened with the increasing development of the economy, largely brought about by increasing foreign aid. A considerable proportion of new buildings are designed or built or supervised by expatriates, who are used to working with building codes, timber design handbooks, and relatively consistent grades. None of these are available locally, so that there is a tendency to use imported timbers which meet design and durability criteria, albeit at some cost to the economy and balance of trade. Obviously this is a situation bearing some similarities to that in New Zealand in the 1950s when radiata pine was being promoted to a consumer market long accustomed to high quality indigenous timbers. It is obvious that through education and advertising the problems can be overcome when the information is available.

Infrastructure and Logistic Supports

The overall absence of infrastructure in developing countries tends to mean that substantial inputs are required either by the government or by industry in the form of roads,

energy production, port development, provision of settlements and servicing industries. Overcoming this lack of facilities is seen as a major goal in most developing countries, leading to more rapid economic growth and improved standards of living.

Added to difficulties with forest assessment is the inadequate supply of support services such as the provision of up-to-date and accurate aerial photography and maps, obviously difficult for developing countries to afford. With increasing development in the South Pacific over recent years, there have been relatively rapid changes in land use which, together with the inadequate description of land tenure boundaries, create difficulties in both long-term planning and day-to-day management. This is particularly so in the mounting of an efficient utilisation operation where more detailed maps of forest types and topography would enable better planning of road locations, landings and the volume of logs likely to be cut. To some extent the recent national forest survey has overcome these difficulties by providing more up-to-date information on forest areas, but difficulties can already be foreseen in keeping the information up to date.

Poor roads lead to considerable reductions in life expectancy of machinery, especially when combined with inadequate maintenance. Furthermore, in utilisation operations poor alignment and surfacing frequently preclude the carriage of full loads and operation at reasonable speeds, so that overall production is lost and costs increased.

Acquisition of Forest Resources

In the Pacific, because of widespread customary land tenure, it is often difficult to obtain rights or concessions to forest areas. In Samoa this problem originates from the system whereby each aiga (family) has a right of ownership over a certain block of land which is allocated by the council of chiefs in the village — a process which is both uncertain and somewhat tedious. Furthermore, there are frequently disputes between villages on their boundaries which often take years to settle. Meantime, forests are being cut and destroyed, with the forests most affected being those of the lowlands nearest to the village settlements, which generally contain both the highest volumes and the species which are most desirable for timber use. For example, despite considerable efforts by the Government when the large mill was set up on Savaii, about 30 to 50% of the potential resource is still not covered by timber licences. This results largely from suspicion and lack of understanding by villagers, even though frequent explana-

tions have been provided by both the Government forestry agency and the company. In some instances this difficulty can be overcome by grouping villages into larger districts for the issuing of overall timber licences (thereby avoiding boundary disputes). However, it is not uncommon to have logging crews and even replanting gangs pulled out from an area under threat of physical violence until a land ownership problem can be settled. Furthermore, timber licences allow the landowners to retain virtually total rights over their land and provide no control over the clearing of forest by the owners. Thus, despite a licence being issued over an area it is not uncommon for forest to be lost by clearing, or for originally envisaged volumes to be reduced by partial clearance.

Supervision by the Controlling Agency

Because of the low status of forestry officers and the general unawareness of forest values, it is difficult to recruit, train and retain able staff to control and supervise forest industries. These usually come in from outside the country, bringing their own key expatriate personnel. In this situation there is a strong risk that industry may, by default of the controlling agency, provide the majority of skills, and hence tend to dictate the terms of forest policy and forest management — a tendency which, once established, can be most difficult to reverse.

Sustention of the Resource

Once utilisation of the forest resource is under way there usually arises an interest in its sustention to encourage the retention of the industrial development. Frequently the most appropriate means of ensuring sustention is to establish plantations which, in turn, give rise to a number of problems in developing countries, including:

- the acquisition of suitable land;
- the selection of suitable species for planting;
- the acquisition of seed and its storage;
- the provision of skilled staff to manage the plantations;
- the tending of young trees in frequent prolific weed growth;
- finance for such a long-term investment which frequently has inadequate logistic support;
- assessment of risk factors, such as hurricanes, pathogen and insect attack, and, to a lesser extent, fire.

CONSEQUENCES

The consequences of these problems tend to be reflected in the evolution and patterns of forest policy and management. In 10 years during which forestry activity has been organised in Western Samoa, initial emphasis was placed on the assessment and utilisation of forest resources. This was subsequently followed up by pilot programmes of research into reforestation, largely with introduced species, and then the adoption of a major reforestation project. The stage has now been reached at which there is an obvious need for more extension work to explain forestry and its value to the community. To this end programmes have been mounted to educate the public on the importance of conserving forest resources for the multiplicity of benefits which they afford. Particular emphasis is given to their role in: conserving what is probably the most limiting natural resource, water; reserving areas of forest as little modified as possible to provide examples of their natural heritage for future generations; encouraging the replanting of forest for the traditional uses on village land of pole-type building and fuel. A major difficulty in mounting such programmes throughout the whole South Pacific is insufficient numbers and calibre of staff and the financial resources to undertake activities which are not seen to have immediate productive benefit. Some of the problems outlined above might have been avoided had there been such resources to apply in the field earlier; and it is to this end that New Zealand can assist its near neighbours in achieving greater benefits from their existing or potential forest resources.

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