Forestry in national development: production systems, conservation, foreign trade and aid

K.R. Shepherd and H.V. Richter, editors
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SUMMARY

Forestry is seen throughout the world as gaining in importance as a form of national development, either as an earner of foreign exchange to finance diversification into other sectors or as a provider of part of the population's basic needs of food, fuel and shelter.

This monograph is the outcome of an international conference held at the Australian National University in July 1978 to consider problems of forestry production in less developed countries. Such production can take place within defined 'forest areas' or in woodlots outside them. Both need an infusion of science and technology to raise productivity and changed social and economic institutions to stimulate response. The specialists brought together at the conference examine problems of land tenure for forestry; production for basic needs; foreign trade prospects; and the complexities of aid relationships in the forestry profession.
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Introduction
Introduction

K.R. Shepherd and H.V. Richter

Australia is a relatively developed country within the South Asian-Pacific area and is frequently called upon to provide assistance to forestry in the area. Such assistance may be given by governmental or semi-governmental agencies, universities, private consulting companies or individuals operating in a range of capacities. The Australian National University finds itself much involved because its Department of Forestry is the national school.

It therefore seemed appropriate for the Development Studies Centre of the Australian National University, in collaboration with the Department of Forestry, to convene a specialist conference on 'Forest Policy and Forest Products in National Development and the Role of Foreign Aid'. The conference was intended to provide an opportunity for forestry experts from the region to discuss mutual problems. It was also seen as an excellent opportunity for Australia, as an aid donor country, to learn a good deal more about the aid and development of recipient countries.

The conference focussed on two specific issues. These were two broad aspects of current development strategy which foresters are seeking to incorporate in their thinking. The first is the 'basic needs strategy' for national development in developing countries as proposed by the ILO Tripartite World Conference. This gives priority to the promotion of employment and the satisfaction of the population's basic needs. The latter are defined to include both minimum requirements for private consumption such as fuel, food, shelter and clothing, and essential community services such as drinking water and education. Clearly there is a forestry component.

The second aspect is the greater emphasis needed in development to scientific knowhow. This is to be considered at the forthcoming UN Conference on Science and Technology for Development. This conference will consider such questions as;
the infrastructure and managerial arrangements needed in developing countries to enable them to apply science and technology more effectively to their own development;

the role played by the education system in assisting the modernization process;

how the science and technology of advanced countries can best be transferred beneficially to developing countries and adapted to their particular economic and social conditions;

how the research capacity of advanced countries can best be utilized to help to alleviate developing countries' problems in accordance with their national priorities;

how the international scientific community, the United National system and other inter-governmental bodies can contribute to these ends.

The relevance of the A.N.U. forestry conference was appreciated by the Australian Development Assistance Bureau and the Australian Steering Committee for the UN Conference on Science and Technology for Development. Both organizations gave generous financial support both in bringing participants to the conference itself and in financing publication of its proceedings. This assistance is gratefully acknowledged: without it the conference could not have been held.

Overseas participants in the conference all came from Indo-Pacific countries and were directly connected with forestry in one branch or another. The Australian contingent included some from other disciplines, economists, geographers and so on. Those presenting papers were asked to draw on their personal experience and interests, and not to attempt to cover a whole field, nor to present a truly balanced view. It was hoped that balance and perspective would be gained from considering the total offering of papers and from the discussion arising from them.

The studies presented have been organized into four parts for publication. The first considers forestry in relation to land use and tenure in the South Pacific region. The second considers forestry under conditions of population pressure, the third where these pressures are not at present severe and exploitation of forest resources is mainly for export, the fourth examines the role of international aid in relation to forestry
The attitude of professional foresters to the role of forestry in development in its widest sense is undergoing radical rethinking at present. This monograph seeks to contribute to the current debate.
Part A
Land tenure and forest development
Preamble

The structure of land tenure systems, particularly in some of the less developed countries of the world, can place severe limitations on the scope for economic development. Lack of clear title affects production decisions and inhibits the investment of capital and skills. This applies particularly to forestry since substantial, and normally contiguous, areas of land are usually needed for production to be economic and the use of land must be tied to forestry for a long time. Limitations to forestry due to tenure constraints can be well illustrated using examples from countries in the Pacific region, and, in particular, from those countries which have a land tenure system derived, at least in part, from customary ownership of land by indigenous inhabitants. The five illustrations given in this part of the monograph are all associated with customary ownership of land and discuss problems of forest development as a basis for economic growth and social welfare.

Many land tenure systems within the Pacific region are similar in nature, as they are largely based on customary ownership of land by indigenous inhabitants as the result of discovery, conquest or gift and as confirmed through occupancy. The present structure and level of sophistication of these land tenure systems, particularly in relation to the degree to which customary ownership is a component of the system, is of significance in development planning.

Within the Pacific region two factors appear to be closely associated with the structure of land tenure systems. The first is the stage in socio-economic development achieved by a country, and the second is the role of the indigenous population in the country's economic organization and social structure. In New Zealand, generally considered a developed nation, land tenure and ownership is a clearly defined product of Maori customary title and a form of the British Torrens title system. About 4.9 per cent of the
country's land is still held under traditional (Maori) title, the remainder being under crown or private title. The 1.3 million hectares of customary title land, much of which is wooded, is important both to future forest industries and as a source of income and employment to its owners. Williams describes the instruments which have been developed in New Zealand to allow its use for modern forest industries, providing an interesting example of the gradual evolvement of modern institutions which at the same time permit development to take place and benefit the traditional owners of land.

In Fiji, a less developed nation with a very strong indigenous political representation, ownership has only recently become clearly defined and 90 per cent of land is still held under customary title. This has proved a major constraint to development. Gregor describes the role of a large-scale state-promoted forestry enterprise there, which aims to involve local owners at every stage of production. Yauieb, Reti and Larmour analyse conditions for forestry in Papua New Guinea, Western Somoa and the Solomon Islands respectively. In all three, problems of land tenure classification are still being wrestled with, and the share of land held under customary tenure ranges from 97 to 80 per cent.

The level of sophistication of the customary title component of land tenure systems is quite variable. It can perhaps be gauged by assessing the ease with which land tenure facilitates land allocation from one use to another in the interests of development. Some of the characteristics of customary ownership tenure which create problems for development are:

(a) Poor definition of property boundaries, since customary title is rarely documented or delineated by cadastral markings.

(b) Duplication of claims for ownership of a given piece of land, which frequently arises from such poor definition. This uncertainty becomes more common following cessation of physical intimidation tactics for resolving land disputes.

1. The Maori proportion of New Zealand's population is 8.6 per cent, according to the 1976 census.
Multiple ownership. This point has several significant development facets. Of particular importance is the inequality of partnerships in land ownership, a consequence, among other things, of inheritance, social standing, occupancy and degree of use of the land. Also important is the actual number of partners. It is possible for a small portion of land to have in excess of 1000 owners.

Such involved tenure creates obvious problems of land allocation and decision-making. In addition, such problems are likely to be compounded by factors such as the heterogeneous nature of land itself and the possible need to amalgamate small holdings under customary title into parcels of land capable of supporting economic forestry development projects. Countries such as New Zealand and Fiji have managed to convert parcels of customary ownership land into a customary title which is more sophisticated and defined so as to facilitate development projects. It has taken these countries a long time to develop such new instruments. Papua New Guinea, Western Samoa and the Solomon Islands have yet to achieve a similar level of sophistication.

The clarification of customary land title to provide more sophisticated tenure eases only some of the problems associated with customary ownership and forest development programs. The long-term nature of forest development projects is also important, not only because of the irregular nature of the returns but also because of the commitment of the land to virtually one use over a long period of time. Owners must decide on a particular project, the method by which it is to be financed and operated, all with a view to maximizing welfare returns to the ownership community. Where there is a large number of owners, achieving a consensus decision may be exceedingly difficult, particularly if some owners are absent or cannot be located.

Three essential ingredients are required for a successful forest development project. These are land, finance and skills. All three will be required where owners seek economic advancement and choose forest development as an alternative or where governments see forest industries as sound economic ventures and encourage customary owners to undertake projects. Capital can often be a constraint, but it is one which can usually be overcome from domestic or foreign sources relatively more easily than early theories of economic development have held, provided that the enterprise seems likely to prove profitable.
The more difficult of the two latter components for the less developed countries to acquire is undoubtedly skill, both technical and managerial. Part of managerial skill lies in the management of land. In turn part of this skill lies in devising production systems for customary owned land in which the owners are continuously involved and committed to the form that development takes.

The five studies in this part of the monograph discuss the options available to traditional owners in the different countries, the problems which have been overcome and those likely to be encountered. Several case studies are also described. The provision of finance and skills are taken up at a later stage in the monograph.
Chapter 1
Afforestation on Maori land in New Zealand
E.W. Williams

Traditional rights

Land was formerly held by the Maoris of New Zealand under a form of communal use title very similar to the customary title of other Polynesian groups in the Pacific. Title stemmed from discovery, conquest or gift, confirmed in all cases by occupation. Occupation could, of course, in the case of bush and mountain land be formal rather than actual. Land suitable for cultivation tended to be held in smaller units with narrower owner-groups, since a lack of hardy shrubs and the harsh climate constrained agriculture; while bush and mountain land, with some minor exceptions, was normally held in large blocks by wider ownership groups. A person belonging to the ownership group (normally a descent group) was entitled to use the land and occupy it. Long absence from the ownership community could result in a loss of rights, but a common rule was that rights were revived by a return within three generations. Rights were always subject to conquest and this coupled with occupation cut right across former rights. In this way, ownership of a great area in the south of the North Island changed hands less than 20 years before European settlement.

Integration with modern titles

Early purchases by the Crown (the State) and by private non-Maoris were made by negotiation with recognized chiefs, but of course it was not uncommon to find two or more groups claiming to be entitled to a piece of land, and as the 'strong arm' method of asserting title gradually disappeared, it became increasingly difficult to determine who were the proper persons to deal with among competing groups. It was mainly to settle this problem that the Maori Land Court was set up in 1865, to hear and determine claims from Maori groups to be the owners of land according to Maori custom, and to give them, in place of their customary rights a 'freehold' title stemming from the Crown according to
European concepts. Ultimately, after some false starts, a system was developed of naming all current members of the entitled ownership group (including minors) and awarding them relative interests or shares. These were normally settled by heads of families on a genealogical basis.

In due course the Maori Land Court was given other jurisdictions. It was given power to partition land - that is to award specific pieces of a block to particular owners or groups of owners. It also received the power to deal with succession to deceased owners, the general pattern being that this went by blood relationship, a surviving spouse having no rights. The Court was also given certain supervisory powers over the alienation (that is to say the leasing, mortgage or sale) of Maori land.

The original purpose of the Court, to determine the ownership of Maori land, has long since been fulfilled. Theoretically, there may still be some areas of Maori land held in customary title but, if so, they are insignificant. All Maori land, of which there remains some 1.3 million hectares, is now held under title derived from the Crown. It is broadly that land which has never passed out of the hands of the line of Maori owners originally found by the Maori Land Court to be entitled to it.

All the land in New Zealand falls into one of three classes:

(a) Crown land, i.e. land owned by the State which may or may not be assigned for a particular purpose such as a public reserve, national park, or some government use.

(b) Maori land, i.e. land still held by the descendants of the Maoris who owned it in 1840 under title derived from the Crown.

(c) General land, i.e. land held under grant from the Crown which is not Maori land, having at some stage passed out of the hands of the original Maori ownership group. This is now held by private persons of any race, and large areas are in fact held by Maoris.

All private land in New Zealand (that is both Maori land and general land) is recorded on a Land Transfer Register with a state guaranteed title, under a type of the well-known Torrens system. In the case of Maori land how-
ever, because there are often Maori Land Court orders on partition and succession held unregistered in the Court offices, the registered title will not necessarily be up to date in its details. There are many cases of partition not yet completed by survey of the new parcels; although a parent title will be on the Land Transfer Register.

Problems of multiple ownership

The general picture of Maori land, then, is of land held in parcels of various shapes and sizes, often surrounded or separated by non-Maori land, each parcel being owned by a number of people not all of whom can be readily located. Current title details must be obtained from the appropriate Maori Land Court office, and generally, if an effective deal in the land is to be carried through, the Land Transfer record will have to be brought up to date. A great deal of Maori land is in bush or mountain areas of low present economic value, but is suited to forestry plantations.

The 1,315,000 hectares of remaining Maori land consists of roughly 25,000 separate parcels, or blocks. The great majority of these blocks are under 40 hectares and they are characterized by multiple ownership. About 75 per cent of them have between 10 and 100 owners; about 6 per cent between 100 and 1,000 and a small number (perhaps 0.2 per cent) have over 1,000.

Many serious practical difficulties arise from multiple ownership, particularly in decision-making on land use or dealings. It is difficult enough to get a unanimous decision from say 50 owners, even if everyone lives in the one locality. But the chances are that a majority of the owners are scattered throughout the country. The addresses of some will not be known or it may even be doubtful if some are still alive. Thus the sending of notices, the signing of legal documents and all the ordinary means of dealing with land are in most cases quite impossible.

(a) Management procedures

New Zealand has therefore found it necessary over the years to devise special means by which effective decisions over the land can be taken and, in some cases, the land continuously worked and managed. These special procedures have been set out in the code of Maori land laws
enacted by statute. At the present time the principal statute involved is the Maori Affairs Act 1953 as amended.

(b) Maori Land Court

A long-standing procedure, going back some 60 years, is the assembled meeting of owners. A meeting of owners of any Maori land may be called by the Maori Land Court to consider some matter put forward by the applicant - for example, that the land be sold or leased, that an incorporation of the owners be agreed to (this will be discussed later), or that money derived from the land be applied in some general way (e.g. towards a communal enterprise such as a marae or church) rather than distributed to the owners. The Maori Land Court, if it agrees to the meeting, arranges for notices to be sent to owners to attend the meeting at a suitable time and place. The meeting is chaired by an officer of the Court. Attendance must reach a certain proportion of ownership, depending on the subject. After discussion, decisions are taken by a vote based on shares held. The meeting's resolution goes back to the Maori Land Court for confirmation, and if confirmed becomes the effective decision of the owners to authorize the transaction,

The Maori Land Court may also create more permanent agrarian institutions in various ways. It may appoint trustees in whom property is vested, with a set of instructions on how they must exercise their powers and for what purposes - but always for the benefit of the owners generally. The trustees may be selected from among the owners or be professional men or some government corporation, or be partly one and partly the other. The trust is constituted by order of the Maori Land Court which satisfies itself that what is proposed is generally in accord with owners' views and for their benefit. The Court in any major trust usually stipulates that a periodic meeting of the owners hears the trustees' report and gives them general policy instructions.

(c) Incorporation

The incorporation system is another common method of giving power to a central body of owners. The Maori Land Court may, if satisfied of the assent of the majority of the owners, make an incorporation order in respect of the owners of any land. The owners thereupon become a body corporate
(rather like a company) and exchange their shares in the land for shares in the incorporation. The incorporation is set up to do certain defined things in relation to the land—e.g., to farm it, or cut timber, or carry on forestry operations. The land becomes the incorporation's property. Affairs are conducted by an elected committee of management with provision for staggered retirement and replacement. Audited annual accounts must be presented to an annual general meeting. One of the advantages of incorporation is that, as all the land becomes the property of the corporate body and shareholders' shares are assessed in relation to the value of shares in land contributed, the enterprise can without complication, once shares are fixed, spread over a number of separate titles. At present over 300,000 hectares of Maori land is held by 145 incorporations, representing about 23 per cent of total Maori land. The incorporation structure is seen by many Maoris as following closely the traditional communal and tribal way of organizing and controlling work.

(d) Amalgamation

The Maori Land Court also has certain auxiliary powers which can be of great use in relation to large scale land operations. It can, for example, amalgamate several existing titles into one, with one list of owners. In this case relative interests in the form of shares are based on the value of the original blocks. It can also amalgamate ownership without interfering with the boundaries of existing parcels so that instead of, say, 10 blocks, each with its own list of owners, there are 10 blocks with one overall list of owners, again assessed on value. The Court still has powers of partitioning, but these are little used; the current tendency is towards aggregating land rather than dividing it. By one combination or another of its powers, the Court can meet almost any set of circumstances. If a proposal is agreed, the title advisers then help to present the matter to the Court and to have the necessary formal orders made.

It is important to realize, however, that all this is in practice dependent on having available the services of skilled title people who can draw up a proposal, procure the necessary technical data such as valuations, surveys, agricultural advice, etc., and then over a period of time by patient discussion and explanation give the owners a chance to decide whether they will proceed. Such relatively large
skilled technical services are unlikely to be available in less developed countries to deal with agrarian rights.

**Utilizing Maori land for forestry**

This chapter has so far dealt with the rationalization of title and provision of decision-making machinery. Assuming that all this has been done in any case, the next step is to decide in what way the land can best be used for afforestation. There are a number of possibilities. Each of these has been tried in dealing with the 100,000 hectares or more of Maori land which is currently being afforested.

There are various possibilities for the owners (Department of Maori Affairs. 1978). These are:

(a) To sell the land to the Crown or to a private forestry company for afforestation. In this case the owners merely get the purchase money for the land, which they have lost forever. Given the Maori attachment to the land, this type of dealing is now virtually unknown.

(b) To engage in afforestation for themselves. The difficulty here lies in providing the necessary finance to plant and manage trees, and to service the debt until significant returns are obtained. However 'Forestry Encouragement Grants' of up to $450 a hectare are made for certain approved expenditures if matched by equal investment by the owners, and management can be provided by the New Zealand Forestry Service on an agency basis.

(c) To lease the land to the Crown or to a private forestry company upon a straight-out rental basis for a sufficient term (usually a long one) to enable adequate returns to the planting organization. Such leases nowadays normally stipulate that rents be indexed in some way to rise with living costs. Renting, however, has the disadvantage of giving the owners no real stake in the enterprise, and virtually severing them from their land for a lengthy term.

(d) To lease the land to the Crown or a private forestry company on some sort of rental plus profit sharing basis, in which the owners
participate in the profits earned when the forest comes into yield. There are many possible variations of this type of transaction, dependent on a whole range of circumstances. The most appealing type of transaction is one in which the owners forgo rent in whole or in part during the early years so as to increase their contribution to the enterprise and thus their share in profits. Most transactions today tend to be of this type.

The Department of Maori Affairs (1978), a New Zealand government department, has, with the New Zealand Forest Service, recently prepared a booklet to advise interested groups of Maori owners of the various institutional arrangements available to them and of some of the factors involved in making a decision to exploit their forest resources. The booklet draws heavily on the experience of the many groups of Maori people who are already involved in forest industries. The advice stresses that each case is different with different soil types, climate, area available, shipping facilities and market potential. A basic decision in many cases is whether to plant a forest for sawlogs or pulpwood. Sawlogs provide higher ultimate returns after a much longer waiting period but also greater employment opportunities. Pulpwood gives faster immediate returns but lower stumpage rates (log values) and presents problems of waste disposal. These decisions are complex, so that it is essential that, at an early stage of consideration, an independent expert forest consultant should advise the owners of the actual possibilities in their case.

Two case studies

It may help in understanding what has been said in general to give examples of actual projects.

(i) In an early case on the central volcanic plateau near the middle of the North Island a lease to the New Zealand Forest Service was arranged by the owners of some 50 blocks of land in scrub and light grassy bush totalling over 28,000 hectares. The lease was arranged by trustees in whom all the blocks had been vested for management. The lease is for 70 years at a minimum rent of 15c per hectare per annum but during the first 19 years rent is not to exceed $10,000 per annum. Thereafter the rent is to be not less than $60,000 per annum. The owners are to receive 18.5 per cent
of stumpage when the timber starts producing and stumpage rates will be reviewed from time to time. If after 50 years no renewal is arranged the royalties are to be used to pay for the establishment and management of carry-over forest, so that the owners will have a going concern to take into their own hands.

(ii) A fairly recent small case relates to 1,350 hectares in the northern part of New Zealand in which the owners have forgone rent in order to obtain a higher stumpage. Here the land was amalgamated into a single title and vested in trustees who have leased it for 46 years to a private company. A payment of $5 per hectare was made on the signing of the lease. The owners' share of the stumpage is to be based on their contribution to the total costs of establishment and management but is to be not less than 25 per cent. The owners' contribution is assessed at 10 per cent a year (compound interest) of the estimated value of the land as determined initially after six years and thereafter every five. This forgone rent of 10 per cent is credited to the owners as their contribution towards costs. Owners have the right after the first rotation to withdraw the land or part of it and to plant it themselves.

The contents of this chapter are based on actual experience and known cases, all of which have occurred fairly recently, over about ten years. During that time knowledge of and interest in forest industry on the part of Maori land owners has been developing and it may be that other patterns of involvement will yet emerge. Most Maori land suited by nature and location for traditional agricultural and pastoral farming is already employed in this way. Much of the remainder is in localities where afforestation is an option of much interest, and it seems certain that there will be further involvement in the next few years.

Reference

Department of Maori Affairs 1978. Afforestation on Maori Land, Wellington.
Chapter 2

Land tenure and forestry in Papua New Guinea: problems and solutions

A.M.D. Yauieb

Customary land tenure

Customary law is the basis of society in Papua New Guinea. It has many strengths and it is clear from National Goals set out in the Constitution that it is to be maintained and developed. Any attempt to substitute for customary tenure introduced concepts of land tenure or introduced principles for negotiating on land rights and rights to other resources such as timber would be incorrect. This was emphasized by Carson (1974), specifically referring to Papua New Guinea (PNG) forestry. Carson maintained that 'each newly independent country must determine its own particular policies most suited to its needs' and not follow policies developed elsewhere which have been 'based on secure land tenure and a permanent forest estate ... In P.N.G., forested land is to all intents and purposes native owned.'

The basic nature of customary land tenure is a combination of rights and powers exercised by groups and individuals at different levels depending on the need to assert those rights in particular cases. This must be kept to the forefront of our thinking. Large groupings ('tribes', for want of a better term) are significant in relation to land in that they protect the group's sovereignty to its territory against threats from outside. Tribes are made up of clans, usually based on descent groups, and have acknowledged powers of allocation of certain land within the tribe's territory. Actual exploitation and occupation of the clan's land is carried out by individuals and families. 'A high degree of flexibility, and scope for individual/clan/village initiative is embodied in the tenure system' (Nagle 1976).

In looking at rights to customary land, the major question is 'rights in respect of what?' Land rights do not exist in isolation, and are only motivated at the different
levels by the particular demands at the time. For example, rights to the products of virgin forest would normally come under the authority of the middle level — the 'clan' — so that it is pointless to investigate individual rights of occupation or exploitation. If we attempt to establish individual ownership and collect the signatures of all 'owners' (or their agents) for some purpose we demonstrate our allegiance to the English law of contract, and our lack of understanding of the basic nature of customary land tenure, and how it operates.

This is the real problem, not the intrinsic nature of customary tenure (which we are bound to preserve), but the inappropriateness of introduced concepts of 'ownership', and procedures for entering into agreements which arise from them.

Land tenure and forest management

'The land tenure systems of Papua New Guinea create many difficulties for the traditional approaches to forest management' according to Nagle (1976). Nagle suggests that such systems are unlikely to encourage 'the correct spacing and timing of production over a large area' needed to produce 'a predictable output each year for several decades, while retaining basic productive capacity'. At the same time, the 'attachment of local people to their land, and their affinity for the existing ecosystems, may be positive forces in guiding long-run forest management'. Carson (1974) commented that native ownership of land does not, however, mean that there cannot be sound forest management policies covering the forest estate, 'but it does mean that management will have to be re-oriented to take account of the existing local circumstances and conditions'.

White (1976) also stressed the problems of forest acquisition and management when he stated that there have been social and cultural barriers, rather than financial ones, in the acquisition and management of a permanent forest estate. There is a general reluctance to sell land for such a purpose and indeed such alienation as understood by Western culture is probably impossible in Melanesian society ... [However] usufructuary rights to use forest produce can be negotiated. The earlier drive of policy to secure a national forest has been diverted and channelled into
this area so that development could proceed with legal
title as understood by the administering authority.
The need for long term management was not forgotten
and provision for this was included in licences etc.
over major areas with subsequent negotiation with the
traditional land owners. However the fragility of
efficient management under these conditions must be
realised. Policies and licence conditions in major
resource areas do require that resource replacement
(forest management) be achieved but these stipulations
are hedged in that Western traditional covenants to
the access and use of regenerated forests are not
legally available at the time of granting the primary
use of the resource. Forest Management agreements
require additional negotiations of Government,
industry and landowners in a complex and difficult
area.

The significance of customary tenure in Papua New
Guinea is, therefore, high. About 97 per cent of land is
held under customary tenure. Papua New Guinea has a land
mass of more than 46 million hectares, 40 million of which
are timbered in varying degrees and 5-600,000 hectares in
agricultural use, including pastures.

A total of only 1.4 million hectares was alienated by
Government Purchase, compulsory acquisition, confisc-
ation and 'waste and vacant' or 'ownerless' declar-
ation. Of this, over 160,000 ha have been freeholded
and approximately 340,000 ha have been leaseholded to
private interests. The remaining .9 million ha have
been reviewed, and much of previous 'waste and vacant'
declared areas have been returned to previous custom-
ary owners (Commission of Enquiry into Land

Procedural alternatives for forest operations

Of the 40 million hectares of timbered land, 8
million hectares have been identified as suitable for inte-
grated forest industry development at various levels of
sophistication.

The then Department of Forests in the 1960s began
a program of identifying areas of timber suitable for sett-
ing up industry on a sufficiently large scale to carry the
cost of private infrastructure development required by the
government in agreement with companies in return for the right to develop the area.

The right to operate in timber areas in PNG could previously be carried out in any of four ways, of which the first, in effect lease from government is overwhelmingly the most important. They are:

(a) **By Timber Permit based on Timber Rights Purchase**

Under the current Forest Act 1936 (as amended) the government may purchase the rights to the standing timber, with various exclusions (see below), and then negotiate with a private forestry company on extraction and processing rights. Procedures for a Timber Rights Purchase (TRP) are as follows:

(i) The area is identified.

(ii) The ownership of the land is established.

(iii) The boundaries of the ownership groups are established by survey.

(iv) The restrictions on culling certain trees (food trees, canoe trees, cultural trees etc.) on operations asked for, are established.

(v) The volume of timber is assessed.

(vi) Royalty payments are agreed (lump sum; or deposit and regular agreed payments; or holding deposit and payments as the logs are cut and measured).

(vii) All owners (or their designated agents) then sign the purchase documents.

Eventually, after an agreement has been signed a Timber Permit is authorized which allows the company to take the timber, on which certain royalty must be paid, and to export the logs (subject to export tax) or to process the logs locally to sawn timber or plywood either for the local market or export.

Other requirements may also be negotiated outside or within the terms of the agreement and a time period is set. The restrictions set out in the permit will make
provision for guarantees, equity, maximum/minimum cuts, penalties, export limitations, working plan/environment/re-afforestation provisions, industrial development levels and time tables etc. Sometimes some or all are included in the agreement.

Up to mid-1978 2,226,000 hectares of Timber Rights Purchases had been made by the government and several hundred permits had been issued by July 1976.

Theoretically there should be no hindrance to continued operation by the permit holder once the ownership pattern has been established, and the people agree on the development going ahead.

Royalty is appraised by a standard method which attempts to equate areas on the basis of stand factors such as proximity to market, quality, volume per hectare, weather conditions and ground conditions. Royalty is split between the land owners and the provincial government of the area, for under the PNG Organic Law, the provinces gain all royalty value of the natural resources developed in their own provinces and no royalties accrue to the central government. At present, the landowners receive 25 per cent and the provincial government 75 per cent. The central government is, however, claiming 25 per cent of the provincial share to compensate it for making Timber Rights Purchases and negotiating agreements. This has been granted in one case. It has also been suggested that an additional 25 per cent should go to the previous owners, but no provincial government has yet given more to them than the standard 25 per cent.

(b) By agreement under the Forestry (Private Dealings) Act 1971

This Act specifically provides for direct dealings between the timber (i.e. land) owners and the proposed development company. The Act allows foreign or national companies to enter direct negotiations with owners, and to start an industry based on the timber resource. Once the project has been identified, the procedure under the Act is broadly as follows. Application is made to the minister in charge of forests for declaration as a Local Forest Area; the Minister examines the agreement to ensure that it is in the national interest of PNG and that:
(i) it complies with the Act;

(ii) that the terms of exploitation are equitable to the timber owners;

(iii) that at least a reasonable proportion of the resource will be dealt with; and

(iv) that the proposal is economically feasible and the intended developer is capable of satisfactory operation of the industry.

There are time restraints on the Minister's decision, and appeal against his refusal to assent to the agreement is provided for to the Supreme Court of PNG.

This Act has been widely criticized as too weak an instrument. It gives the government no punitive powers to enforce the observance of conditions agreed to except by cancelling the whole agreement, no rights to enter and inspect field operations etc. or to control such operations. Up to mid-1976 four declarations of Local Forest Areas totalling 131,000 hectares had been made. Volume cut was only <8 per cent of the total cut in 1976, but is expected to become more significant. No royalties accrue to either central or provincial government under this Act.

(c) By Native Timber Authority

Under the Forestry Act 1936 (as amended) landowners may sell small lots of timber to buyers/sawmillers under the Native Timber Authority (NTA). This method was designed specifically for small operations up to 50m³ each authority issue, to enable small volumes of timber from clearing to be sold rather than wasted. Export of the logs is specifically prohibited. Although designed for small operations, nevertheless one large sawmill subsisted on the continued issue of these Authorities for several years when it was unable to obtain a licence under the more widely used Timber Permit System.

There have been hundreds of NTAs issued each year, but they accounted for only about 0.4 per cent of the total volume cut in 1976.
(d) **By cutting on freehold property**

Such small areas of freehold property as existed in PNG prior to the change to leasehold allowed unrestricted logging operations. The total volume aggregated only .03 per cent of the total logs cut in 1976.

The solutions

The complexity of customary ownership and the alternatives available for forest operations pose problems for forest development in PNG. What are the solutions?

The basic solution appears to be to work with the operative group throughout the transaction. In the case of Timber Rights Purchases we should be dealing with the resource-owning groups, the clans. In essence a clan is a corporate body in that it exists as a recognizable entity and its members are bound by an accepted set of rules, the customs of the clan. There is provision at present for the legal recognition of clans as corporations, the Land Groups Act 1974, an Act which is expected to be used generally for the purpose of Timber Rights Purchases. Once a land group is incorporated, the representative body of the group can dispose of interests in customary land to the extent allowed by custom (this latter qualification would not pose any problem in disposing of timber rights).

It is proposed to introduce new legislation shortly which will clarify the powers of groups to enter into agreements about customary land. This legislation, while providing for checks on the exercise of powers by a body representing a land group, will strengthen the legal effect of agreements validly entered into. As far as Timber Rights Purchases are concerned, its repercussions will be limited to the establishment of group boundaries. If these cannot be settled by agreement, then there is provision for any dispute to be dealt with under the procedures of the Land Dispute Settlement Act 1975. The order of a Land Court under that Act is binding on the parties.

Once groups and areas have been settled, the representative bodies of the incorporated land groups will be able to enter into enforceable Timber Rights Purchases for the timber rights within their areas.
In the Melanesian situation, a transaction is not generally regarded as binding in all its terms indefinitely; indeed not even during any shorter period stipulated in the agreement. Rather the validity of an agreement is assessed according to its perceived fairness at a particular time. Obviously with modernization an 'agreement' of such an open-ended nature is not acceptable to companies contemplating heavy initial capital investment in the expectation of future returns, and legal enforceability is required. Much greater continuous acceptability of agreements can, however, be achieved if provision is made at the outset for the continuous involvement of the selling group in the profits and new life-style which the release of their resources has allowed. There is a great variety of ways in which this can be done, beyond payment of regular royalties. These include guaranteed provision of employment and access to the new business opportunities, provision of roads and other services etc. In other words, the resource-exploiting company can be used as a vehicle for providing development opportunities which the government cannot afford. If the price that government has to pay for imposing these special burdens on the company is a reduced share of the profits, many people would regard this as profits well invested in the nation's future.

Current problems

The forestry industry has recently run into two major problems with owner groups arising out of land tenure: logging and re-afforestation.

(a) Logging

Work is sometimes disrupted by landowners (or previous owners in the case of 'waste and vacant' areas) who are aggrieved and interfere with logging, roading etc. for various reasons. For example, the clan leaders claim that (i) the 'waste and vacant' declarations were improper; (ii) that they were tricked into selling either land or timber at below fair market value; or (iii) that they are not satisfied with the flow of royalty payments.

(b) Reforestation

The other chief problem concerns reforestation. Policy is that forestry should be on a sustained yield basis. But there is a natural reluctance amongst the landowners to
allow customary land to be leased to government for on-leasing to reforestation companies, because this involves long term withdrawal of such land from customary usage. Clans may also feel they will need the land for agriculture before the end of the normal pulp rotation (10-12 years). In view of the customary attachment to the land, it is now obvious that PNG agreements, for example, must be more definite in providing for reforestation. There has been a tendency to gloss over the problem of land acquisition in the hope that it will disappear with the anticipated success of forest industry development and acceptance by the local people participating in its benefits.

In the event, this hoped-for acceptance has not occurred. Thus it appears necessary to follow Carson's (1974) recommendations:

(1) In future, timber rights purchase areas and agreement in principle for leases for reforestation areas should be negotiated at the same time as part of one deal, and there should also be an option for owner participation under the terms of the lease.

(2) There should be a reforestation obligation written into the agreement; either for planting up a percentage of the annual coupe area or for payment of a cess (resource tax) to a central fund to finance reforestation operations.

General conclusion

Forestry in Papua New Guinea encounters a number of problems associated with customary land tenures. The present system of Timber Right Purchases has a poor reputation among the people. Many claim that it is not fair because first payments and royalties are low, and there is often little provision for participation by the local people. Timber Rights Purchases do not legally alienate the land from the customary owners, but in practice tie it up. Where the Purchase is not quickly followed by timber milling, this is sometimes resented by local people. If timber milling is not likely within a reasonable period and the local people are meanwhile inhibited from commercial farming, some relaxation of the Timber Rights Purchase over part of the area should be considered. Forestry officials should advise legal owners how they can develop their land for agriculture without damage to the trees that the government has bought.
The Timber Rights Purchase system is not an adequate legal basis for reforestation and other long-term follow-up work on the land after timber cutting. The most suitable arrangement seems to be for the customary right-holders to register their land and lease it to government on terms which give them a minor share of royalty payments, guaranteed employment, training in the industry, and shareholding in the whole development on the land.

One method of involving the local population successfully in modern forestry in their area is through Timber Working Groups. This method is outlined in the next section, which describes how such a group is helping to smooth operations for the Madang chip industry.

The Madang wood chip project: a case study of a solution

In the Madang project, the government has been successful in tackling the problems arising for forestry out of customary land tenures, as well as a number of other issues between the project managers and the local people.

The Madang project is Papua New Guinea's one integrated wood chip and reforestation enterprise. It is a joint venture between the government and JANT, a wholly-owned Japanese subsidiary. JANT is responsible for logging and chipping operations. For reforestation, a joint company has been set up, the Gogol Reforestation Company, in which JANT hold 51 per cent and the PNG government 49 per cent. The company is charged with reforesting a large part of the chipped area with species acceptable for pulp harvest so that viable operations can be carried on in perpetuity.

To avoid problems likely to interfere with the project's success, the government established the Madang Timber Working Group (MTWG) to oversee, co-ordinate and facilitate the whole operation. The most important problem to be tackled was that of further land acquisition. No specific undertaking had been required of the landowners at the time of the Timber Right Purchase to commit a defined area to reforestation following logging, to allow the industry to develop. The MTWG's primary function has thus been to acquire land on behalf of Gogol for continued and
expanded operations, and it has had to be very active securing land on a year by year basis for each season's planting.

The MTWG comprises representatives of four major government departments (Forestry, Agriculture, Lands, and Provincial Affairs), and seven representatives of the people of the timber areas. The Timber Company is invited to attend meetings and take part in patrols.

The main functions of the MTWG are:

(a) Day to day co-ordination of the various departmental activities.

(b) To provide for liaison ('problem solving') between the government, the people, and the JANT Company.

(c) The acquisition (leasing) of adequate land for major reforestation purposes.

The MTWG was set up in 1972 immediately after the signing of the agreement and the issue of the permits for woodchipping. Its primary task was to patrol all areas to be affected and keep the people informed on developments. In addition it was to seek the people's view on all aspects of the development, including the necessity to provide land for reforestation and to advise the people that they had a body (MTWG) to assist them in their dealings with the company.

In its activities the MTWG has, in fact, been able to soften the apparently catastrophic effect such a project can have on the land and its people. MTWG has operated to smooth out these problems and find solutions. In particular, it has to a large degree been able to overcome the natural reluctance of the land owners to allow adequate land to be withdrawn from customary use and made available, under lease to the government, for on-leaseing to the Gogol Reforestation Company for planting or logging.

The Reforestation Company currently leases a total of 1175 hectares for reforestation, acquired in successive lots of 165, 350, 300 and 360 hectares in the four years 1974-75 to 1977-78.
The Working Group has also tackled the problem of allocation of land in logged-over areas between agriculture and forestry. The MTWG liaison enabled satisfactory land use studies to be carried out and acceptable planning of post logging land use, from many possible alternatives, to be developed as a basic management tool for the area. Broad scale planning was made possible by the fact that chip logging is virtually clear felling of a major proportion of the area.

The survey and MTWG liaison has allowed identification of the area required in the longer term for reforestation, agriculture, etc., and facilitated the immediate leasing of such land to the Reforestation Company.

Broad planning has been made possible for post-logging land use. It is expected that after logging, the area will be further utilized somewhat after the following pattern:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smallholder use for intensive gardening</td>
<td>6</td>
</tr>
<tr>
<td>Capital intensive agriculture development (mechanized rice, or large scale cattle development)</td>
<td>2</td>
</tr>
<tr>
<td>Bench mark reserves (biosphere reserves)</td>
<td>2</td>
</tr>
<tr>
<td>Pulp reforestation</td>
<td>39</td>
</tr>
<tr>
<td>Enrichment planting to long rotation timber species for selective logging</td>
<td>44</td>
</tr>
<tr>
<td>River, swamp, etc.</td>
<td>7</td>
</tr>
</tbody>
</table>

The MTWG has also conducted research on the people of the area; and its work underlines the problems encountered in fostering such a development. The genealogies compiled by the MTWG showed the Gogal and Naru areas of development covered:

(i) an area of 63,000 hectares;
(ii) a population of only 2,300;
(iii) eight language groups; and
(iv) 250 distinct land owning groups.
The difficulties involved in drawing up a land use plan to meet the needs of all the owners can be imagined. Nevertheless, the MTWG can report that at present 10,000 hectares has been logged; 1,175 hectares reforested; that smallholders have been assisted in developing 100 hectares of cattle projects and 100 hectares of crops such as cocoa; that reserves have been established; royalties distributed and problems solved.

The Madang Timber Working Group is now used as an example for others to follow. Consequently, a TWG has been set up in the Open Bay Timber Development Area in East New Britain Province, and other Timber Working Groups will follow in each major timber development area.

References


Chapter 3

Forest utilization and land tenure: the Fiji Pine Commission

Ewen W. Gregor

Introduction

A basic aim of the forest policy of Fiji is to secure self-sufficiency in timber supplies. This aim has been followed by developing a sawmilling industry based on indigenous forest species and by investigating the establishment of exotic plantations. There have already been substantial importations of softwood timber and *Pinus caribaea* was included in early species trails to promote import substitution. The species proved to be well suited to Fijian conditions and was able to grow on areas of low fertility grassland which had not been used. In due course growth rates and timber qualities enabled Fiji to produce its own requirement of softwood. It then became clear that the areas of land suitable for pine growing were far greater than those required to produce material for local consumption.

This led to an examination of export possibilities and to the eventual establishment of a scheme to provide for both local needs and export. The aim now is to develop a net plantation forest estate of some 60,000 hectares with a sustained annual production of 800,000 m³. The implementation of this scheme is in the hands of the Fiji Pine Commission (FPC).

The Fiji Pine Commission: a partnership

The FPC is a statutory corporation, created in July 1976 under an Act which requires it to 'facilitate and develop an industry based on the growing, harvesting, processing and marketing of pine and other species of trees grown in Fiji'.

To achieve this aim, it is necessary to bring together land, expertise and finance and to do so in such a
way that the long term stability essential for industrial forestry is assured.

It is helpful to look at each of these three major factors separately and then at their combination.

(a) The land

Land tenure is the single most vexing problem of commercial forestry in Fiji. The strong emotional attachment of Fijians to their land has made it difficult to obtain areas on the scale necessary for a viable long term industry. More than 80 per cent of land in Fiji is in the hands of indigenous Fiji landowners, the balance being freehold and Crown land. In the area for pine development about 85 per cent is Fijian owned and held under a communal, family type of title. Ownership boundaries are well known and described and although there are no formal titles, a Native Land Commission, established in 1880, did rationalize and confirm land allocations.

Within a communal boundary land ownership rests with the group and cannot be sold or mortgaged. In the modern context, this is a major constraint to development, since landowners seeking to raise capital cannot use titles as collateral for loans. Moreover, agreement among the numerous owners to lease land for a long-term is difficult to organize.

The Native Land Trust Board is the other organization involved in Fijian land management besides the Native Land Commission. This body was set up in 1940 to protect landowners from exploitation, and to lease native land in the most advantageous way on behalf of the owners. If a lease is required for any purpose it is normally necessary to obtain the agreement of the particular owners. But the actual lease is with the Native Land Trust Board on behalf of the owners and this body is responsible for the validity of the contract, the drafting of its terms and for the collection and distribution of rent.

The Native Land Trust Board is also used in relation to the smaller scheme for self-sufficiency in timber, under which native land had been leased to government to enable the Department of Forestry to carry out its afforestation programs. The native owners received rental through the Board for the use of their land but that was the
limit of their participation.

The indigenous Fijians are not only emotionally attached to their land, they also cling to it as a means of power. Immigrant races, predominantly Indian, with minority representation of European, Chinese and others, came from industrialized or semi-industrialized countries. They were more sophisticated commercially than the indigenous Fijians, who in this respect were at a substantial disadvantage. This the Fijians sought to counterbalance by their possession of the land and became increasingly reluctant to lease directly to other races. A situation started to develop in which it was important for the national wellbeing that Fijian land be brought into production through inputs of capital and skills, while the land itself was being held ever more tenaciously by the Fijians who lacked both the expertise and finance to develop it themselves.

It was in this atmosphere that advocates of the pine establishment scheme found themselves faced with the task of acquiring thousands of hectares of native land. Their solution was to evolve the Fijian Pine Commission.

(b) **Expertise**

The earlier self-sufficiency program in pine timber was developed by the Department of Forestry which employed experienced officers. These were initially largely expatriate, but the service was gradually localized under rational and successful training programs. The need for trained manpower rose sharply when the planting program expanded dramatically and the industry shifted towards export orientation which demanded new commercial organization and skills. Overseas assistance was investigated and, since the United Kingdom was withdrawing from the region, New Zealand emerged as a likely and interested source. In the event, the New Zealand aid program to Fiji has provided the bulk of the expatriate expertise required to implement the revised strategy. An accelerated training scheme was introduced for local people which, as it gathered momentum, proved successful in providing the skilled manpower needed by the organization to carry out the planned programs.

(c) **Finance**

The initial timber import replacement scheme had been funded by the Fiji government operating through the
Department of Forestry. But the planned expansion in areas of plantation and the eventual development of an industrial processing complex based on the new raw materials was clearly going to become a multi-million dollar development beyond the government's resources. At the same time, the government supported such a development strongly for two reasons. First, because it would diversify Fiji's limited export trade, which still is very dependent on sugar. Second, because it would help to improve the imbalance in income between the predominantly Fijian rural hinterland and the urban commercial and coastal sugar cane lands, principally inhabited by other races. This is a key objective of the government's seventh development plan (1976-80) especially as the comparative rapidity of development in these latter areas necessitated a concentration of services there, further increasing the disparity between urban and rural standards in living. This, allied to the reluctance of Fijians to lease land, which constrains the ability of a growing population of other races to provide for themselves while land lies apparently idle, suggests potential economic and social problems in a country deservedly well known for its stability and racial harmony. The pine development scheme had the potential to provide answers to some of these problems through economic growth and the redistribution of wealth. It could also slow the worrying urban drift while spin-off industries could be expected to provide employment opportunities for all races.

The government was prepared to guarantee loans for the expanded forestry scheme and to channel certain overseas aid towards it. The Commonwealth Development Corporation (C.D.C.) in London was approached for funds and, following their independent evaluation of the commercial viability of the scheme and of Fiji's technical ability to execute it, a loan was arranged and guaranteed by the Fiji government. This loan provided for most of the onshore costs of running the scheme during the plantation establishment phase. Separate borrowings, possibly allied with joint venture partnerships, are contemplated for the industrialization phase.

The New Zealand government was approached for help in financing capital inputs such as imported machinery and for technical assistance, and that country is currently providing these in substantial measure. Thus at present C.D.C. loan finance accounts for about $F3.2 m of the scheme's average annual expenditure of $F4.0 m while the remaining
$F800,00 is subscribed by the New Zealand aid program. There are in addition small inputs under other aid programs and the government assists directly with some import tax concessions. Thus, given a combination of land and expertise it was possible to raise the necessary capital.

(d) The combination

An enabling agency was needed to organize land, skills and capital to create the planned forest industry. The FPC was formed to fulfill this role and basic to the stability of this agency was the development of the partnership concept with the owners of the land to be planted. This partnership seems to have been created successfully and, although it is still developing and subject to certain growing pains, it appears to have developed the all-important basis of trust.

An essential ingredient has been the move away from the concept of an 'alien' agency which leases land and develops it for its own benefit while limiting the owners' role to that of landlord. This has been replaced by the concept of developing the people themselves. The eventual aim is that when the scheme is completed and the development costs have been repaid from profits so that a viable industry has been created, its operation may revert to the landowners, if they so choose. It seems realistic to expect that the owners will in the meantime have developed sufficient skills at all levels to operate the industry more or less independently. This approach has overcome the 'alienation' problem effectively.

Again, the terms of the leasing of the land have been designed, after intensive consultation, to suit owners' needs. The total sums which could be made available as rentals and shares of stumpage (log value) were first calculated and then answers were sought on how the distribution of these sums should be spread. The result was an arrangement for the payment of a premium on concluding the lease agreement, a reasonable level of rental, and a relatively small share in final stumpage. This fitted with owners' aspirations since there were many ventures which they had been prevented from undertaking by their inability to raise capital, as already discussed. The lump sum premium payment and ongoing rentals provided the necessary funds. Lease arrangements were made so that wherever possible, owners would be employed and the satisfaction of working on their
own land preserved. However, sufficient good sense was exhibited not to push this so far that unqualified landowners occupied positions to the detriment of overall efficiency and eventual profitability.

In the same spirit of partnership technical forestry staff attempted to devolve responsibility where possible to village committees, for example for the provision of labour contract gangs, and also tried to remain sensitive and sympathetic to landowners' problems in so far as this was possible and compatible with the main requirement of developing the forest industry. It was sometimes very difficult for staff members, who had, by any country's standards, a very large and taxing technical job to carry out, to stay attuned in this way. This was particularly so for expatriate aid staff. However, most soon realized that the resource they were developing consisted of people as well as trees and the situation is now satisfactory.

Finally, the Board of the FPC is so constituted that four out of the ten members are landowners who themselves have land in the scheme. This is very much more than a token representation, particularly as the other members are drawn from a variety of sources, so that the landowners working together have a very potent voice in the policy making forum of the organization. This inspires confidence in individual landowner participants that they really can influence the way in which their land is used within the accepted constraints of the main objective.

These factors have come together to provide a full sense of partnership in a venture which aims to establish a viable forest industry which will provide profits, in the widest sense, for all involved in it and to encourage communal landowners to identify with a development scheme which is in the national interest.

The FPC has so far acquired an estate of 54,300 hectares, most of it being native owned land. 22,800 ha have been planted and an annual establishment rate in excess of 5,400 ha has been achieved. The scheme is operated by a largely local staff numbering 120 and employs 350 artisans and semi-skilled labourers on a permanent basis. Through its contracting systems 2000 jobs became available in 1977, predominantly to people who owned land in the scheme. The relatively short term nature of individual contracts does not materially disrupt the normal sequence of traditional
village life and this is believed to be important in providing a compatible employment pattern. Payments totalling more than $F1,000,000 (US$1.17 million) were made to contractors involved in anything from cone collecting to tree planting and from small roundwood logging to pruning. This, together with rents and land premiums, represented a substantial infusion of wealth into the rural sector and allowed many communal aspirations such as improved water supplies, new schools and truck purchases to be met.

The FPC produces posts and poles and sells preservative treated timber on the local market. It will install its first sawmill in 1978. In the same year it hopes to engage in a roundwood export trade as a first step to the establishment of a major chipmill/sawmill complex in the mid-1980s. It is, however, planned to increase the roundwood export trade only gradually, since a massive training program must be undertaken to enable a country quite inexperienced in large-scale plantations to handle huge volumes of roundwood exports successfully.

Conclusions

The logging industry appears to offer an unprecedented opportunity for native Fijians to develop as businessmen. Given the necessary support, communal institutions can be employed to finance and encourage contractor/businessmen working on their own land, or more accurately, the forest of which their own land forms an integral part. A thorough and diverse training is required for participation both in the practical and in the accounting fields. It is expected that some 70 contract businesses involving at least 240 trained men will eventually be required and this represents a development cost beyond the capacity of the FPC, both technically and financially. Other arms of the Fiji government will be involved and it is an area where aid assistance could well be extremely productive.

The FPC pattern of partnership thus goes far beyond simply growing a raw material and passing this on for utilization. It is already using its resources to develop the people as well as the land and will continue to do so through the logging, transportation and manufacturing phases. In this way stability can be achieved in a nationally important industry and a more equitable distribution of wealth and skill created between all races, leading to a better Fiji for all of its inhabitants.
Chapter 4

Land tenure and forest utilization:
Western Samoa

Iosefatu Reti

Introduction

Western Samoa's most important forest resources are concentrated on Savai'i, one of the country's two main islands, which is 1800 km² in extent. The other main island, Upolu, 1100 km² in area, has significant forest cover, but much smaller forest industries. There are six minor islands, of which two are uninhabited.

The population of Western Samoa, predominantly of Polynesian origin, has risen from about 30,000 in 1895 to over 150,000 in 1976. The people live mainly around coastal areas and depend on fishing and small crop farming for food.

Forestry and agriculture are greatly affected by the country's mountainous topography and heavy rainfall. The islands are volcanic in origin, built up from successive basalt lava flows from a line of eruption vents running northwest. The low country of both islands consists of a flat coastal plain and gentle foothills which gradually merge into more rolling and dissected (15-20°) slopes at intermediate levels until upland areas are reached at 600 m on Upolu and 1,400 m on Savai'i. The upland areas are punctuated by lines of volcanic vents reaching 1,800 m on Savai'i and 1,100 m on Upolu.

The climate is governed by the southeast trade winds modified by the lie of the ranges. Over the bulk of the islands, rainfall ranges from 3200 mm at sea level to 5100 mm at 900 m (126" to 200""). Rainfall exceeds 6400 mm (250"") above 1200 m on Savai'i. The lowest rainfall areas are in the northwestern sectors of both islands where annual rainfall is 2500 mm. In these areas a 'dry' season is usually experienced between July and October.
The pattern of vegetation is determined largely by elevations above sea level and roughly follows certain contour bands.

Lowland forest - 0-230 m (0-750')
Foothill forest - 230-550 m (750-1,800')
Upland forest - 550 m (1,800) and above.

Shifting cultivation, a normal practice of the local small farmers, has had a detrimental effect on the country's vast forest vegetation. High hill forests have been progressively cut or burnt while at the same time the country was importing about 75 per cent of its timber requirement from Canada, New Zealand, Australia and other countries.

Little of the primary coastal forest remains and a considerable portion of the present forest may be comparatively recent in origin and forms a mosaic of interlocking plant associations modified by natural disasters and other influences (Table 1).

<table>
<thead>
<tr>
<th>Land cover</th>
<th>Savai'i</th>
<th>Upolu</th>
<th>Total a</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural forest (1977)</td>
<td>104,240</td>
<td>49,890</td>
<td>154,130</td>
<td>54.0</td>
</tr>
<tr>
<td>Cropped village land (1962)</td>
<td>17,980</td>
<td>20,360</td>
<td>38,340</td>
<td>13.4</td>
</tr>
<tr>
<td>Grass-scrub village land (1962)</td>
<td>4,320</td>
<td>6,600</td>
<td>10,920</td>
<td>3.8</td>
</tr>
<tr>
<td>Village areas (1962)</td>
<td>450</td>
<td>550</td>
<td>1,000</td>
<td>0.4</td>
</tr>
<tr>
<td>Plantation forest</td>
<td>1,010</td>
<td>8</td>
<td>1,020</td>
<td>0.4</td>
</tr>
<tr>
<td>Lava fields</td>
<td>11,430</td>
<td>-</td>
<td>11,430</td>
<td>4.0</td>
</tr>
<tr>
<td>Other types</td>
<td>31,490</td>
<td>37,280</td>
<td>68,770</td>
<td>24.0</td>
</tr>
<tr>
<td>Total</td>
<td>170,910</td>
<td>114,690</td>
<td>285,600</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Land ownership

There are three main classes of land in Western Samoa—government, freehold and customary. By far the largest share is held under customary tenure. Government owns less than 10 per cent of the land area of Savai'i where forestry is more important, but owns 17.2 per cent of the total land area throughout the islands (Table 2).

Few of the boundaries have been surveyed and demarcated. This applies to a greater extent to customary land and results in continuous land disputes, occasionally settled by the Lands and Titles Court. Only freehold land is normally surveyed, demarcated and registered.

Table 2

<table>
<thead>
<tr>
<th>Land tenure</th>
<th>Area hectares</th>
<th>Per cent of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Church missions</td>
<td>2,020</td>
<td>0.7</td>
</tr>
<tr>
<td>Freehold</td>
<td>6,500</td>
<td>2.3</td>
</tr>
<tr>
<td>Samoan government</td>
<td>49,000</td>
<td>17.2</td>
</tr>
<tr>
<td>Samoa or customary land</td>
<td>228,100</td>
<td>79.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>285,620</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Source: As Table 1.

(a) Government land

The government holds relatively small but significant areas of land in both islands of Upolu and Savai'i. The largest block of government land at Asau (the Cornwall Estate) is currently the centre of forest utilization and development and will undoubtedly remain the most significant until better access to customary land is ensured.
Other blocks of government land are dedicated to other development projects such as agriculture, water reserves, national parks and industrial developments etc. The Forestry Division of the Department of Agriculture and Forests is charged with the development of national parks and reserves. This will entail the conservation of forest resources in some parts of the country.

(b) **Freehold land**

Freehold lands are of very little value for forest utilization and amount to only 2 per cent of the total. They are usually on the outskirts of towns and are intended for settlement. Beyond the towns freehold lands are small and scattered.

(c) **Customary land**

About 80 per cent of the total land area is held under customary tenure under which the matai (traditional leaders) control prevails and dictates the rights to work the land. Each family (aiga) in a village has a share of the village land which is usually allocated by the council of elders (Fono a Matai). Boundaries of family land are often undefined and not clearly demarcated. This is the most common cause of land disputes between the families in a village. Compounding the problem is the uncertainty of boundaries between village lands. Where boundaries are disputed by more than two villages the problem becomes more complicated and it is hard to arrive at a mutually satisfactory solution.

Since the consent of the majority of the matais is necessary, access to customary land is difficult.

**Land tenure and forestry**

Forestry requires large areas of land for sustained and economic production. This presents a major problem in Samoa where attempts to acquire forest areas on customary land for utilization create anxiety and cautiousness amongst the people. The mass land acquisition of the early European settlers has instilled a permanent suspicion in their minds. Consequently, negotiations between village and government is a time-consuming process and its outcome is unpredictable. In the meantime, the forests are being continually cut and wasted for crop farming.
Forestry is a new field in Samoa and there is a lack of public appreciation of its values and of its benefits to individual communities or to the country as a whole. This negative attitude towards forestry is, however, gradually disappearing in the vicinity of the major timber industry where the adjacent communities benefit from job opportunities, revenue and income earnings, improved communication, and a better way of life. It is hoped that these benefits will be appreciated by other communities and result in a more favourable attitude towards forestry.

**Land tenure and timber licences**

To utilize timber on customary owned lands, a timber licence is necessary. The terms of the licence must be agreed upon by government, the forest industry and the matais. Difficulties usually arise from the difference in opinions and attitudes of the matais towards forestry and forest utilization. Normally timber licences are refused until an agreement has been reached. If at all possible, the agreement covers all the matais, or as many of them as possible. Such consent is rare and licences are normally granted after long periods of negotiation. Consequently only 50-70 per cent of total forested land is available to the Samoan forest product industry is currently committed by licence. (Roughly 20-30 per cent is customary land and the remainder government land.) These areas, although under licence, are still being cut and cleared for agriculture, so that considerable timber may be lost by the time logging commences.

At present, the terms of the timber licences allow the landowners to retain their rights over the land. Hence they can gain access to these areas at any time and operate as they please. A quick and practical solution to overcome this problem is difficult. Mass public education through the use of the mass media and personal contact is probably the best that can be attempted at this stage, at least until other means become available to increase the appreciation of the landowners and the public at large of the value of forestry.

**Land tenure and reforestation**

The shortage of land for reforestation is undoubtedly the major concern presently faced by the government in
trying to ensure and maintain a stable forest industry. There is insufficient government land within the reach of the major timber industry to support economic operations. Therefore customary land has to be utilized if the industry is to continue its operations after the native forest resources have been exhausted. The acquisition by lease of these customary lands for reforestation usually results in much apprehension, and at present only 2,400 hectares have been acquired. The maximum term for leasing under existing law is 60 years, divided into three periods of 20 years.

The government is still trying to obtain more customary land for reforestation, possibly combined with cattle grazing or taungya farming (shifting cultivation) to obtain optimum use from these areas. Such integrated use is still in its experimental stage. It is hoped, however, that its success will create a favourable attitude to development of a forest industry in the country.

**Contribution to economy**

The cash economy of Western Samoa is based mainly on agricultural exports. At present timber is the country's third major export, behind copra and cocoa and could well expand its role. It is predicted that with proper management and utilization of the remaining resources, coupled with quick artificial regeneration of logged areas, the forest industry will increase in importance to become one of the major contributors to the economy. Table 3 presents recent data according to the report of P.F. Olsens and Company, forest management consultants to the government.

Employment in the forestry sector, including forest management and primary processing staff and workers, but excluding secondary production such as carpentry and cabinet making, has risen from 75 in 1972, to 485 in 1976. Employment at one time reached a peak of 520 and it is expected that employment will continue to rise in the future.

Perhaps one of the chief factors contributing to the slow development and conflicting uses of land is the absence of a land use and planning program. Such a program would perhaps prevent the occurrence of numerous conflicting uses and competition for land. Until such planning is undertaken, the future of forestry and related industries will remain uncertain, and their justification questionable.
Table 3

Timber production

<table>
<thead>
<tr>
<th>Year</th>
<th>Area logged (hectares)</th>
<th>Volume logs removed (000 m³)</th>
<th>Sawn timber production (000 m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Savai'ia</td>
<td>Savai'ia</td>
<td>Upolu</td>
</tr>
<tr>
<td>1971</td>
<td>400</td>
<td>13.3</td>
<td>6.1</td>
</tr>
<tr>
<td>1972</td>
<td>430</td>
<td>46.2</td>
<td>7.0</td>
</tr>
<tr>
<td>1973</td>
<td>570</td>
<td>55.1</td>
<td>6.9</td>
</tr>
<tr>
<td>1974</td>
<td>750</td>
<td>53.8</td>
<td>6.8</td>
</tr>
<tr>
<td>1975</td>
<td>590</td>
<td>52.3</td>
<td>5.4</td>
</tr>
<tr>
<td>1976</td>
<td>285</td>
<td>18.3</td>
<td>6.3</td>
</tr>
<tr>
<td>1977</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

a No detailed records have been kept for Upolu, but the figure is approximately 80 hectares per year.

Source: As Table 1.

Conclusions

Forestry development in Western Samoa is in its infancy in all its aspects. It could realize much of its potential with proper planning and application of appropriate technology. But sympathetic understanding and adaptation of its customary land holding systems to modern conditions are essential prerequisites.

Reference

Chapter 5

Forest utilization and land tenure in the
Solomon Islands

P. Larmour

Introduction

Modern forest industries can only develop on the basis of assured land rights. This chapter will discuss the relationship between land tenure and forestry in the Solomon Islands in two main sections. The first will discuss the development of land tenure policy generally as it affected forestry over the years up to independence. The second provides a case study of recent land laws in practice at Kolombangara, the country's largest present producing region.

General land tenure policy

The history of land tenure policy in the Solomons is one of almost continuous review, interspersed with brief periods of implementation, usually hampered by staff shortages. A British 'Protectorate' was declared over the islands in 1893, and political independence achieved in 1978. For a total of 44 of these 85 years land policy was in a state of suspension while commissions of enquiry were being considered, were sitting, their recommendations being enacted in law, or the law amended. The first such period ran from 1914 to 1931, and the second from about 1945 to 1968 (surrounding respectively the Phillips and Allan land commissions). The third period began in 1974 with the appointment of a parliamentary select committee of enquiry, which reported in 1976, and is still not complete.

There is still an unresolved contradiction between customary and introduced forms of land tenure. In the Solomons the alienation of customary land to Europeans was never more than 15 per cent of the total land area and that percentage is declining as land is returned after repurchasing or conversion into leases. Eighty-eight per cent of the Solomons is now legal customary land. The other 12 per cent is registered under a Torrens title system; about 8 per cent being owned by government and the rest by Solomon Islanders as groups or individuals. About 15 per cent of
this registered land is leased to non-Solomon Islanders, on
terms up to 75 years. Ownership and use of customary land
is legally reserved to Solomon Islanders, defined as people
with at least two indigenous grandparents. Non-Solomon
Islanders, including government and corporations, may not
own or use customary land as such. They can only do so
after a long process of investigation, adjudication, appeal
and survey to establish who the customary owners are, and
if they wish to deal. If they do, those customary owners
are registered and become owners of the 'perpetual estate'
in the land. Dealings may then go ahead through the land
register. This process takes at least 7 months to complete
legally but can take years. 'Perpetual estate' is the
registered-equivalent of freehold; a form of state-guaranteed
private property that may be held by individuals or, through
trustees, by groups.

On the surface, the history of land legislation
has been one of a series of unstable compromises between the
interests of expatriates and Solomon Islanders. Further
sales of customary land to expatriates as freehold were
banned in 1914, and earlier freeholds converted into leases
in 1977.

Attenuation of principle of public interest

Behind this, however, there has been a more steady
and fundamental erosion of the principle of public interests
in land, derived, no doubt, from disbelief that a colonial
state would properly represent those interests. A series
of declarations of land as 'waste and vacant', made between
1901 and 1914, were drastically reduced after Solomon
Islander representations to the Phillips Commission in the
1920s. In the 1950s the Allan Commission tried to dis­
tinguish three kinds of land: that owned under written title
(then exclusively by expatriates or government); owned
customarily (by Solomon Islanders); and a third category of
'vacant' land owned by neither. A Land Trust Board was
set up in 1961 to identify this vacant land, and to manage
it in the public interest, but it failed to find any.

By the 1970s it had become hard to assert any kind
of public interest over customary land. The proclamation
of a National Park behind Honiara had to be revised so that
it included only land actually owned by government. An
amendment to the land and titles ordinance prohibiting the
subdivision of agricultural land for urban purposes only applied to non-customary land, and a Land Development and Control Bill was torn up in the Legislative Assembly when members realized it would apply to customary land. By 1976 even the principle of public ownership came under attack. The Select Committee recommended that title to all rural land acquired by the government before 1963 be returned to the descendants of its original owners. The decline in the principle of public interest over land has been paralleled by the extension of legally dubious private ownership to customary land. The effect of current land legislation is to assume that all customary land is owned by someone, usually a lineage group, and that ownership is as absolute as the freehold rights once claimed by expatriates.

Forest policy and land tenure


These four periods in the development of forest policy coincide with three decisive political interventions by Solomon Islander political representatives who were at first nominated, were later elected to, and finally came to hold power on the policy making committees. The start of the second period was marked by the inactivity of the Land Trust Board whose Solomon Islander membership consisted of one public servant and ten members of a panel. Invited to implement a policy which they had had no say in making, they politely refused to co-operate. At the beginning of the third period came a dispute over forest area declarations. Asked to approve a forestry white paper, Solomon Islander elected representatives protested against the declarations. At the end of the third period Solomon Islander representatives were required to make policy rather than approve or implement it, and formed a majority on the forestry policy committee.

1952-1960: waiting for land legislation

Though an expatriate timber company had worked in the Solomons before the Second World War, a government forestry department was not set up until 1952. It had no
forestry legislation to work through until 1960. Its enactment was held back until the Allan Land Commission reported in 1957, and the first version of a new Land and Titles ordinance was introduced in 1959.

Forestry's proposed legislation centred around two concepts, 'forest reserves' and 'forest areas'. The former applied to land allocated to long-term forestry use, while the latter was to be more a short-term means to control current exploitation (hence 'forest areas' might not necessarily become 'reserves').

'Reserves' were intended to be on public land which it was hoped would include land found to be 'vacant' by Allan's proposed Land Trust Board. 'Areas' could be declared over any land.

1961-1967: building the production forest area

By 1961 the Forestry Department had given up hope of the Land Trust Board finding any 'vacant' land (though the Board itself remained in existence until 1964). Through the Lands Department it embarked on a vigorous program of buying customary land, usually on the agreement from the owners that part of it would revert to their use once logged, and the remainder would be kept for replanting. This purchase program was called building the production forest estate.

Large-scale logging began in 1963, and was confined to land actually owned by government. The machinery set up in the ordinance, finally passed in 1960, was only put slowly into use. Only one declaration of a forest area was made before 1968. Moreover, declarations of 'forest reserves' waited on the excisions of those parts of the land bought that would be returned to customary owners after logging.


Seventeen 'forest area' declarations were made in 1968, with disastrous consequences. The Forestry Department Annual Report for that year stressed that 'despite all efforts to explain, both prior to and following the declarations, that their sole purpose was to put the government in a position of effective control over the use and development of the country's timber resources, the declarations led to misunderstandings, suspicion and a strong element of active
opposition. The particular fear was expressed that the owners' use and development of their land would be impeded'. The furore coincided with the department's presentation of a comprehensive White Paper to the Legislative Council, half of whose members were elected, and half nominated or official. The White Paper had to be amended to substitute licensing of companies as an alternative system of control to the designation of land.

A new ordinance was introduced in 1969. It provided for licensing and a weaker form of 'forest areas', called 'controlled forests', where control was restricted only to water catchments. 'Forest reserves' became 'state forests', an explicit recognition of what had hitherto only been recognized in practice. Controls could only be applied to government-owned land.

The 1968 White Paper explicitly concentrated on production rather than protection of forestry, an emphasis conforming with priorities in the Sixth Development Plan (6DP), running from 1971 to 1974. This plan marked a decisive break with its predecessors in that it was the first plan to be prepared with economic advice, and to make a detailed evaluation of integrated development needs (BSIP, 1971 p.3). In practice this meant faster exploitation of natural resources; and capacity, not lack of available land, emerged as the constraint on reforestation.

In this new economic policy climate, abandonment of the constraint of sustained yield practices was considered, but not finally proposed. Forestry nevertheless began to take a more relaxed attitude to leasing land, accepting that replanting was less likely. Some comfort though, could be taken from the fact that the minimum period required between planting and cutting, and hence the extra area that had to be reserved to reach the sustained yield level, appeared to be shortening. In 1964 it stood at 70 years, by 1968 it had fallen to 35-40 years and by 1974 had become 20 years, a result of evidence of faster growth from plantations and the marketability of smaller logs.

By 1974, even the option of leasing, or negotiating timber cutting rights ('profits') by the machinery of the Land and Titles Ordinance, seemed to be closing off. It worked well enough on Isabel island, though the forest was destroyed by a cyclone in 1972, and partly on Kolombangara,
but collapsed completely over bitter disputes between groups and ownership on New Georgia. While the disputants mainly agreed that they wanted to grant timber rights, they disagreed as to who should grant them. The New Georgia acquisitions were finally called off in 1974.

1975-: the Forest Policy Review Committee

A policy review committee was appointed in 1974 and reported in 1975. It took a more cautious view of expansion, and its recommendations about rights to cut and replant timber marked a decisive break with the Land and Titles Ordinance. Responding particularly to the failures on New Georgia, which it blamed on registration requirements, it recommended that 'timber right agreements should preferably be signed between the tribe or clan and the government, naming the timber company if appropriate. The agreements should not involve the registration of customary land, but should deal only in timber rights needed to allow working and extraction.'

New institutions were to be introduced to speed the settlement of disputes about ownership. Whereas government officers had adjudicated claims when land was being registered and local courts were empowered to deal with any disputes over customary land, the committee recommended that, for timber rights, this job should go to newly formed local council area committees.

Replanting was to go ahead as fast as possible on government land, where forestry interests should be protected by the declaration of State Forests, especially where there was conflict with agricultural potential. At the same time, high priority should be given to devising schemes for joint ventures between the people and the government for large-scale planting of forest crops in suitable areas of customary land. Not only would joint ventures allow replanting to extend outward from the existing stock of government land, but it would also extend it within it too, for government should consider schemes for suitable participation in planting schemes on government land by the people who originally owned the land.

Legislation embodying the timber rights recommendations of the Forestry Policy Review Committee was delayed by yet another review of land policy following the Select Committee Report of 1976. While there was no conflict between
the two reports, the Assembly was unwilling to deal with forestry until land had been settled. Forestry's Bill had to be withdrawn from the Assembly in late 1976, and was not passed until a year later. The first agreement made in anticipation of it was signed between Lever Pacific Timbers and customary landowners on Kolombangara in September 1977 (see p. 12) and the bill finally became law in January 1978.

Availability of land for forestry

Most of the non-customary land in the Solomons was bought or taken before 1914. There was another burst of activity in the 1960s when the Land and Titles Ordinance was used to buy land for forestry, but this subsided by the early 1970s when even leasing became hard.

Resistance to colonial rule, and more particularly the creation of perpetual estates by the Land and Titles Ordinance, have created a strong preference for private ownership of customary land, and the legal opportunity to achieve it. Arguments about the individual or communal nature of that ownership have preoccupied land commissions, and the principle of private ownership is adaptable to both. In consequence it has been hard for government to assert planning or conservation controls over customary land. The Forest Areas debacle of 1968 was followed by the contraction of the National Park, limitation of controls on sub-division and the defeat of the Land Development and Control Bill.

Public ownership, and hence control of use by terms of leases, is an alternative, but of course only applicable to the land government happens to own. Leasing, too, is inapplicable when the major users are government agencies themselves, and planning or conservation are only two departmental interests among many.

The stock of government land has tended to decline as land was returned or resettled (sometimes by squatters) since the forestry acquisitions of the 1960s. The legal conversion of non-Solomon Islander perpetual estates into government leases, a result of the 1977 amendments to the Land and Titles Ordinance, provided a 25 per cent, though once-and-for-all, increase in the area of government title, and an opportunity for a more rational re-ordering and use of the existing stock of non-customary land. The opportunity it offers, however, is constrained by the demands on administrative resources that its case-by-case implementation
requires, especially as it will take many years to settle finally the terms of every new fixed term estate created by the amendments. For many parcels of land the effort may hardly be worth it. In any case, it appears to be a job that does not generate much enthusiasm except among those who might benefit, i.e. the original owners.

**Long-term investment trends**

As a result, long-term investment in timber planting and other land-intensive sectors is being determined according to a geographical pattern determined mainly before 1914, and to a lesser extent during the 1960s. This pattern may only by chance be appropriate to an independent Solomons, with a different kind of economy, in the late 1970s. Fortunately, it is not completely skewed, since expatriates took the best land. This, however, had been for copra and hence was largely coastal. Without vigorous attempts at redistribution of income, which may be hampered by the coming of provincial forms of government, this could lead to a continuing pattern of uneven regional development. The island of Malaita, for example, has so far considered itself fortunate to have avoided extensive alienation, but as far as development is concerned the opposite may be the case, as productive investment is directed towards commercially more accessible land in the Western and Guadalcanal provinces.

Limitation of long-term investment to an existing stock of government land leads to growing competition among potential users. That these users are now mainly within government or statutory bodies has two consequences. First, the private sector, both local as well as expatriate, is likely to feel the squeeze first, and decisions on allocation will tend to be taken by a process of inter-ministerial bargaining, rather like budget making. Second, more land will be compromised by prior agreements. Wise bureaucrats will tie their hands with commitments, for example, to aid donors, even before the bargaining begins. Much will depend on personalities present at negotiations. At the very least there will be a need to distinguish between those ministries promoting and those arbitrating.

In the Solomons, it has taken some time for this limitation on the location of long-term investment to become clear, since much more land was historically alienated than ever used. For the Asian Development Bank cattle project
the constraint can perhaps be resolved by doubling up cattle under replanted forest or old copra plantations. For something like oil palm, the conflict of interest between forestry and agriculture, warned about by Hansell and Wall (1976), has already become fact on Kolombangara.

Meanwhile, intragovernmental competition for available land continues and its availability remains politically uncertain. On Kolombangara the Select Committee's arguments for the return of government's title to descendants of the original owners (accompanied by the implication that investment could continue on lease) have become mixed with more direct demands from squatters that land committed to forestry replanting be released to them for their own cash and subsistence needs. Original owners, who are also short of land, are politically difficult to resist, even if it is hard to establish both the original ownership and present shortage. Again sequencing and doubling up of land use may be the solution.

The Forest Policy Review Committee's recommendations seem to offer a chance to redirect timber cutting and replanting away from a declining stock of government land towards a more rational pattern of land use. If so, they may offer a model for other forms of foreign aid investment on customary land. In the short term the recommendations seem to be working. Timber cutting rights are being settled in precisely those areas where the Land and Titles Ordinance failed to secure them. For the long term, no joint ventures for replanting customary land have yet been negotiated, and long-term investment on customary land continues to depend on landowner willingness to release land for long periods. The Review Committee was confident that such willingness exists and had only been frustrated by the lack of previous incentives and legal machinery. The committee did not tamper with the principle of private ownership, which for all its familiarity, is by no means self-evident. As the 1968 White Paper remarked, 'Government does not recognise claims of individual landowners to minerals but does recognise their ownership of trees'. Having recognized and entrenched that ownership in legislation, government must continue to twist and turn around its consequences. Private owners, whether individuals or groups, may, for perfectly rational economic reasons, not want their land replanted, or the timber on it conserved. Like private owners anywhere, they will resist the application of planning controls that prevent them doing what they like with their land.
The next section describes the tenure changes introduced in Kolombangara to enable forest industries to develop, and demonstrates how the new institutions are working.

Forestry on Kolombangara: a case study

Background

Kolombangara is an island in the western province of the Solomons. It is almost circular, with a diameter of 30km, surrounding the cone of an extinct volcano about 1700 metres high. A land resources study carried out by the British Ministry of Overseas Development in the late 1960s identified four major land systems. The most common, named Ringi Cove, covered the lower part of the ridges running radially down from the cone to a narrow coastal strip. This coastal strip, a raised coral reef with a swampy belt a few hundred metres inland of it, constitutes a second system, Lomousa. Between the two, and running inland up river valleys between the Ringi Cove ridges are the more fertile Serambuni and Londumoe systems.

The study by Hansell and Wall (1976) identified fully 33 per cent of the land area of Kolombangara as having landforms of high agricultural suitability. It designated 52 per cent as an Agricultural Opportunity Area, defined as a 'largely unused or underutilised area exceeding approximately 2,500 ha in which the prospects for cash farming are good'. Hansell and Wall concluded that overall, probably the best use of the land is for perennial crops not requiring ground cultivation, and noted that there was a potential conflict of interest between forestry and agriculture.

Kolombangara had a population of 2866 in 1976, over half of them connected with forestry activities, Lever's four copra plantations and a mission school. Only 34 per cent of the population was born on Kolombangara. All but 2 of the 49 rural villages, whose average population was five households, are on the coast, though people used to live inland mainly up on the Ringi Cove ridges. Most of the rural village population is strung along the southwest coast on customary land, but during the 1970s there has been migration to new villages along the north and east coasts to government land.
Seventy-five per cent of rural village households report some market gardening, and 80 per cent grow coconuts both for cash and consumption. Government services are minimal, and the only roads on Kolombangara are the intensively used, but short lived, ones built by Lever Pacific Timbers to extract timber. Many Kolombangara people own trucks. The rural villagers living on the customary land in the southwest of Kolombangara complain they are short of land. Their relatives who have migrated around to the north and east coast use this argument and their rights as descendants of the original owners to justify their squatting on government land. Taking into account their rapid rate of population growth, the growth of market gardening, copra and cattle, and the need to reserve sufficient ratios of the area presently under use to feed only the existing population on a subsistence cycle, then they are rightly perceiving a coming shortage of the more fertile Serambuni land system under customary ownership. As on other islands, some may be considering a move back inland onto the less fertile Ringi Cove foothills, where the main limitation is very low subsoil fertility. On Kolombangara they are also moving to empty land further along the coast, owned by government. Of course if there is already incipient land shortage on such a relatively under-populated, and relatively fertile island such as Kolombangara, then this must indicate an emerging crisis in subsistence agriculture in the rest of the Solomons. A proposal for an interlocking 20 year cycle of subsistence gardening and plantation forestry, set out by Marten (1977), was designed with this in mind.

Forestry land tenures

About 59,000 hectares of the Kolombangara land was first granted to the Pacific Islands Company under the waste-land regulations of 1901-2. They sold out to Lever Pacific Timbers (LPT) in 1906, but as soon as LPT began clearing land to plant copra, there were local protests against declaration of the land as waste and vacant. LPT's certificate of occupation was suspended until 1931 while the Phillips commission considered this and other claims against expatriate ownership in the Solomons. Phillips recommended that the area of LPT's certificate be reduced by 22 per cent. But for other reasons, particularly difficulties in getting labour, LPT only planted just over 1000 hectares of the 46,000 then granted. Neither side could finally make much of a claim to ownership based on use.
Between 1967-68 government and company worked out a package deal. LPT would surrender 36,000 hectares to government, but would retain the timber rights over it. LPT plantation company (LPPL) would retain 10,000 hectares in the southeast, including the base LPT was to build at Ringi Cove and the four old copra plantations. In addition government would negotiate with the owners of the remaining 17,000 hectares of customary land in the southwest of Kolombangara, to secure LPT's rights to cut timber there, and hence over all of Kolombangara.

Negotiations began over seven blocks of customary land mainly up on the Ringi Cove ridges, and well inland of current coastal settlements and gardens. The instrument used was the Land and Titles Ordinance. Customary owners were identified, counterclaims adjudicated, the land surveyed and then registered as perpetual estate in their names. First, the owners granted leases, then registered timber cutting rights which were then known as 'profits'.

This procedure worked for four of the blocks, but broke down initially over disputes about ownership of the other three. The dispute centred around identification of old village sites and whether one lineage group had, in time, split and become three separate groups. This disputed area was, however, the first place where the new procedures recommended by the Forestry Policy Review Committee were tested, and an agreement was signed between LPT and local landowners in September 1977.

Finally, at the end of 1977, LPT's 'perpetual estate' over its remaining 10,000 hectares in the southeast of Kolombangara was converted into a fixed-term estate, a government lease whose terms and area are still being negotiated.

Logging operations and foreign aid

Lever Pacific Timbers began logging natural forest on Kolombangara in 1968, and are now cutting about 2,800 - 3,000 hectares a year of mostly utility timbers. Lever Pacific Timbers is the largest and most efficient of the four major timber companies working in the Solomons. Its base on Kolombangara provides 75 per cent of the Solomons production, all in logs, and all for export, mainly to Japan.
Kolombangara is also the main centre of reforestation. Apart from trials, reforestation is mainly carried out by government, largely financed by foreign aid funds. In 1976 aid projects were agreed with Britain and New Zealand covering 20,000 hectares of replanting, 45 per cent of it on Kolombangara. The rate will be a little slower than Lever Pacific Timbers' current rate of extraction, and is determined by two main factors: first, rapidly rising wage costs, which aid donors are unwilling to cover, and second, the urgent need to grow a sufficient area of pasture under the new trees to allow the build-up of a national cattle herd at the rate agreed with another aid donor, the Asian Development Bank. Lever Pacific Timbers will have finished logging there by 1982, and will move on to neighbouring New Georgia, retaining their base facilities on Kolombangara. Allowing for 20 years growth of trees, a policy of fully sustained yield will be possible within Kolombangara by the late 1990s.

Lever Pacific Timbers reforestation, and cattle-under-forest projects are relatively big, needing trained and experienced management, national in scope and directed towards export markets. Two of the three are financed by foreign aid. Government investment in LPT, with British aid, is also under discussion. The concentration of such high intensity projects on Kolombangara rather than elsewhere, is, however, something of an historical accident. Government happens to own about 70 per cent of the land there in fair sized parcels, as against an average of 8 per cent throughout the Solomons, generally in smaller units.

Sawmills

The LPT runs a sawmill for its own use only. Commercial sawn timber and veneers, for local sale and export, are produced mainly by the other major timber companies. There are another 15 smaller sawmills in the country, producing timber for local consumption. The local market is, however, not expanding and only one sawmill is working at more than 30 per cent of capacity.

Conclusions

It will be evident both from the account given of the lengthy deliberations on general land policy in the Solomons, and from that of progress of timber operations on
Kolombangara, that failure to resolve land tenure difficulties has held back forestry development. Until recently, the tenacious attachment of customary owners to land claimed has diverted most development of forest industries to the relatively small areas directly controlled by government.

A cautious start has been made in creating a legal and institutional framework to expand activity on customary land by divorcing timber cutting rights from land ownership. It remains to be seen whether recent changes are adequate to stimulate a general development of forest industries in the Solomon Islands.

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Part B
Forest utilization for local needs
Preamble

The second part of the monograph explores some aspects of what has been termed in world aid circles the 'basic needs strategy' for national development in developing countries. Such a policy would give priority to satisfaction of the populations' basic needs and the provision of employment opportunities founded on local resources. Basic needs are seen to include the minimum requirements for the individual of fuel, food, clothing and shelter, and for essential community services such as drinking water, education and transport.

Forest policies have recently laid far more stress on the need to recognize adequately such basic needs as a component in plans for forest utilization. It is clear that the rural poor will continue to look to forests to provide much of their basic requirements of fuel, fodder and building materials. There is every indication that wood will continue to be the preferred fuel for cooking in most developing countries. The forests must provide grazing and fodder, especially during dry seasons. Wood must serve as a principal construction material for the rural poor.

It will be a major challenge to development to meet the constantly expanding effective demand of rural communities for forest products for such needs. Probably the most hopeful strategy in assuring supply lies in community forests, in which forests are run by and for local people.

A measure of the important role which community forestry may play in the future was the emphasis given to this strategy at the Eighth World Forestry Congress held in Jakarta in October 1978. This meeting followed the Expert Consultation on Forestry for Local Community Development,
also held in Indonesia, in December 1977 (FAO 1978). The FAO and World Bank project evaluation teams are also emphasizing the place of community forestry in development planning.

The first section of this monograph has stressed the problem of land tenure in forestry development. For community projects land appears to be a manageable problem and a number of approaches have been shown to work successfully. Many requirements have to be satisfied for community forestry to be effective, apart from land availability. A forest project must accurately reflect the aspirations and the needs of the local people. The local people must also be involved in the project at both management level and at the level of direct work input to tree planting, care and harvesting.

Government must also be committed to community forestry; for only government can make available the finance and expert technical assistance required. Capital and expert advice may come either from in-country resources or from aid donors, but in either case the central government will act as the agent and must be committed to the concept.

A commitment by government to community forestry will require some redistribution of resources from the towns to the country. It may also require some redistribution of resources from agriculture to forestry, or at least a broadening of the horizons of traditional agriculture to encompass tree crops. A positive factor, however, is that any improvement in the lot of the rural poor could lead to a lessening of the drift of people to the cities with all the hardships, misery and costs that this has caused in many developing areas of the world.

There needs to be a common purpose at several levels, between aid donor and aid recipient country, between central government and small rural communities, between outside experts or government officials working in these communities and the local leaders. Finally the goals and aspirations espoused by the local community leaders must, in practice as well as theory, be in accord with the community and not the wishes of a richer elite.

FAO. 1978. Forestry for local community development.

The community forestry concept means a radical rethinking in the forestry profession. Griffin discusses two quite different concepts in the structure and organization of the industry, demonstrated by the profession's concepts of integration. To the western-trained professional this means vertical integration of forestry industries, usually in less developed countries oriented towards export. By contrast, community forestry must be a process of lateral integration of forest industries into the local economy, perhaps with little income flowing from expanded output to the wider community outside the region.

Shepherd deals with the problem of providing energy from the forests, mainly in the form of fuel for cooking and fodder for work animals. He discusses both demand and supply, demonstrating that production systems and utilization methods are often grossly inefficient and destructive of community habitats.

The three remaining chapters in this part of the monograph provide some excellent examples of community forestry projects in action, six instances in all, each with quite different social and environmental backgrounds. Banerjee analyses the immense forestry supply problems in India which must be solved if the basic needs of the rural village people are to be satisfied. His contention is that the supply problem is not insuperable and he describes two successful efforts to develop community forest projects, the one given a modest subsidy by government and the other sponsored by private enterprise. A multiplicity of such small projects spread throughout the country, combining broad local support with some outside technical, managerial and financial assistance, could go far to fill the supply gap.

Soedarwono's chapter on Indonesia complements the others in stressing the necessity for forestry officials to change their attitudes and management practices in areas where local needs for forestry products are pressing. This is the more necessary because traditional sustained yield forestry policies are inevitably collapsing under population pressure in densely settled rural areas. In effect, he urges the profession to recognize realities in such regions, and to fight alongside the local population, instead of against them.

Pryor, drawing on African experience, describes
three different modes of organization of community forestry projects in differing socio-economic and geographic circumstances. In all three of his examples outside technical and managerial assistance has proved essential to success and sometimes financial help as well, at least in the initial stages. Such support for local community leaders must come from regional or central authorities, but foreign aid, too, can play a useful part.

This analysis draws together a number of points in the current discussion of community forestry. The problem in maintaining a supply of these forest benefits is seen to contain two essential elements. Firstly, the local population must recognize that the forests are being over-used and be willing to change their attitude to the forest. Up to this point the forest has been seen as always providing these benefits with no need for the same careful husbanding of the resources as is given to food production areas. Secondly, having realized the need for active participation in producing their own forest products, these rural communities can be assisted in community forestry endeavours. Such projects must make the best of often very limited land resources, limited finance, and the constant pressures of ever-present poverty. It is here that the integration of all elements in the problem must begin.

It has to be realized that in poor rural communities, beset by poverty and without any outside assistance, the forests will be used to provide basic needs to the point where the forest is destroyed. To conserve the forest so as to provide both forest products for local consumption and other values, including clean water, soil erosion control and flood mitigation, the local people must be involved in forest management. Under conditions of high population pressure in poor rural areas, western-style central administration of state forests is doomed to fail and the forests just disappear. With a modest government subsidy and the provision of sympathetic technical assistance, the co-operation of local populations can be secured to conserve the forest. However, the forests must be administered by the local people and provide benefits essentially for the local people. These benefits will include fuelwood, grazing fodder, building materials, fruits and nuts, and in some areas game. To those outside the region, at least in mountainous areas, the principal benefit would probably lie in better control of erosion.
Chapter 6

Forest utilization for local needs: thoughts derived from the Nepal - Australia Forestry Project

D.M. Griffin

Introduction

The more developed countries of the world generally lie in medium or high latitudes. It is therefore in these climates that modern, technologically intensive, high energy forestry has developed. Further, because educational systems in such countries are more advanced, most professional foresters with higher qualifications from both developed and less developed countries have been trained within them. There is thus a grave risk that many foresters will see forestry in the developing countries of the tropical and sub-tropical regions in entirely inappropriate ways, technologically, biologically, culturally and socially. In recent years, however, there has been an increasing realization that the very nature of forestry in the tropical and sub-tropical regions needs to be rethought. This chapter raises some of the issues, looked at particularly from the viewpoint of forestry in Nepal, where forest utilization is essentially for pressing local needs.

Integration in forestry: developed country concepts

The word 'integration' is becoming familiar in forestry circles. 'Integration' can, however, lead to diametrically opposed operational systems in societies at very different stages of economic development. It is essential that the underlying issues in these operational systems be clearly recognized.

In Australia and other developed countries, integration has two major aspects. The first refers essentially to the forest site where the attempt is made to maximize utilization of forest productivity throughout the rotation. Sale is sought for all material that can be sawn, chipped or used for veneer or plywood. Even in Australia, however, with its huge livestock industries, the possibility of grazing is not a prime input in integrated planning. If grazing occurs in the forest site, its economic importance is minor
compared with wood-based products. Further, negligible use is made of tree foliage. Under extreme drought conditions, trees of the savannah woodlands are lopped to feed stock. There is also distillation of oils from eucalyptus leaves on a very minor scale. Neither use enters into general forestry planning, however.

The second aspect of integration in developed countries centres on transportation. Although there are exceptions, the sites of conversion to sawn timber, woodchips, hardboard pulp, or paper are usually at some considerable distance from the forest site. The places where the boards and paper are eventually used are even further away. Thus in most cases the efficiency of operation is enhanced if the forests consists of large blocks of successive age-classes of one tree species. Forest operations, transport, conversion and utilization can then be most easily integrated, with intensive mechanization at each stage to reduce labour costs.

Although operations of the type described are thus integrated in some senses, they are not in others. Thus, all forest work is undertaken by employees whose whole income is derived from this. The benefit of the forest to them and the neighbouring community is first in terms of cash and then in the social services and amenities associated with a thriving community. Apart from payments for work within the forest, the neighbouring communities may well be scarcely involved in forest use. Indeed, it will often be that those most frequenting the forest are drawn there for recreation from urban centres. Thus, the interest of the community near the forest site in the total operation is basically financial rather than in the final product itself, although they will of course use timber and paper like the wider community. Further, most people employed in the conversion and utilization industries have no direct interest in the forest site or in the growing trees.

Clearly, in all this, integration refers to the way that the primary forest product is related to the converted product. It scarcely refers to the relationship between forest and forest product on the one hand and local communities on the other, except in a financial sense. The whole depends heavily upon mechanization and therefore upon an abundant supply of cheap energy.
Forestry of the type described is relatively modern, having evolved hand-in-hand with increasingly efficient means of transport and, more latterly, of conversion. The principles and practice derived from it are emphasized in forestry schools in the more developed nations and it is thus the initial framework of thought for most foreign aid workers.

**Alternative models for less developed countries**

The application of such sophisticated patterns of capital-intensive operation and organization to forestry in less developed countries is often quite inappropriate, because it almost inevitably produces certain consequences. The first of these consequences follows from mechanization, since large machines are so expensive that they must be used intensively if they are to be profitable. The planning of the whole forestry operation thus tends to be dominated by the requirements of machines rather than of men. In sparsely populated regions, this conflict may not be serious but it can be most deleterious in areas where there is a large population of the underemployed. Mechanized forestry may then be most damaging socially. A further result of even minor mechanization is likely to be the uneven distribution at the local level of the benefits of forest use. If one relatively wealthy person can purchase a piece of equipment, even a chain-saw, his productivity may depress further the opportunities for the poorest.

Yet another consequence of such specialized forestry organization is that benefits will leak from the local community to more remote groups. Where forestry for export is involved, this leakage is inevitable. It may even be nationally desirable when the resource is large in relation to the population of the local community.

In many regions in less developed countries forest resources are not large in relation to local population. It will then normally be desirable to maximize and retain the benefits of forest productivity within the local community. To achieve such ends, a deliberate effort is required to think anew, to question fundamentally many of the practices and attitudes associated with modern forestry. It is ironical that the required mental approach is in fact not new but is derived from much older practices. The forestry of local communities in the mixed forests of Europe in previous centuries is particularly relevant.
Forestry in Nepal

My own thoughts are much influenced by my experience in Nepal. Agriculture in the hills of Nepal appears to be highly adapted to the extraordinary topography and climate of the country. The systems traditionally used were conservative in their effects on the ecosystem and had obviously evolved over a long period of time. The recent rapid increase in population has, however, strained the system beyond its limit. Terracing has been attempted at elevations and on slopes and underlying strata that were previously avoided, with serious consequences.

In contrast, it is to be doubted whether the use of the forest was ever so conservative. It was simply there, ever ready to supply fuel, forage and lumber. There appeared to be no need to cherish it with the same minute attention to detail obvious in agricultural practice. Only exceptionally were trees deliberately planted.

Thus, if the effect of greatly increased population on cultivated land has been serious, its effects on forested land has been disastrous. Forests have retreated further and further in the face of a multi-pronged assault. The initial consequences, loss of the forest resource in the hills, is serious enough but the long-term effects of erosion of the now denuded hills far outweighs it. In Nepal, the land surface can fall over 8,000m within 150km. Combine this topography with a monsoonal climate providing a rainfall approaching 2 metres in four months, and the potential for erosion is immense. According to some reports, the beds of some Nepalese rivers, through their courses on the plains, are rising at 15-30cm annually and being displaced laterally by 0.5km annually. The covering of fertile lowlands by deposits of huge boulders is obvious and the seeming reinforcement in recent years of the cycle of flooding and drought in the Indo-Gangetic Plain is probably the result of the degradation of the Himalayan foothills.

Different type of integration needed

The primary aims of forestry in the Nepalese Middle Hills must therefore be to grow trees on sites for purposes associated with that site and its immediate environs. The trees must stabilize the topography during growth. They must also provide firewood, foliage loppings and timber for
those living within a few kilometres of the site. If the trees in addition provide resin and fruits, act as a refuge for wild animals and increase the purity and consistency of a water supply, so much the better. None of this can be accomplished unless the local community become managers, rather than simple exploiters, of forests. In other words, the forest will not survive productively unless the forest product is seen by the villagers and others as being as necessary as agricultural products, and management is seen to be necessary to forest survival.

The contrast with modern forestry in the more developed countries is almost as complete as it could be. The silviculturalist is now the same person as the user of the immediate forest product. Transport is short-distance, and usually on the human back. Extensive forest monoculture has no place. The energy output from the forest greatly exceeds all inputs, with the sole exception of solar power. 'Integration' here has quite a different meaning, implying that all stages of forestry are intimately linked with the needs of the immediate community, who are nearly all directly involved with the forest.

The successful establishment and management of such forests in Nepal will require a great deal of co-operation. The altitudinal, aspect and soil variations are so marked that the area accessible to even a single community will in fact be a complex mosaic. The trees suitable for planting must be selected as much from local knowledge as from that of professional forest officers. The appropriate techniques for establishment are more likely to be known by the professional, for traditionally trees have rarely been planted by the agricultural community. Education is therefore essential for effective management by the community. This education must be two-way, however, for the overall mix of species and products must reflect community need.

Areas of forest that will provide for the needs of those living within easy walking distance have been emphasized here. There are also other areas of forest under the control of the Ministry of Forests rather than of local individuals or groups. These government forests will not be secure unless local need can be satisfied by local community forests. Provided, however, that need can be met, government forests may be able to supply forest products, especially fuel and lumber, for urban communities. Thus the Ministry of Forests
in Nepal plans that some of the fuelwood for Kathmandu should be derived from plantations in the nearby Chautara Forest Division, to which it is already linked by a reasonable forest road. In such a case, the planting of more extensive areas of single species is appropriate, although still restricted by altitude, aspect and site. In such forest sites, operations will be performed by those who work for pay, but the same people may work without pay in planting and tending the adjacent community forest.

If forestry in the hills of Nepal is to succeed, therefore, it will not be through the application of the principles and practice of 'integrated' forestry on the pattern of the more developed countries. It requires the re-integration of forestry into local community life. In Nepal, there are reasons for both optimism and pessimism. Encouragement is to be drawn from the fact that the reality of the crisis in the forestry resource is now appreciated by some village panchayats. They are avid for technical assistance and educational support in forestry and are prepared to put their own meagre resources alongside those of the central government and aid donors. Given sympathetic professional assistance by foresters (whether Nepalese or foreigners on aid projects) who realize their own strengths and limitations in regard to community-oriented forestry, the way is open for a gradual advance. Progress will inevitably be gradual, both technically and spatially: the acquisition of the full range of appropriate silvicultural practices will not occur overnight, and the advance will be from panchayat to panchayat, as one sees the benefits beginning to accrue to its neighbour. Dramatic schemes, presupposing the rapid and wholesale conversion of hill dwellers to new attitudes to forests, are almost certainly doomed to failure.

There are, however, also reasons for caution, even pessimism. It is impossible to return to the old ecological balance. The populations of both humans and their animals have increased greatly and the former, at least, is unlikely to decline. Expectations of life have rightly expanded, and should expand still further. The critical question for the long term is, therefore, can the re-constituted forest resource be brought into balance with the greatly increased demands made upon it? Two changes are essential if the balance is to be tipped in a favourable direction. Production must be increased, utilization become more economical.
Lines for advance

There is little doubt that the rate of generation of the forest product can be significantly increased over that of the present. Silvicultural trials, on a local basis, will obviously yield important information. Such trials, however, must reflect the end product. Thus mean annual calorific increment may be more important than mean annual increment if the wood is to be burnt, and that it should not burn too fast or slowly, or too smokily. The nutritional value and weight of foliage and period of new leaf production will be important for fodder species. Efficient seed collection, storage and distribution are indispensable.

Nepal is fortunately blessed with a range of native species that are well-suited to supplying most needs. But there is far too little detailed knowledge of optimal silvicultural practices. Provenance studies have yet to commence. Some exotic species are promising, especially *Pinus patula*, but others raise complex problems. Thus *Eucalyptus* requires fertilizer for good establishment and early rapid growth. Can this be justified in a country able to afford little fertilizer even for agricultural purposes? Again, the growth of *Eucalyptus* spp., such as *E. camaldulensis* and *E. grandis* differs spectacularly with slight change in aspect and site. Perhaps these species have a place less in plantations than as single trees planted in favourable sites, there yielding a large proportion of their timber as loppings and firewood for the farmer.

Utilization is traditionally grossly inefficient. One estimate suggested that for house construction in the hills about three-and-a-half times as much wood was logged as was necessary. More recently, such lumber has been recycled from old to new buildings, hence improving overall utilization, but much remains to be done. Again, the traditional stove allows much of the wood energy to be dissipated. Relatively small changes in design to permit effective damping and focussing of the fire would probably greatly reduce fuelwood consumption. Finally, there is little doubt that better systems of fodder production by grasses, shrubs and trees within the forest can be devised. Research is required on conservative methods of lopping, whether for forage or firewood. It is very likely that some lopping regimes will prove to be far more productive in the long run than others.
It is important to appreciate that most of the suggested lines of improvement are likely to be attained by relatively simple grass-roots experimentation, involving the co-operation of the local community. It cannot be expected that research will rapidly yield conclusive results, although it may well provide worthwhile indications. If foreign aid is involved, this will need to be on a relatively long-term basis, probably at least ten to fifteen years. Controlling authorities will need to be patient.

Conclusions

The rate and manner of introduction of new technology is a key issue, involving the familiar tangle of economic, social and manpower factors. To take an extreme example, the extensive mechanization of forestry in the Nepalese terai cannot be justified when there is neither local skill nor foreign exchange for maintenance. Effective use of older, less energy-demanding methods involving many underemployed people is preferable. Yet are chainsaws admissible? Will such a tool benefit the already better-off, and increase the penury of the poorest? To introduce no new techniques, however, is to let the people slip further behind year by year compared with developed countries.

These thoughts on community forestry are not new—indeed they are gaining increasing acceptance. They do indeed appear to be an essential component in any program in the development of forestry in the lesser developed countries. It remains for both the trained forestry professional in these countries and the aid donors who seek to play their part in development to assimilate such different concepts of 'integration' into forestry practices, and to persuade local communities of their merits.
Chapter 7

Energy from the forests: an exercise in community forestry for developing countries

K.R. Shepherd

Introduction

The Third FAO/SIDA Expert Consultation on Forestry for Local Community Development was held in December 1977 in Indonesia. Dr King, Assistant Director-General of FAO, in his opening address to the meeting, noted the current world concern with human rights: the rights of freedom of speech, to fair trial, to political dissent or to emigration (FAO 1977). But, continued King, he was concerned with more fundamental rights than these, the rights to the basic necessities of life, the right to food, the right to shelter, indeed even the right to exist. In many developing countries of the world, with high population pressures and diminishing natural resources, these are the human rights of great concern.

Here we are concerned with forest utilization for local needs so that King’s remarks are particularly relevant to our discussions. An important aspect of providing the basic rights of food and shelter of which he spoke is the provision of an energy component. An energy source is required to cook at least one meal a day and to provide fodder for domestic animals. In most of the poorer countries of the world this energy comes from the forest, as fuelwood or charcoal for burning and as foliage and grass to feed animals which provide much of the power for transportation and agriculture. If the forest cannot supply this energy source readily, the alternative is usually some form of fossil fuel. But fossil fuels are too expensive to substitute for forest products, especially after the dramatic price increases of recent years.

In many countries, for example in parts of India and in Nepal, forests have been exploited for fuel and fodder beyond their capacity to produce a sustained yield. Many forests have deteriorated and in the most serious cases have been reduced to waste land. Ironically, the forests have
been destroyed by the people nearby whose very existence depends on a continuous supply of forest produce. In the long run, they depend on the forest as much as they do on their agricultural land, but all too often desperate poverty has made them sacrifice the forests for animal fodder or to provide more crop land for a short-term gain in food production. For the forest has always been there and many of the people imagine that it will always be there. Often only when it is too late do they begin to realize as a community the desperate situation they face.

King, in accepting 'that forests are capable of solving the fuelwood problem', sees the solution to be forestry directed specifically to fulfil local community needs. Such a form of forestry endeavour involves substantially different approaches to 'the traditional and classical approaches to forestry and forest industry development'. The main working paper for the FAO/SIDA Consultation (FAO 1977) examined the nature and scale of the forestry problems involved in providing aid and development for the local rural community, including the problem of providing an energy source. The report concluded that in many countries with heavy population pressures a genuine concern for community forestry may lead to some rehabilitation of the now partly denuded forest lands so that local people can obtain the benefits of careful husbandry of trees in their area.

In this analysis I will concentrate on the situation in Nepal of which I have some first-hand knowledge and for which there is a considerable amount of documentation. Nepal also presents examples of some of the most disturbing aspects of this problem. Excessive fuelwood and fodder harvesting is leading to severe erosion and many places once covered by forest have been reduced to near wasteland. The ultimate result will be devastating landslides and erosion in one of the steepest and wettest, yet most heavily populated regions of the world, the very blueprint of ecological disaster not only for the region itself but also for lands downstream.

Population energy requirements

Energy usage from all sources in less developed countries is low by western standards, especially if measured against usage in the U.S.A. Nepal is reported by Earl (1975) to use 7480 MJ of energy per caput annually1 as compared to

1Throughout this chapter per caput figures will mean use per person per year. All tons are metric tonnes.
312610 MJ per caput for the U.S.A., a ratio of 1:42. Many other of the less developed countries of Asia, Africa and South America have similar per capita energy usage figures of less than 28,900 MJ (equivalent to 1 ton of coal equivalent (CE), see Appendix A) and for most of these countries a very high proportion of the energy is derived from the forest, in Nepal almost 96 per cent (Earl 1975). Something of the pattern of fuelwood use for a number of less developed countries can be understood from Table 1. According to the estimates given in this table, almost the whole population of four Asian and African countries used fuelwood. Usage changes slightly with per capita income and the proportion of national income derived from subsistence activities.

This table is taken from a household survey to estimate fuelwood consumption carried out in Nepal by the Energy Research and Development Group of the Institute of Science (1976), Tribuvan University. This group polled 508 households to estimate their use of fuelwood for all purposes. This amounted to 1.22 m$^3$ (15,320 MJ) but the survey did not report the household figures by ethnic groups. Earl (1975, Appendix 1) reports on a number of other estimates for Nepal. In one study in the Terai, three ethnic groups, the indigenous Tharu people, Hill people who had migrated to the Terai and immigrant Indian families, were estimated to use $13,670, 8700$ and $16,820$ (average $15,690$ MJ per caput ($1 \text{ m}^3 \text{ of wood} = 12,560 \text{ MJ energy}$). The Tharu people live in larger family groups and use less fuelwood per caput. In a separate survey of 16 hill families in areas of scarcity and high prices, Earl estimated the use of fuelwood was as low as 0.52 m$^3$ or only about 6600 MJ energy per caput, that is about the absolute minimum requirement calculated below for three cooked meals per day using charcoal as an energy source. Earl estimated per capita fuelwood consumption for the country as a whole was 0.68 m$^3$ (= 8670 MJ energy) but suggested that because of scarcity, especially as land clearing in the Terai comes to an end, fuelwood would shrink to 0.5 m$^3$ (= 6360 MJ energy) by the end of the century.

In the first of a series of seminars dealing with 'Problems of Utilising Forest Resources as a Component of Development' in this University early in 1978, Jacobs suggested that people in Indonesia use 3.75 kg of charcoal to cook three hot meals a day for a family of six, or 0.62 kg (18.4 MJ) per person a day (Jacobs 1978). Thus for the Nepalese who
Table 1

Fuelwood use in some developing countries

<table>
<thead>
<tr>
<th>Country</th>
<th>1973 GDP per caput</th>
<th>Proportion GDP from subsistence sector</th>
<th>Proportion of urban population</th>
<th>Population using fuelwood</th>
<th>Fuelwood use per caput</th>
<th>Charcoal share of fuelwood consumption</th>
</tr>
</thead>
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<tr>
<td></td>
<td>$US</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>m³</td>
<td>000 MJ</td>
</tr>
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<td>69</td>
<td>5</td>
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<td>0.53</td>
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<td>15</td>
<td>97</td>
<td>1.10</td>
<td>19.0</td>
</tr>
</tbody>
</table>

Source: Institute of Science, Tribuvan University, Nepal, 1976: Table 2.7.
traditionally eat only two cooked meals per day the annual energy use for cooking alone could be estimated at as little as 4340 MJ per caput. For three meals a day the per capita annual requirement would be 6360 MJ. The more recent estimate of fuelwood consumption for Nepal (Table 1) of 9250 MJ per caput is an indication of a very low level of energy consumption and the figures for Thailand, Zambia and Tanzania would indicate little more than a very modest standard of living.

Thus for one of the poorest countries of the world, in terms of GNP, the average energy use for fuelwood is at present very low and by the year 2000 is estimated to be about equivalent to what might be considered the lower limit for existence, about 6360 MJ per caput. For even a modest standard of living it would seem at least 30000 per caput is required.

All of these calculations have, however, neglected the drain imposed on the forest by fodder collection. For Nepal the estimated number of farm animals, roughly 14 million in 1969, exceeds the human population of 12,250,00 of 1974 (Panday 1976). The highest concentrations of farm animals are in the hill regions which are most vulnerable to overgrazing and erosion. In Nepal, as in a number of neighbouring countries with a monsoon dominated climate, the dry season is a critical period when great demands are made on the forests for fodder. Uncontrolled lopping is common so that much of the hill forests have been reduced to shrublands of little more than 3m in height, soon to disappear altogether.

According to FAO (1977) estimates, a buffalo will eat up to 7.0 tons fresh weight of leaves a year comprising 41 percent of its feed and a cow 2.5 tons or 27 percent of its feed. In Nepal, almost all of this leaf material is gathered from the forest. If we convert these figures for consumption by using Panday's (1976) animal population figures we can obtain an estimate of forest biomass consumed by these animals in a year (Table 2).

This estimate of $2.51 \times 10^{11}$ MJ of energy is obviously a most questionable figure but it is interesting to consider the comparison of this figure with the estimated use of $1.13 \times 10^{11}$ MJ of energy of forest biomass as fuelwood. From personal observation it would seem likely that the domestic animal population in Nepal does in fact consume annually the equivalent of forest biomass twice that used
for fuelwood. The manner of gathering this fodder biomass is also probably far more disruptive of forest productivity than fuelwood harvesting as the tree crowns are mercilessly lopped, with little regard to regeneration.

Table 2

<table>
<thead>
<tr>
<th>Animals</th>
<th>Numbers 000 (1969)</th>
<th>Annual consumption of fodder leaves 000 tons</th>
<th>Dry matter content 000 tons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cows and oxen</td>
<td>6,226</td>
<td>15,565</td>
<td>5,185</td>
</tr>
<tr>
<td>Buffalo</td>
<td>3,482</td>
<td>24,374</td>
<td>8,125</td>
</tr>
<tr>
<td>Sheep and goats</td>
<td>4,349</td>
<td>3,587</td>
<td>1,196</td>
</tr>
<tr>
<td>Total</td>
<td>14,055</td>
<td>43,526</td>
<td>14,506 c</td>
</tr>
</tbody>
</table>

a Estimated moisture content of leaves 200 percent of dry weight.

b Estimated to consume one quarter the amount of a cow.

c Total of 14.5 million tons equivalent to \(2.51 \times 10^{11}\) MJ (251,000 million). One ton of dry matter approximately equal to 17,340 MJ energy.

The capacity of the forest to produce fuel and fodder

There are various estimates of the primary timber productivity of the continental areas of the earth but for our purposes Lieth's (1975) estimate of 121.7 billion tons will be used. This suggests an average productivity of 8.16 tons per hectare per year, with a range for forest areas of moderate productivity, depending on geographic location, of about 4 to 35 tons. Lieth (1975) estimated the 50 million km\(^2\) of forest in the world had an approximate mean net primary productivity of 16.3 tons per hectare per year, producing 81.6 billion tons annually. Earl (1975) in his estimates of the productivity of the world's forests used a figure derived from Olson (1970) of only 7.5 tons a hectare a year, so that his estimate of 36 billion tons annually is at considerable variance with that of Lieth. This in no way negates
his argument that a considerable proportion of the world's incremental forest energy resource is not used.

However, in the context of our discussion of forest use for local energy needs, it is to a large degree irrelevant that the world's forests produce 81.6 billion tons annually, or the equivalent of 20 tons per caput based on a world population of 4000 million, as much depends on where this production occurs. The productive forests in the heavily populated less developed countries have either disappeared through clearing for agriculture or have been severely depleted through lopping. The important fact is that the remaining forest lands and deforested land unsuited to agriculture have the potential to produce probably 6 to 25 tons per hectare annually of biomass, and more in the most productive tropical rainforest areas. Of equal importance is how much of this accessible forest remains and how seriously impaired is its productivity through excessive cropping for fuelwood and fodder. This last question cannot be answered with any certainty and herein lies the problem of ensuring the basic right of local people in many less developed countries to at least the bare necessities of fuelwood and fodder.

The form of forest energy: fuelwood, charcoal or electricity

The energy produced by the forest may be used directly by burning or it may be converted to other forms of energy, for example generating electricity.

The simplest form of forest energy is fuelwood. But fuelwood is heavy, with a relatively low calorific value, 14.7 MJ per kg for air dry wood at 20-30 per cent moisture content, up to 19.7 for oven dry wood, compared to 28.9 MJ per kg for coal (Earl 1975). Fuelwood is, therefore, expensive to transport over any distance and is mostly used within walking distance of a village (one or two days walk in many parts of Nepal).

Wood can be converted to charcoal using a relatively low level of technology. Charcoal is very light (specific gravity 0.4) and can be transported easily. But wood's conversion to charcoal is very wasteful of energy unless the most sophisticated techniques are employed. Earl (1975) deals extensively with this problem. These and other data relevant to Nepal suggest that only the less sophisticated portable steel kilns, similar to those used in Uganda, would suit the needs of most developing countries (Earl 1973). The charcoal
yield by weight is only 20 to 30 per cent of the dry weight of the wood used but its calorific value is higher (1.5:1) so the energy yield is 30 to 45 per cent. Charcoal cooking is also probably more efficient than wood. Where retorts are used and the exhaust gases are collected, condensed and fractionated, relatively little of the energy may be lost. But the capital costs are high and a large throughput of wood is required annually, so that a plant must be located near to a large area of productive forest.

Forest produce may be used as fuel for electric power stations but the efficiency of energy conversion is low, the capital costs of the plant are high and an expensive and sophisticated reticulation system is required. Feasibility studies made of such a project for Hawaii (Gill 1977) showed considerable difficulties, even where the power plant was to be linked to an existing grid system. The 23 MW plant would require 6000 hectares of eucalypt plantation with a yield of 20 m³/ha/year and would need quite sophisticated harvesting and transport facilities. Similarly Earl (1975) has estimated that a 150 MW power plant would require 786,600 m³ of air dry wood per annum. At an average sustained yield of 20 m³ per hectare per year this would require 40,000 hectares of productive forest within reasonable distance of the plant. The thermal-electric conversion in this scheme was assumed to be 35 per cent.

This level of investment and technology appears inappropriate to our present discussion and certainly in hilly Nepal hydro-generation the obvious source of electrical energy. Neither is electricity seen as a source of energy in the village system in relatively flat Java, except for a few large villages on main routes and close to cities, and most villages have little export or import of energy (Soemarwoto 1975). Conversion of the energy provided by the forest to other forms of energy such as electricity is, therefore, considered inappropriate for the rural poor of the less developed countries.

Improving end-use efficiency

There is considerable scope for improving the end-use efficiency of fuelwood and fodder provided by the forest. The enormous drain on the forest by domestic animals in Nepal was estimated at possibly twice that for fuelwood in terms of biomass. A high proportion of this usage is due to the sacred nature of the cow in Hindu society and is of
very little direct benefit to man.

There is scope to improve the efficiency of use of fuelwood. It is now a little over one hundred and eighty years since Sir Benjamin Thompson, Count Rumford, invented a close-topped stove which economized on fuel, but most of the world's population still uses very inefficient cooking facilities. In the most basic situation food is cooked over an open hearth, either in the open or under shelter, or in the house as in the Sherpa houses in Nepal. On the terai in Nepal a very basic mud stove, the 'chulo', is used which has neither flue nor draught control. In Thailand the equivalent, for burning charcoal, is a 'tao than' of open terracotta construction.

The problem of improving the efficiency of the use of fuelwood by providing better stoves is discussed in the Nepalese report previously cited (Institute of Science 1976). This report put the end use efficiency of present fuelwood usage at 0.15 but estimated that a relatively low level of technology could raise this to 0.20. It stressed that during the short run, development must be cheap to the consumer, of simple technology and contain a minimum of imported components. Three levels of improvement were described. As an indication of the sort of costs considered appropriate, the lowest level technology involved a cost of NRs 50 (A$4) with no metal or imported components and with an estimated lifespan of 3-5 years. The highest level of technology suggested involved a cost of 150-200 NRs (A$16) with a 100 NRs (A$8) import component for tin and ironplate and an expected lifespan of at least 15 years.

It was estimated that to achieve such a minimum improvement an expenditure of approximately A$2 million would be required over ten years to construct and demonstrate two such units in each of 30,000 villages. The possible consumer costs arising from a general improvement in cooking facilities could amount to A$48 million with the high level of technology, including half this amount for imports. To place this level of expenditure in perspective, this would be about 4 per cent of the GNP of Nepal, estimated by the World Bank at US$1100-1200 million (World Bank 1977).

There is every reason to believe it is possible to reduce the per capita consumption of fuelwood usage by improving end-use efficiency. Only a low level of technology is required for an improvement in domestic cooking facilities which might lead to savings of up to a quarter in fuelwood
consumption. Aid programs in forestry at the community level in developing countries should include such an improvement as one of their primary objectives.

**Seeking an assured energy supply from the forest**

Mankind has used fire to cook food and fire for warmth from time immemorial. This situation is not likely to change for many people. How then is a continued supply of energy from the forest to be assured?

In our discussions we are seeking to answer this question in part by finding a way for aid to make a contribution. For most of the rural poor in the less developed countries foreign aid has up to now been of little benefit (Lipton 1976). All too frequently much of the aid effort has been directed to the urban sector, often in the form of sophisticated technological development which has benefited mostly the urban elite. Why should energy supply from the forests be any different?

An answer to this second question is relatively easy to find. Aid directed towards forestry which aims to improve the local forests for community use could reach out and benefit the people more directly than many other forms of aid have managed to do. But herein lies a major problem for donors. For the provision of aid in this form requires a major change in attitudes. Aid to community forestry can only be achieved by modifying the present 'development' approach and accepting a form of aid which will improve the lifestyle of the rural poor but which may not alter the GNP by one single dollar. As King said in his address in Indonesia to the conference on forestry for local community development, 'We have got to eschew the traditional and classical approaches to forestry and forest industry development. We have got to display more imagination in forestry than we have hitherto been called upon to exercise. We have got to be innovative' (King 1977). It will not be easy for aid agencies to adopt this new perspective but there is evidence that in many areas of forestry aid this principle is being accepted.

An answer to the first question of ensuring an energy supply from the forest is more difficult to find. In countries such as Nepal and India the forested land is already under great pressure and all the evidence points to a continued decline in productivity from over use and
exceedingly wasteful and destructive harvesting methods. Three things are necessary if fuelwood for all is to be provided:

(a) All non-agricultural land not immediately occupied by housing and other buildings must be made as productive as possible and protected from excessive grazing.

(b) Village people must be taught to manage their forests as well as they manage their agricultural land and to harvest products without harming the stock.

(c) Rural people must be assisted to make the most economic use of the fuelwood and fodder available to them.

It seems inevitable that much more land will eventually be used for agriculture to feed the world's increasing population. There will, likewise, be little alternative to creating more homogeneous agricultural land, often protected by pesticides, and boosted in productivity by fertilizers (Jacobs 1975). This is in spite of evidence that primary productivity of these man-made agricultural systems is not necessarily as great as the natural ecosystems they replace (see for example Lieth 1976). If the remaining land is to provide the needed fuelwood and fodder it too must be modified and managed. But here the change can probably be effected with only a modest loss in diversity and little loss of productivity. Tamm (1975) has argued persuasively that, in order to obtain high yields, forestry does not need to change the ecosystem nearly so drastically towards what he calls a pioneer stage as does agriculture. Such a concept is graphically illustrated for a tropical environment by a description given for the home garden of a Javanese village (Soemarwoto 1975), where the different layers under a canopy 20m high are fully occupied by a wide variety of productive plants. Fuelwood and fodder can be part of the products of such a garden.

For the forested lands to provide community benefits they must therefore retain diversity and the monocultural plantation approach is mostly inapplicable. Often the areas involved will be quite small, a few tens of square metres, and capable of carrying a canopy made up of a few large crowns. The species mix will be quite diverse, trees for timber and fuelwood, for fodder, for fruits and nuts, for shade and possibly for religious significance (in Nepal these trees are often the only ones to have survived).

From my own observations in the Chautara region of Nepal there appears to be ample area within and adjacent to
cultivated lands in the hill country for this form of afforestation. The population is approximately 450,000. About 20 per cent of the land, 90,000 hectares, is forested to a greater or lesser degree and about 45,000 hectares possibly could be accessible for harvesting. At the very low level of productivity of 4 tons per hectare per year this land could produce 400 kg per caput or about 6940 MJ energy a head on a sustained yield basis. Careful husbanding of this resource with rotational lopping and planting up of pockets of unproductive land could raise this figure two- or three-fold. By contrast a substantial area of land would be needed to produce this material in plantations and this land would be very difficult to obtain in manageable areas - for say three trees per person per year on a fifteen-year rotation at 1000 stems per hectare the area required would be 20,000 hectares.

Jacobs (1978) has described a similar approach for parts of India, the 'Hundred-tree Formula' under which farmers are assisted to plant twenty trees per year in and around their farms for self-sufficiency for firewood and small timber requirements. Such plantings will require a great deal of liaison with local community groups who are often keen to learn what is essentially only a new way to farm. For aid workers who cannot speak the local language the task will be formidable.

What appears still be a totally unexplored field of study is the problem of how best to harvest fuelwood and fodder from the forest in these simple village circumstances. In the average Nepalese community the only implements are basic indeed. The results of incessant lopping with these primitive tools with no apparent rest period to allow regeneration of the lopped trees has reduced vast forested areas to an unstable low scrub. To be effective, any aid program must carry out urgently needed research into how this problem can be overcome while maintaining fuelwood and fodder supplies at at least their former levels.

Finally an aid program established to foster community forestry must set out to find where the fuelwood and fodder goes and in what quantities. Earl (1975) has noted how often estimates of consumption for whole regions or countries are based on inadequate data. Accurate figures must be available on consumption by individual family units, especially if any determined attempt is to be made to improve the efficiency of fuelwood use.
Appendix A

Energy conversion factors

\[
\begin{align*}
\text{cal (calorie)} & = 4.19 \text{ J (joules)} \\
\text{k cal (kilocalorie)} & = 4.19 \text{ kJ (kilojoules)} \\
1000 \text{ k cal} & = 4.19 \text{ MJ (megajoules)}
\end{align*}
\]

<table>
<thead>
<tr>
<th>Calorific Value (CU)</th>
<th>MJ per kilogram</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paraffin</td>
<td>43.6</td>
</tr>
<tr>
<td>Fuel oil</td>
<td>41.1</td>
</tr>
<tr>
<td>Charcoal</td>
<td>29.7</td>
</tr>
<tr>
<td>Coal</td>
<td>28.9</td>
</tr>
<tr>
<td>Wood (oven dry)</td>
<td>19.7</td>
</tr>
<tr>
<td>Wood (air dry)</td>
<td>14.7</td>
</tr>
<tr>
<td>Cow dung (dry)</td>
<td>16.7</td>
</tr>
<tr>
<td>Peat (dry)</td>
<td>16.7</td>
</tr>
</tbody>
</table>

Coal equivalent (CE) : 1 ton coal = 28,900 MJ

\[= 2.3 \, \text{m}^3 \text{ air dry wood} \quad (\text{density 0.88})\]

<table>
<thead>
<tr>
<th>Wood air-dry density</th>
<th>MJ per m$^3$</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 lb/cu ft</td>
<td>0.48 per cc (conifers) 7,000</td>
</tr>
<tr>
<td>50 &quot;</td>
<td>0.80 &quot; (hardwoods) 11,800</td>
</tr>
<tr>
<td>70 &quot;</td>
<td>1.12 &quot; (dense hardwoods) 16,500</td>
</tr>
</tbody>
</table>
References


Jacobs, M.R. 1978. 'The importance of forestry in the development of emerging countries', seminar series on 'Problems of Utilizing Forest Resources as a Component of Development', Development Studies Centre and Department of Forestry, Australian National University, Canberra.


Panday, K.K. 1976. 'The livestock fodder situation and the potential of additional fodder resources' in *Mountain Environment and Development*, Swiss Association for Technical Assistance.


Local needs of small timber and fuel wood in India

A.K. Banerjee

Introduction

The provision of small timber and fuelwood in India has to be seen in the context of present and future total demand and supply of timber and wood-based industries in the country and of availability of alternative raw materials. In this chapter it will be argued that, although the emphasis in Indian planning has recently shifted to rural development, urban and industrial needs will in practice doubtless receive priority. The problem of supplying rising urban and industrial demand can probably be resolved, provided that present plans are implemented. But the problem of meeting rising rural needs for small timber and fuelwood are more intransigent, so that new systems of forest management will have to be introduced and vigorously carried through over a wide area if basic needs of the mass of the population are to be met.

Industrial needs

Before considering basic needs, it is worthwhile to quote some relevant forest, demographic and industrial statistics and analyse the pattern of present and projected industrial demand in India.

India

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Area</td>
<td>= 329 million hectares (ha)</td>
</tr>
<tr>
<td>Population (1971)</td>
<td>= 548.2 million</td>
</tr>
<tr>
<td>Average density of population (1971)</td>
<td>= 167 per sq km</td>
</tr>
<tr>
<td>Forest area</td>
<td>= 75 million ha</td>
</tr>
</tbody>
</table>
Per capita forest area = 0.14 ha
Growing stock = 1727 million m³
Increment (annual) from forest area = 33.17 " "
Industrial wood requirement (1975) = 22.00 " "

According to government planning estimates, the aggregate industrial raw material requirement for 1980, 1985 and 2000 A.D. under assumption of low and high income growth are expected to be as in Table 1.

Table 1

<table>
<thead>
<tr>
<th>Estimated demand for industrial wood</th>
<th>1980</th>
<th>1985</th>
<th>2000 A.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low income growth</td>
<td>25</td>
<td>30</td>
<td>47</td>
</tr>
<tr>
<td>High income growth</td>
<td>27</td>
<td>35</td>
<td>64</td>
</tr>
</tbody>
</table>

a R.W.E. = Roundwood equivalent


As present increment¹ from the forest area in m³ (R.W.E.) is 33 million, the requirement of industrial wood of about 30-35 million m³ in 1985 will be met, provided that the entire increment is so utilized. However, the situation will change to one of deficit immediately after 1985 unless the average increment per hectare in the commercial forest areas is pushed up from the average mean annual increment (M.A.I.) of 0.43 m (level of 1970) to 0.69 or 0.95 by 2000 A.D. corresponding to low and high demand. It is proposed to achieve this with large scale man-made forests of high M.A.I. such as Cryptomeria japonica, Pinus patula, Cupressus cashmeriana in the hills; and Eucalyptus tereticornis, Leucaena, and poplars in the plains, besides the traditional timbers

¹ Increment is the forester's term for crop productivity; it measures yield per unit area over the year, or potential annual extraction rate on a sustained yield basis.
like *Shorea robusta* and *Tectona grandis*. In addition, concentrated natural regeneration over very large forest areas has to be encouraged. From 1951 to 1974, that is up to the mid-point of the fourth five-year plan, 2.1 million hectares had been planted (Government of India 1977a: 226). As about 0.2 million hectares is now being added annually, total plantations must today be around 3 million hectares. The annual planting program is due to be more than doubled and it is visualized that the total plantation area will be 13 million hectares by 2000 A.D. In addition, it is expected that concentrated regeneration will have been successfully carried out over 32.8 million hectares by that time. The program if successfully executed is expected to keep supply just ahead of the projected industrial demand. There is, however, virtually no surplus for non-industrial demand in these supply balance projections for timber extracted from the forested areas.

**Non-industrial local needs**

Local needs of 80 per cent of the people who live in rural areas will thus have to be satisfied mainly by supplies from non-forest areas.

The rural population of India (1971 census) was 439 million, inhabiting 575,936 villages. Their demand for wood can be analysed in two principal categories: timber and fuelwood.

**Timber**

The local timber needs are for ploughs, for carts and for house building. The net area sown in 1972-73 was 136 million hectares. While tractors and other mechanical equipment have been introduced in certain parts of India, the basic means of working the soil remains a wooden plough. It has been calculated by a study undertaken by Pre-Investment Survey of Forest Resources, Government of India (1977b), that one plough is needed to plough 3 hectares for 3 years, and that the (round) timber content of each plough is 0.056 m\(^3\). Similarly, one cart, amortized over three years and needing 0.5 m\(^3\) of timber (round), is required to service 9 hectares. The total number of rural houses is not known. Taking into account the large number of mud huts, temporary sheds and homeless people,
it can be conservatively taken that there is one housestead for every ten rural people. The same study quoted earlier measured an average use of 1.8 m$^3$ of timber for each house with 10 per cent depreciation.

Using the above data, it is possible now to estimate roughly the total requirement of timber (round) for the rural people.

(a) Plough: \( \frac{136,779,000 \text{ ha} \times 0.056}{p \times t} = 0.85 \text{ m}^3 \)

where \( \text{ha} = \text{net sown area} \)
\( p = \text{no. of ha/plough} = 3 \)
\( t = \text{time to replace} = 3 \)

(b) Carts: \( \frac{136,779,000 \times 0.50}{p \times t} = 2.50 \text{ m}^3 \)

where \( p = 9 = \text{no. of ha/cart} \)
\( t = 3 \)

(c) Houses: \( \frac{\text{439 million people} \times 1.8 \times 1}{10} = 7.90 \text{ m}^3 \)

This makes a total of roughly 11.3 million m$^3$ annually. The estimate is based on a number of assumptions but it can be safely said that it is conservative.

Fuelwood

The fuelwood requirement is estimated at 277 m$^3$ per thousand inhabitants. A natural forest under scientific management puts on an increment of 1.5 m$^3$ per hectare per year. The fuelwood component of this increment is, on an average, about one-third of the total or 0.50 m$^3$ per hectare per year. Therefore, to satisfy the demands of the local population of 1000 people, roughly 500 ha will be required, \((277 \div 0.5)\) or in other words 0.5 ha of forest to satisfy the needs of fuel per caput. The total population of the country was 547 million in 1971 and is increasing steadily. Seventy five million hectares of forest could thus at best supply fuelwood to 150 million people, or less than a quarter of the present population, assuming that all of this area were available for supply. In fact, in 1970 forests provided
less than 10 per cent of fuelwood supplies, or 13 m.m$^3$ out of a total demand of 150 m.m$^3$. The balance of 137 m.m$^3$ came from non-forest areas.

The projected man-made forests will surely produce a greater volume of firewood per hectare per year than the natural forests. But the emphasis in the man-made forests is for production of straight bole timber with fewer branches, and as pulpwood and firewood are substitutable, the branch-wood will go for pulp in preference to fuel. It is clear, therefore, that man-made forests alone cannot satisfy the fuelwood needs of the country at present and that the gap will increase further in future.

Fuelwood demand is forecast to rise to 202 m.m$^3$ by 1985 and to 225 m.m$^3$ by the year 2000. To this may be added some 20 m.m$^3$ for local timber needs by the latter year, making 245 m.m$^3$ in all. Supplies from the forests are expected to expand to 40 m.m$^3$ by 2000 A.D. and the gap of around 200 m.m$^3$ will have to come from non-forest areas. This infers a rise of nearly 40 per cent on 1970 production levels there.

To recapitulate, we can summarize the conclusions reached so far: (i) increased plantings in man-made forests and the proposed effort in concentrated natural regeneration in the indigenous forests will in all probability satisfy the projected industrial demand; (ii) local needs of timber for ploughs, carts and low cost rural housing will have to be met substantially from the non-forest sources; and (iii) production forests can at best supply up to 20 per cent of the fuelwood needs of the country in the foreseeable future.

Spatial distribution of forests

to satisfy local needs

A look at the distribution of forests of India brings into focus some interesting spatial characteristics.

(a) The entire Indo-Gangetic plain starting in the west from Haryana, running southeast and east through Uttar Pradesh, Bihar and West Bengal have hardly any forest.
(b) Similarly, the western regions from the north at Punjab, through Rajasthan, Gujarat and parts of Maharashtra are sparsely forested.

(c) The central regions in Madhya Pradesh, Orissa and the northeast regions of Assam, Arunachal Pradesh, Tripura, Manipur have very high percentages of land under forests and so have the southern parts at Kerala and parts of Andhra Pradesh.

Except for the Himalayan region, Madhya Pradesh, Orissa and the northeast regions, the forests in each state are localized in big patches while the remaining areas are more or less treeless. In effect, the country has a non-uniform pattern of forest distribution, with local imbalances.

The local non-industrial needs of the population have to be met at a low price. This is possible only if the raw materials are available at economic distances. Long distance haulage of bulky but cheap lumber and fuelwood, even if urgently needed, can never be afforded by an economically backward country. It has to be understood that lumber and fuelwood, in spite of being very basic indeed, cannot compete in essentiality with, say food and clothing. Notwithstanding high transportation cost, rice can be rushed from one corner of the country to the other, with a subsidy if necessary, but a region suffering chronically from fuelwood supply will never be considered a fit case for subsidization. Therefore the national availability of growing stocks of fuelwood or cheap timber is often not as important as are local supplies to meet the demands of the rural population.

Supplies for the satisfaction of local needs can be analysed in three contexts: (i) areas with some forest land in the vicinity; (ii) areas with no forest land in the vicinity but alternative sources of energy and supplies of building materials; and (iii) areas with none of the advantages of (i) and (ii).

Areas with forests in the vicinity

The first category to be discussed is that in which the needs of the local population for fuelwood and building
materials can be satisfied from forests in the neighbourhood. In such areas employment aspects are usually crucial. There is very acute unemployment and under-employment in most rural areas of India. This is particularly so in areas where the country is wooded. Since annual investment in forests is very low (on an average Rs.10/per hectare, or about US$1.00) the generation of employment in the forests remains low. In areas where man-made forests are being created, clear felling and artificial regeneration generates a lot of immediate employment in its vicinity, but it falls off as soon as the area is planted up. The establishment effort shifts to a new area and the labour force near the completed area becomes jobless. As a result, in many areas, the local people subsist on surreptitious removal of fuelwood and small timber from the forests. The forests gradually become depleted and the boundary recedes away from the village. A perpetual antagonism develops between the foresters, who are the guardians of law and protectors of forests and the people, who act as destroyers through necessity. This position must be rectified, as otherwise the entire concept of growing trees to satisfy local needs will be defeated.

One successful experiment along these lines has been at Midnapore. In the Midnapore district of the state of West Bengal, a forest area was chosen for an experiment to see if forest protection could be effected by participation of the local community. The forest, a patch of 800 hectares (ha), consisted mainly of stumps of Shorea robusta with a sprinkling of Terminalia tomentosa, Lagerstroemia parviflora and a climber Combretum decandrum. The crop, once part of a dry deciduous forest of good density, looked like a meadow from the distance, as only one year's dense coppice growth, one metre high, remained. Every year as the coppice growth developed, the local rural people hacked it back to ground level, dried and bundled the cut shoots to sell in the nearest market to earn a half day's wage. Unemployment and under-employment were thus responsible for the degraded state of the forest. A survey showed that the people subsisting in this forest area lived in nine villages which surround the patch of 800 hectares of forests, with a combined population of 1302. The total number of unemployed and under-employed man-days there was 40,000 a year. During the survey, and following intensive discussion with the villagers, a number of important facets of the problem were established

(a) The theft of forest produce could be stopped and protection ensured provided that employment
in monetary terms equivalent to what villagers earned by sale of stolen produce was generated.

(b) Employment had to be phased so that it matched the seasons of maximum under-employment.

(c) The responsibility of protection had to be entrusted to the villagers with minimum official interference. There is a large communication gap between officials and rural people, and the latter are usually distrustful and suspicious.

(d) The supply of fuelwood had to be ensured to the villagers and for this they were willing to pay a nominal price.

The scheme was organized by accepting these principles. The area on survey showed the following composition: (i) 400 hectares of forest land which contained stumps of Shorea robusta with the potential to grow into small poles in 10 years, provided that they were protected from hacking; (ii) 200 hectares of forested land with no useful vegetation or stumps, covered by a climbing shrub Combre tum decandrum; and (iii) 200 hectares of wasteland on which even the tree stumps and the climbers had been uprooted.

It was decided that the following works would be undertaken for a period of 10 years from 1971: (i) planting 25 hectares annually with Eucalyptus hybrid and Acacia auroaeculiformis in the waste and shrubby areas; (ii) planting of Sabai grass (Eulaliopsis binata) over 10 hectares annually; (iii) paddy and mesta jute over 50 hectares in the first two years; (iv) sinking of a well for a nursery, construction of two huts for malis (nursery men) and planting of some fruit trees like guava, plantain, pineapple, etc.; and (v) selection of three coppice shoots for retention, and cutting of the balance over 200 hectares every year in the winter-spring in the Shorea robusta stump area for sale as headloads to the villagers for fuel.

This work provided 40,000 man-days of employment at a total cost of Rs.80,000 per year. The entire work was entrusted to the villagers of the nine villages who operated under elected representatives, one from each of the nine villages. Each representative worked for one month and was replaced by another elected man and so on over the year.
At the end of two years the forest, which had been degraded and had not earned even a single cent of official revenue for 25 years, looked healthy. It had become covered with vegetation and had earned some money from the sale of firewood, paddy and mesta jute.

The scheme has now run for seven years and the expenditure committed each year initially has been considerably reduced. Notwithstanding, the forests in the 800 hectares have held their ground because of the goodwill of the local people and the growing stock will earn enough revenue to compensate for expenditures. The conclusion from the experiment is that dedicated and sincere effort, with proper planning and regulated expenditure (in the present instance Rs.100 per hectare per year, or roughly $10) for offsetting local unemployment and under-employment, can greatly improve the yield from degraded forests. It was also established that 800 hectares of forests in a semi-arid zone, if properly looked after and protected, can supply the fuelwood needs of 1300 people, from its thinnings alone.

Areas with alternative sources of supply

The second regional category is that in which alternative sources of energy and building materials are available in the vicinity to satisfy local needs. The alternative source to wood for energy is coal and for building materials it is brick. Other sources such as petroleum, electricity or steel are still out of reach of rural people.

The total production of coal in 1978-79 is expected to be about 100 million tons of which 8 per cent or 8 million tons are for domestic consumption. It is obvious that such small tonnage cannot satisfy the needs of the rural population, except for urban centres and villages immediately adjoining the coal mines. Similarly, for brick manufacture, ample supplies of firewood or coal are required. In areas with paucity of fuelwood, bricks cannot be made economically to supply the existing needs of the population. It is, therefore, not possible to depend too much on alternative sources of supply for replacing wood.

Areas without forests or alternative sources

About 80 per cent of the rural population of India live in areas with neither nearby forests nor alternative
sources of energy to supply local timber needs. It has already been pointed out (page 506) that, to meet rising local demand, production of fuelwood and lumber from non-forest areas will have to rise by about 40 per cent to around 205 mm$^3$ by AD 2000. Intensive effort is therefore called for. It is proposed that 'social forestry' should be expanded. This concept was introduced some years ago but has not made headway so far except in certain pockets of the country.

As an example we can examine a model of 'social forestry' undertaken last year in a place called Barasat-Basirhat - Khaspur in 24 Parganas, District of West Bengal, about 60 kilometres from Calcutta.

Khaspur village was selected and during the rains of 1977 a lecture was organized on a local market day. The marketeers became curious and thronged round when we introduced the subject of planting various trees on a large scale on their homestead land, on village wastes, boundary embankments between holdings, around ponds etc. The response was immediate but we found that they were more interested in commercial crops which will yield monetary return. The species they suggested were various types of bamboos, eucalypts, coconuts etc. They also wanted a quick return. We were able to organize distribution to the villagers of 1000 seedlings of bamboo (*Dendrocalanius strictus*). By the middle of winter we saw that 80 per cent had died. After further discussions with the rural people we realized that the following actions are necessary to make the scheme a success:

(a) Intensive publicity to convince the rural people of the monetary value of growing fuelwood and commercial tree crops. The campaign should include distribution of handbills, projection of slides in rural cinema houses, posters and homeside chats. In fact, all these methods are being used this year and the response seems to be very good.

(b) Creating voluntary groups to promote and execute the project made up of all sections of the rural population. The help of school teachers, pupils, unemployed youth and of course the peasants is required. It may be necessary to give a small monthly allowance to the members of these groups.
who are to be responsible for distribution of seedlings and for ensuring after care by the recipients. Two such voluntary groups have been formed in the present project and they are functioning well.

(c) Decentralization of nurseries. It is better to have many small nurseries rather than one centralized one. The local peasants take up such a work enthusiastically.

(d) Guarantee of off-take of the woody materials the villagers produce at a reasonable price. In the present project, that guarantee has been provided by a large paper mill, the Titaghor Paper Mills Company Limited, Calcutta.

The program for this year is to distribute 100,000 seedlings of bamboo and eucalypts, the commercial crops that will be required by paper mills.

Through this scheme, which is apparently a socio-industrial project, the local needs of the people will be served, as any villagers wanting fuelwood or small timber will have the choice of using their own trees or bamboo either for sale or use in the kitchen. The promise of monetary gain has, however, to be placed in the forefront for the rural people to take to a social forestry scheme.

Conclusions

The conclusions can be summarized as follows:

(a) That it will be possible to supply the industrial requirement of wood for India through intensification of man-made forestry programs and concentrated regeneration of natural forests.

(b) That protection to forests in the vicinity of villages is possible through employment schemes in the pattern of the Midnapore model, which can at the same time supply local needs for fuelwood and timber. Such models should be vigorously taken up.
(c) That very large scale intensive effort is required for 'social forestry' programs in order to satisfy local needs in non-forest areas where the bulk of the population live. Otherwise there will be an acute shortage of small timber and fuelwood in the near future.

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Chapter 9

Forestry under conditions of population pressure in Indonesia

Soedarwono Hardjosoediro

The problem of over-population is well known in developing countries. Its effects are found everywhere as unemployment, urbanization, agricultural intensification and forest destruction. Indonesia is facing this last problem in particular and is struggling to find a solution.

Many foresters blame the government and society for not being capable of coping with population pressures on the forest, for not doing enough to encourage transmigration out of the area, for not adequately stimulating the growth of industry so as to absorb the unemployed of the country. They have no other concept than that the forests need rest and must be left undisturbed to perform their functions properly. This attitude clearly makes the forestry profession insensitive to the challenges of its present environment, especially the challenge of overpopulation.

The consequences of foresters' attitudes and of resulting forest management policies will be shown to be responsible for a loss of forests in this situation. Old mature stands are destroyed and are not replaced by new plantations. New forest management policies and techniques must be created, adapted to these new conditions. The aim of this chapter is to show how urgent the situation is and to propose a system that has shown promise in one area for regenerating devastated forest lands.

The effects of population pressure on the forests

The area of forest of each age class in a district and the relationship between these areas can suggest the ways in which a forest is being affected by population pressure. The possibility of identifying significant factors influencing the forest will depend on the species' composition, and on the age class distribution of those species.
The forests of Java most sensitive to population pressure are the teak forests. Teak is a species sensitive to insufficient soil oxygen. It cannot withstand swamplike or compacted ground and cannot tolerate root competition. It needs ample sunshine and is thus intolerant to shade. Its young stem is weak, it cannot stand any great physical disturbance. These characteristics of teak must be taken into account in every step of management. Javanese teak forests are located in low hilly terrain, inhabited by peasants who are mostly working rainfed fields. The Gunung Kidul district of Yogyakarta is typical and shows contemporary problems of population pressure clearly.

The division of the forests of the Gunung Kidul Forest District into the teak and non-teak areas is summarized in Table 1. The management requirements of these areas will be discussed later (see p. 108). The table gives statistics of the forest district according to age and species composition. 'Productive' teak forests are divided into seven age classes, each of one decade. 'Unproductive' areas are subdivided to take account of the sensitive growth requirements of teak. Five workable divisions have been designated. 'Cut over' areas and bare or 'clear' ground are both suitable for teak production but are separated from each other on the basis of the risk involved. 'Cut over' areas have proved their ability to produce teak whereas 'clear' lands have yet to do so.

'Failed teak' plantation designates areas which have not been adequately regenerated and must be replanted. Teak cannot be replaced without the necessary ground clearing that in Java can only be carried out cheaply and successfully under the 'Tumpangsari' contract system (to be described later in this chapter). 'Failed' teak plantations take priority in replanting over 'understocked' plantations.

Areas categorized as 'other species' under b)'unproductive' in Table 1 are sites suitable for teak production and may be made available for trial and soil regeneration purposes. There is virtually no difference between this class and that in the same class listed under 'not for wood production'.

A study of Table 1 demonstrates the effects of population pressure on the forest. In particular, it shows:
(a) the generally large areas in age classes I, II and III, that is in the first 3 decades of the rotation
Table 1
Forest class summary of Gunung Kidul Forest District
Yogyakarta, 1958, 1968 and 1973

<table>
<thead>
<tr>
<th>Forest class</th>
<th>1958</th>
<th>1968</th>
<th>1973</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(ha)</td>
<td>(ha)</td>
<td>(ha)</td>
</tr>
<tr>
<td><strong>Teak</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Productive age class</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>4244.0</td>
<td>2246.1</td>
<td>2267.6</td>
</tr>
<tr>
<td>II</td>
<td>1525.4</td>
<td>1743.8</td>
<td>1792.4</td>
</tr>
<tr>
<td>III</td>
<td>651.9</td>
<td>1287.9</td>
<td>1193.5</td>
</tr>
<tr>
<td>IV</td>
<td>182.1</td>
<td>282.1</td>
<td>253.2</td>
</tr>
<tr>
<td>V</td>
<td>15.8</td>
<td>73.2</td>
<td>70.6</td>
</tr>
<tr>
<td>VI</td>
<td>90.7</td>
<td>19.3</td>
<td>29.5</td>
</tr>
<tr>
<td>VII</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>6709.9</td>
<td>5652.4</td>
<td>5597.9</td>
</tr>
<tr>
<td>Old stands with poor increm.</td>
<td>1139.8</td>
<td>5.0</td>
<td></td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>7849.7</td>
<td>5657.4</td>
<td>5597.8</td>
</tr>
<tr>
<td>b) Unproductive</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cut over area</td>
<td>333.9</td>
<td>607.9</td>
<td></td>
</tr>
<tr>
<td>Clear ground</td>
<td>1481.4</td>
<td>-</td>
<td>238.3</td>
</tr>
<tr>
<td>Failed teak plantation</td>
<td>885.9</td>
<td>-</td>
<td>103.0</td>
</tr>
<tr>
<td>Understocked teak pl.</td>
<td>36.6</td>
<td>-</td>
<td>1.0</td>
</tr>
<tr>
<td>Other species</td>
<td>199.9</td>
<td>148.0</td>
<td></td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>2937.7</td>
<td>755.9</td>
<td>342.3</td>
</tr>
<tr>
<td>For clear cut production</td>
<td>10787.4</td>
<td>6413.3</td>
<td>5940.1</td>
</tr>
<tr>
<td>Not for clear cut</td>
<td>-</td>
<td>608.2</td>
<td></td>
</tr>
<tr>
<td><strong>Total for teak production</strong></td>
<td>10787.4</td>
<td>7021.5</td>
<td>5940.1</td>
</tr>
<tr>
<td>Not suitable for teak</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clear ground</td>
<td>378.1</td>
<td>-</td>
<td>351.4</td>
</tr>
<tr>
<td>Dying teak stand</td>
<td>118.6</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Other species</td>
<td>499.6</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>996.3</td>
<td>-</td>
<td>351.4</td>
</tr>
<tr>
<td>Total for wood production</td>
<td>11783.9</td>
<td>7021.5</td>
<td>6291.5</td>
</tr>
<tr>
<td>Not for wood production</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other species for trial</td>
<td>1303.8</td>
<td>6070.3</td>
<td>6808.5</td>
</tr>
<tr>
<td>Protection forest</td>
<td>12.8</td>
<td>7.8</td>
<td>-</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>1316.6</td>
<td>6078.1</td>
<td>6808.5</td>
</tr>
<tr>
<td><strong>Grand total</strong></td>
<td>13100.3</td>
<td>13099.6</td>
<td>13100.0</td>
</tr>
</tbody>
</table>

*a Each age class is a 10-year interval
Source: Soedarwono 1975.
of about seventy years;

(b) significantly smaller areas in the older age classes;

(c) the large decline in unproductive forest ground considered capable of growing teak, resulting in a reduction of area for 'clear cut' forest regimes from 10,787 to 5,940 hectares in fifteen years, and the commensurate increase in areas designated 'other species' under the head 'not for wood production' from 1,304 to 6,809 hectares over the same period.

An analysis of the productive age class areas I to VII for teak is also informative. Roughly 2,000 hectares of new teak plantations have failed to survive during the period 1958 to 1968. Each age class older than class I in 1958 entered the higher class with a smaller area than in 1968. No teak areas exist to age class VII. Forest classes IV, V and VI still contained small areas in 1973.

Moreover, a detailed analysis of the age distribution within class I of Table 1 might in fact show that over the past ten years the area planted has been much larger than is shown in the table. The separate class list deals in decades. But the young teak area may survive for only five or six years. Because its establishment has been a failure, this land reverts to the class 'clear cut' ground, which needs to be replanted.

Factors acting to destroy the teak forests are operating on all age classes, from the youngest plantations to the oldest stands.

Other species planting trends

The increase in the land area designated 'other species' under the heading 'not for wood production' signifies a decline in the area devoted to teak forest management in favour of safer species. A close study of those other species plantations, however, suggests that most of them must be replanted every five years. In the first Five Year Development Plan (1969-1974) 3,361 hectares of 'other species' were planted, of which only 738 hectares still existed in 1973, about one-fifth of the area cultivated.
Forest management

It is clear that major changes in forest policy and management practices will be needed if further deterioration of the teak forests is to be prevented. To obtain a better insight into the situation, some knowledge of the organization-al units of management is helpful. There are two important aspects involved: the optimal size for a unit of management; and the optimal size for planting operations. Each is subject to two constraints: the limited capacity for effective control and the limited capacity for manual work.

Organizational unit of management

Under sustained yield policies of teak forest management as organized in Java, the smallest unit of operations is normally around 800 hectares. This is because the forest is managed under an 80-year cycle, divided into 80 successive annual plantings and cuttings of roughly 10 hectares each.

This is the smallest unit of management in which all forest operations are carried out continuously. Every year an area of mature timber is cut out and an equally large area is planted. The whole area must be tended according to a prescribed schedule and security for it must be provided. This 800-hectare area is controlled by a supervisor, who has under his command four foremen each of whom is responsible for one aspect of the operations throughout the block; planting, cutting, tending and security.

The supervisor of such a unit of operations has to divide his working time into an appropriate balance between the planting and cutting to be done on the 10-hectare sites to be dealt with that year and controlling the work throughout the remainder of the area. In isolated locations of the forest district of Cepu in central Java, where conditions are similar to those which prevailed in most of the Javanese forests before the Second World War, the author found that the supervisor allotted his time in the following percentage shares: security 40, planting 25, cutting 20, tending 2 and the rest miscellaneous (Soedarwono 1970).

Organization of planting: the 'Tumpangsari' system

For teak planting operations, a collaborate system with peasants has long been organized in Java. This is called the 'Tumpangsari' method and is in effect a system of
shifting agriculture (taungya). Under this system, peasants contract to plant and tend teak saplings for a defined period, usually two successive years. For this they receive a small fee, but their main reward is the right to grow crops between the rows of trees. If the system is working as it should, the contractors keep the ground clean and loose, prevent the domination of weeds and promote good aeration. The farmers are in fact doing this primarily for their own crops, but the teak seedlings benefit as well.

The area which is best suited to the peasant contractors' capacity under this system is held to be 0.5 hectares, of which 0.25 hectares is planted and tended in the first year and an additional 0.25 in the second.

A foreman is appointed to supervise the 'Tumpangsari' work, assisted by four volunteers, usually elders, selected from amongst the contracting farmers. Each of these volunteers has 9 to 11 peasant families to control. As each family is to plant 0.25 hectares annually, this gives an area of 10-12 hectares for each foreman to manage. The work to be done in a planting operation is constant and defined, as the planting technique is prescribed and executed accordingly, and the ratios of supervisor to subordinate of one to four for the foreman and one to 10 or 12 for the volunteers are adequate.

This described the 'Tumpangsari' system in theory and as it still is in practice in forest regions with adequate land. However, in regions affected by population pressure the system is becoming profoundly disturbed, just as have taungya systems under population pressure elsewhere. To satisfy the local population's need for land, the planting areas offered to 'Tumpangsari' contractors are allocated in a larger number of smaller allotments, so that each foreman has a greater number of peasant contractors to control. At the same time the peasant contractors seek to raise yields and production by overcropping their smaller plots and neglect the teak plantings. The situation is often made worse by uncontrolled cattle grazing after the contractors move out at the end of their two years. Under these conditions a large proportion of new plantings revert to clear ground within five years.

Timber stealing starts in the older stands and shifts to the younger ones which contain any saleable timber as the old ones are cut out. The reduction in the area of older stands becomes critical, as can be seen from Table 1.
The supervisor of a management unit in such circumstances is over-loaded. He is not able to cope with all the managerial operations in his area. Consequently, the situation is virtually out of control.

Some socio-economic characteristics of the resident population

Population pressure on the forests in developing countries is caused by people living near and in pockets in the forest. Most of them are peasants. To understand their pressure on the forest, we need to know their way of living.

The traditional pattern

Peasant families in Java live from their rice fields and home gardens. The rice fields provide their staple food, while the home gardens produce crops other than rice, necessary for the well-being of the family. In addition, the home gardens are also used as a place for their houses, stables and store-houses. The pattern used in the home gardens is a multispecies and multistoried structure of gardening, using efficiently every spot and space of the garden, arranged in the most economic order. The top layer is occupied by the light-demanding coconut trees, followed by fruit trees below; small trees fill in the space of the lower story. The ground cover benefits from the remaining solar energy, while climbers make use of the patches of sunshine which come through leaves and branches of the other plants during part of the day.

Horizontally, the plants are arranged in the order of their functions and daily use. Bamboos are planted in the backyard, functioning as a fence and used for miscellaneous purposes, for construction walls, mats and other household articles. Coconut trees are placed far from houses so that nuts do not fall on roofs or playing children. The nuts are used for meal preparation in the kitchen, the leaves for temporary roofs and for firewood and the dead stems for construction wood. Seasonal fruit bearing trees successively provide vitamins all the year round. Non-seasonal fruit trees are arranged not far from the house to make the harvesting easier. Trees producing sour fruits for cooking are placed not far from the kitchen, usually near the well.

Once the home garden has been formed, not much
labour is needed for its nursing. The whole structure is in balance. It produces fruits and vegetables for daily needs and some surplus for the weekly market. All the work is carried out by the members of the family, divided among themselves according to their ability, the man to do the heavy jobs, mother for the housekeeping, able children to help the father in the field or repair the fences of the house and garden and the daughter to help the mother in the kitchen. Smaller children graze any cattle. As all the work is done manually, the amount of labour available in the family determines the volume of work.

According to convention in this region, the bahu, that is the area of rainfed rice which provides an adequate livelihood for a peasant family working manually, is held to be 0.7 hectares, while the convention for a home garden is around 0.3 hectares, making around 1 hectare in all. This was the normal size of a family holding almost everywhere in Java around 1930, when the total population was less than 35 million.

**Intensified use of land**

At that date the forest boundary was defined. Since then, no land extension has been authorized in the region for house construction or agriculture. As farm populations grew, newly formed families could no longer open new land. The rice field of their father had to be divided. One family could not have one bahu of rainfed rice field any more, and the home garden had to make room for the newly formed family or families. Trees had to be cut, fuelwood shortage became more and more common. Intensification of yields per hectare were necessary, in the rice fields as well as in the home gardens.

The intensification carried out in the rainfed rice fields begins with experiments in growing rice twice a year by planting dry rice at the beginning of the wet monsoon, followed by a wet rice variety planted at a somewhat later date than usual. As the population rises, the intensification of the rice fields increases. Second crops such as maize or cassava are introduced, mixed with dry rice in dry regions or maize with dry rice followed by wet rice in wetter regions. In some places, soya beans are planted after wet rice. Cattle breeding forms an additional activity that helps the peasant to earn cash and work his rice field. Remains of the second crop give foliage for his cattle.
The impact on the forests

For peasants living in the neighbourhood of the forest, the 'Tumpangsari' system of forest planting provides an expansion of their living opportunity. They try to intensify their crop growing at the expense of the forest plants. Cattle breeding becomes a sought after opportunity for landless peasants. Their cattle flourish in the immature forest plantations, and the mature stands are attractive to them to be transformed into cash, although illegally. Firewood gathering forms the daily work for women and children.

It is obvious from this description that the peasants try to satisfy their needs not far from home. They are immobile, they know little about the opportunities outside their surroundings. Only educated youngsters and those landless who have connections in town leave the isolated countryside. But the flow of some hundreds of thousands of people to the towns raises a strong protest of dangerous urbanization. In this situation, the forestry profession has no other choice than to look for an appropriate management policy that meets the needs of the resident population.

The new forest management policy

Hermann Knuchel (1953) writes 'In the establishment of the object of management the needs of the resident population must be taken into account'. The 1927 Forest Law of Java and Madura also prescribed this, but remains unimplemented.

Under the condition of population pressure in Java, forest management could be said to be racing against time, or against population growth or both. Indeed, forest officers find themselves having to cut old stands just to be earlier than the thieves. In these conditions foresters are on the losing side. This pessimistic view is hard to believe, but the challenge of the conditions is overpowering.

If the phenomenon is studies in abstract, two important factors emerge. They are the extent of forest land and of cheap labour. Forest land in over-populated areas has relatively high value, and is much in demand from the local residents. At the same time, there is abundant cheap labour in the area looking for job opportunities. A potential market
can be realized. The problem is to combine the existing potentials into a productive reality.

Forest management still has important capital in its hands. It consists of the soil, though already in bad condition, the climate that every season provides fresh rainwater and unlimited sunshine and seeds of plants to accumulate materials for the needs of man. Development-oriented forest management policies can exploit these assets and at the same time defend the forests against the attacking population. To be strong enough to counter every attack, such policies must not merely be battle shields of law and law enforcement. They must aim to develop a multispecies and multistoried forest that meets the need of the resident population and preserves the natural resources, and must be managed accordingly.

Socio-economic succession method of development

Most of the forest soils and decomposing rocks, though deteriorated, are still capable of being regenerated. If adequate time can be given to ensure their regeneration, the process will proceed by itself. It can be encouraged by the planting of shallow, dense rooting and heavily foliaged species which are able to grow on soils not entirely ready to support them. By struggling against the environment, these plants produce bit by bit root remains and leaf debris, and layer after layer of humus can be formed and micro-organisms flourish. In the wake of the regenerating process, seed and fuel-producing species can be planted, which will be followed by the planting of fruit and wood-producing trees. This concept of regenerating devastated forest is referred to here as the 'socio-economic succession method' of forest development, and is based on the selection of successive species that are chosen to meet the successive condition of the environment and to open opportunities to absorb the idle and otherwise destructive labour of the resident population.

An experiment which puts this theory into practice has been in progress in 'Wanagama I' since 1967. This is an area of about 80 hectares of bare forest land owned by the forest district of Yogyakarta and licensed for use by the Faculty of Forestry, Gadjah Mada University. The first step taken was to place guards on the spot to inform the population of the trial. They had to make the people understand the objects of the project and that in the fairly short run it was in their interest to collaborate. The staff had to teach
the peasants to recognize other people's property in a language that they would understand. The people have to know that a staff of guards is on duty, backed not by the written law but equipped with the knowledge and the skill to handle the law of the common people.

It has to be realized that the resident people do not feel guilty about their improper conduct in the forests, which conforms to established community practice. They act to meet their needs and according to the opportunity available. This attitude can be traced to the existence of former territorial rights, i.e. the right to make use of what their territory provides. According to tradition, they may take almost everything from unfenced and uninhabited homegardens. They may graze their cattle in other men's fields if they are not being worked or planted. They are not found guilty for stealing wood from or grazing their cattle in the forest. They do not see the forests as managed by the forest service, which must be regarded as its owner. They only accept the reality as it is.

They can, however, learn to accept the protection of the forest by the forest guards if they can speak to them and if possible to touch them as proof of their presence. A good forest guard in their eyes is he who is visible at any time and with whom they can share their luck and sorrow as their good neighbour, and from whom they can borrow food in time of emergency, which occurs once or twice a year, i.e. at the time they plant wet paddy and shortly before the cassava can be harvested.

Guided by these ideas, the project field officer, a baccalaureate graduate, stayed on the spot, regularly visited the people in the neighbourhood and played host in the project's quarters. Almost all the project construction works were given to local labourers. Some plots had been given temporarily in production sharing to some peasants. The project's share of the harvest was stored to help in loans to people coping with the periodically recurring crises. In the dry season, when green foliage is rare elsewhere, the people were able to collect fodder for their cattle in the project in return for a basket of manure each. All these acts evoked recognition and a co-operative attitude among the people towards the project. They ceased grazing their cattle in the project area and their wood stealing is lessening. In this way, time for the soil to regenerate is more or less secured.
The project 'Wanagama I' is now ten years old. Some preliminary conclusions can be drawn from its experiments, though no records have yet been made. They are:

(a) The regeneration times for the devastated soils varies from 5 to 10 years according to:

   (i) soil conditions before treatment,
   (ii) the influence of the guards.

(b) It is possible to regenerate areas devastated by population pressure on the basis of the so-called socio-economic succession method forest development.

(c) The regeneration process of devastated areas under the condition of population pressure has innumerable facets that can only be studied systematically by a special research staff equipped with a complete field laboratory.

The result of the project so far provides adequate proof of its possibilities. It may help to find new forest management policies for forests under conditions of population pressure.

References


Chapter 10

Forest establishment and utilization for local needs: small scale eucalypt operations in Africa

L.D. Pryor

Introduction

The continent of Africa, which stretches from 35° north to 35° south, straddling the equator, is three times the size of Australia or the United States. Some parts of Africa are quite densely forested but there are many areas where the forests have disappeared and others where there has probably never been tree growth. In much of North Africa and parts of southern Africa wood is in very short supply and local populations are frequently desperately short of firewood and of small building material, mostly poles. Eucalyptus has been widely cultivated in many parts of Africa, because it is well adapted to its geography and the climate in certain areas. Firewood and poles from it are particularly suited to meet the needs of many of the African people. Over many years a number of species of the genus have been planted and these plantations have begun to assume an important role in maintaining the well-being of people in substantial areas of Africa.

Eucalypt plantations can be successfully organized on short rotations, sometimes less than ten years, and in relatively small areas of as little as 5 to 50 hectares. Even though these are quite small, they can be of great significance in the local economy. There are always social elements in production, as well as interesting technical aspects in the organization of such plantations. This chapter concentrates on these social elements and deals with three examples of community forestry in Africa which differ in their planning and organization. They illustrate three alternatives, each of which appears to be successful in the particular context.

The projects described are in Lesotho, Botswana and Sudan. The first two projects have more in common silviculturally, in that the cultivation of the trees relies
on the natural rainfall whereas that in Sudan depends upon irrigation water. In the following sections the technical requirements will be set out and the evolving social and organizational aspects of each case will be outlined.

The Woodlot Project in Lesotho

Lesotho is in sub-tropical latitudes but at relatively high elevations. Most of the country is at more than 1,600m (5,000 feet), rising at the upper limits of the Drakensburg to over 3,600m (11,000 feet). The extent of the original forest is uncertain and it appears that some of the country may never have carried forest in recent geological times. There is, however, a comparatively long history of human occupation, first by Bushmen who have since died out, and then by Bantu groups, joined later by some Europeans. Lesotho has recently suffered severely from population pressure and for some time the population has had to endure difficult living conditions in which fuel and building materials have often been in short supply.

The climatic and soil conditions are adequate for satisfactory growth of planted eucalypts, at least between the elevations of 1,450m and 2,450m where most of the people live. The traditional way of life is to cultivate short maturing summer crops and to graze cattle and other stock. The climate poses some problems for the selection of suitable eucalypt species for planting as there is only moderate rainfall which occurs during a relatively short summer period. The country is also high enough in many parts to suffer frosts sufficiently severe in winter to preclude the use of some eucalypt species which could otherwise withstand the rainfall regime and the soil conditions. For example, it is too cold for E. citriodora. Nevertheless there are several species, in particular E. camaldulensis, E. tereticornis, E. macarthurii, E. maidenii and E. bicostata which grow satisfactorily and produce quite good yields of timber under relatively short rotations.

Under such conditions there are two main requirements in establishing wood producing plantations. First, the soil must be prepared so that competition from perennial and other herbaceous plants is eliminated during the establishment period. Second, the planted seedlings must be protected from grazing animals for the first few years. In addition, there is a critical need for fire protection during
the dry period since small trees can readily be destroyed by grass fires in the very early stages of establishment. Effective fire control is therefore a necessity. Local experience in these basic management skills, in nursery techniques and in overall silvicultural practices is short, so that it has been necessary to obtain advice from outside experts to set up the basic organization necessary to establish a planting program.

Once such an organization is well established, it has been demonstrated that the production of firewood and building poles is feasible over about a ten-year rotation. The production of such materials locally is of great benefit in raising living standards of the local community. Firewood in Maseru, the capital, is imported at high cost from the neighbouring Orange Free State of the Republic of South Africa. Most construction timber is also imported, much of it from eucalypt plantations in the Republic. However, urban demand differs substantially from that of the rural areas, where timber for modest houses and fuel of the simplest kind is often in critically short supply. It is in these latter areas that short rotation forest plantations would be of great value to the people. The rotation period must be short, so that the people can expect to obtain speedy benefits for themselves following the establishment of a plantation project. This is critically important if the rural poor are to be persuaded to adopt community forestry.

Eucalypt plantations can be relatively easily established with little need for advanced technology when grown as an exotic. They are largely free from damaging insects and can produce very fast growth rates. The Lesotho program, called the Woodlot Project, is funded about equally from three sources, the Lesotho government, the British Ministry of Overseas Development and the Anglo-American Company of South Africa. This company has undertaken not only more than a third of the funding but also the management of the project. The program involves a target area to be planted each year of about 400 hectares scattered in blocks throughout the country. The social organization of the region is tribal and the land is under tribal ownership. It is essential to convince the tribal chief and the clan elders that the project is potentially beneficial to them and to obtain their agreement to make land available for the operation. The good will of the common folk in the tribal area must also be secured to ensure a reasonable chance of protection from fire and the maintenance of fencing to
exclude grazing animals during the first few years after establishment.

The project has not yet reached the marketing stage, but it is intended that the products of the plantation become the property of the tribe. A proportion of the proceeds from sales is to be used to repay project loans and another part is to be paid to the tribal owners of the land in lieu of royalty and profit. The project has been going for five years and gives promise of being a highly successful undertaking. During the next four or five years, as the plantations mature and some products are sold, the economic and social benefits can be evaluated more precisely. These benefits seem assured but they cannot readily be quantified at present.

General conditions in Lesotho are such that this project could probably ensure self-sufficiency in fuelwood in most rural areas. Perhaps, too, a significant contribution could be made to supplying the timber needs of the few urban areas in the country, including the capital Maseru. A very useful quantity of round poles for building in the rural areas will also be produced.

Apart from foreign assistance with capital, expatriate technical aid is required for the project. Technical assistance is needed to organize seed supply, raise nursery stock, ensure the availability of land and its demarcation, organize site preparation and planting, and to supervise the general maintenance and protection of the plantation after establishment. Technical assistance will later be needed at the harvesting stage. Perhaps one of the most significant elements in ensuring success of this particular project has been the building into the program of the utmost attention to the need for enthusiastic participation of local people through their tribal organization.

Co-operative timber production project in Botswana

There is a good deal in common between Botswana and Lesotho which affects the afforestation projects. Although the population of Botswana is smaller, there is more residual timbered country in the form of open woodland. The land too is at somewhat lower latitudes and altitudes and so is generally warmer. Social problems in Botswana, although similar, are a little different from those in Lesotho.
is a great deal of unemployment, particularly amongst younger people, and as the program for education extends, bringing people together in settlements, social and economic problems develop. One is to find suitable employment, another to provide fuel and building material for a population which quickly demolishes the indigenous slow growing woody plants around settlements. There are substantial imports of pole timber and other forms of timber into the capital, Gaborone, from South Africa and some came also from Rhodesia until a couple of years ago.

The forestry aid program in Botswana is only in about its fourth year, and suitable eucalypt species for plantations there are still being sought. Attempts have been made to grow *E. grandis* and *E. maidenii* but although performance is encouraging in years of good rainfall, the occasional dry years which are a feature of the climate are a cause for concern. There are, however, somewhat slower growing species such as *E. camaldulensis*, *E. sideroxylon* and *E. microtheca* which are known to be quite reliable and will provide the needs sought in this program. *E. grandis* and *E. maidenii* cannot be expected to prove a suitable species to fulfill long term needs, without irrigation or save in very special sites.

The project is organized on a different basis from that in Lesotho. The work is controlled by the Kweneng Rural Development Association, a co-operative whose activities centre around the town of Molepolole, some 60 to 70 kilometres from Gaborone. The Rural Development Association is funded primarily by the British government on a soft loan basis. The aim is to make it fully self-supporting financially through marketing its products. The Association has a range of projects of which forestry is only one. Plantations of *E. camaldulensis* grow successfully and are expected to provide building pole sized timber, now in very short supply, in about 6 to 10 years. About 80 hectares have been planted, the first of which is now 5 years old. It is expected that material produced will be sold on the open market at a profit and that the whole project will in time be able to pay back the loans provided to set it up.

The association is self governing and is made up of representatives of groups of the local people. As in Lesotho, this approach seems to have every prospect of being successful. An allied project carried out by the association to make
bricks to supply building projects in the Molepolole area has already proved to be economically viable. The forestry project is longer term and a little less secure financially. Aid inputs required include technical advice on suitable materials and equipment, on seed supply, and on the organization needed to meet the economic aims mapped out for the project.

Both the Botswana and Lesotho projects have been imaginative and have departed somewhat from the pattern of many other aid programs involving wood production by means of eucalypt plantations. They do not involve a government forestry department directly and they are enterprises which are expected to prove economically viable. A refreshing element in both schemes, which seems to be a response to this kind of an approach, is the evident enthusiasm of the local people who are involved in them at various levels. Both projects are worth watching as they may prove to be suitable models for other countries.

Forestry component in Sudanese Gezira cotton scheme

The third project in Sudan is of a rather different kind. It is an afforestation program which has been developed within the centrally organized Gezira co-operative scheme. This scheme is a state-organized project to grow cotton on the black soils of the Gezira between the Blue and White Niles, extending over some 1.2 million hectares. The production of cotton as a cash crop has, of course, created the general environment in which the forestry component could proceed. Wise planning at the early stages in this irrigation scheme led to the setting aside by the central authorities of a small proportion of the agricultural land (about 0.5 per cent) for forest plantation. As land was prepared for planting a very sparse nomadic population was transformed into a large, sedentary agricultural population. During the development phases there was sufficient wood for their needs from the clearing of the low vegetation, supplemented by wood of Acacia nilotica which grows to a reasonable size on overflow areas from the river system. But this latter resource is strictly limited and could not be organized on a sustained yield basis to meet the substantial fuel needs of the area.

The technical problems in this case were formidable. The land lies in a low rainfall zone (450mm a year during a very short monsoon period), the very heavy black soils are
highly alkaline with a high pH around 8.5 – 9, with free lime and gypsum in the profile. The scanty natural water supply for forestry can rarely be supplemented by irrigation, which is provided and timed primarily to meet cotton growing requirements. Few tree species are capable of growing under these conditions. *Eucalyptus microtheca* (Coolibah), although of poor stem form, will nevertheless provide reasonable increments under these harsh conditions. The woodlots are usually planted in 10 to 20 hectare blocks set aside within the irrigated areas for this purpose. In spite of the poor form of *E. microtheca*, the demand for building poles is so great that even quite crooked material is taken and used economically. There is some scope for growing *E. tereticornis* in this area and perhaps on some of the less extreme soils it may be possible to grow other species. In an area such as this, originally with a scanty population, it would be difficult to envisage the setting up of this type of project without the organizational and financial backing of a central government authority which has access to the full range of necessary technical services. As it has evolved, the Gezira scheme is frequently cited as a viable state-sponsored co-operative development model and its forestry component has also proved successful.

Conclusions

Each of the African examples discussed in this chapter demonstrates the possibility of small scale *Eucalyptus* plantations being organized quite successfully by local population groups. In each instance the living standards of the local people in these developing areas will be improved and this is in situations where it is often very difficult to achieve any improvement in living standards. The ingredients most important to success appear to be:

(a) co-operative organization of local people to supervise and carry out work;

(b) some input of financial resources from either aid or government sources; and

(c) expatriate technical advice.
Part C
Forest utilization for export
Preamble

This group of chapters examines the contribution that forest industries can make to development through export. To many wood-rich countries of the Asia-Pacific region, including Peninsular Malaysia, Indonesia and the Philippines, earnings from exports have made an important contribution to economic growth and development. Such diversified development can, in turn, provide employment and better living standards for many people now subsisting in poor rural communities or as fringe dwellers in the big cities.

During the past two decades there has been a very considerable increase in exports of forest products from a number of the developing countries in the Asia-Pacific region. Dr Ferguson analyses, in some detail, the trends in trade of forest products for the Asia-Far East region. World trade is dominated by North America, Europe and Japan, and that of our region by Japan, although significant quantities of Asia-Far East timber are exported to Europe.

World trade was buoyant up to 1973 before the impact of the oil crisis. Exports of forest products then fell sharply as world economic activity slowed. Ferguson suggests that markets and trade are not likely to return to pre-1973 levels until the early 1980s. In fact, he concludes that the market for sawlogs will remain generally depressed or highly competitive up to the year 2000. In contrast, the prospects for plywood and veneer logs, and for plywood and veneer seem much better, although real prices will probably rise at a very slow rate.

The prospect of expanding export markets for paper products or pulp, which will favour these wood-rich developing countries, seems remote and real prices are not likely to rise significantly. There are scant prospects
of important markets opening up in other less-developed
countries of the region. Moreover such expansion of
world sales as does take place for pulp seems likely to
be supplied mainly by developed countries with a surplus,
such as New Zealand and possibly Australia.

Jabil is genuinely enthusiastic about Peninsular
Malaysia's prospects for expanded trade in forest products.
But his message is quite clear. To reap increased rewards
from its forests, the country must export in higher value-
added form. Peninsular Malaysia ceased exporting logs
nearly thirty years ago but still has to develop much more
sophisticated industry to obtain the full benefits from the
raw material available to it. Jabil holds that, given
the commercial incentives, Malaysian forest industries
have the capacity to make full use of the country's op-
portunities.

The second part of the message is, however, also
quite clear and emphatic. All too frequently developing
countries have been able to expand an industry only to have
it decimated by tariff or non-tariff barriers erected by
importing countries. The forest products industry is no
exception. Much more careful consideration must be given
in the developed countries to the relationships of aid and
trade policies.

The forest products industry in Indonesia is at
a somewhat different stage in its development. Sadikin
discusses the size and distribution of the enormous forest
resource available and the policy issues associated with
making use of this resource. Foreign sales of forest
produce will be a source of capital for other forms of
national development, both by government and private
enterprise. Export earnings from timber in 1977 brought
in roughly $US 950 million and were second only to oil.
Indonesia, too, is gradually moving to retain more of the
total benefits from the forest within the Indonesian
economy. Government is encouraging greater local owner-
ship of processing industries and of value-added forms
of processing and is phasing out the export of logs.

A problem in development in the forestry sector
of countries, such as Indonesia and Peninsular Malaysia,
is the difficult one of regeneration of the logged-over
forest. In Peninsular Malaysia much of the raw material
which has been available to the burgeoning processing
industry has come from clearfelling for agriculture on tropical lowlands, for oil palm, rubber and other crops. This is a once-only cut and sustaining the forest industry in the longer term will depend increasingly on the more inaccessible hill forests. For example, Sadikin gives details of a 110 million hectare forest development plan for Indonesia, in which 2 million hectares will be used for farming and transmigration and 80 million retained as forested land. The remaining 28 million hectares is occupied by shifting cultivators and will mostly be converted to permanent agriculture. Thus some 30 million hectares out of the 110 million dealt with by the plan will be lost as productive forest land.

The regeneration of the cut-over land to retain it as production forest is mostly quite inadequate throughout the region. This is only hinted at in most of the country studies. In Papua New Guinea Yauieb reports that in the Madang woodchip concession 10,000 ha have been logged, 1,175 ha have been reforested and 200 ha converted to cattle grazing and agriculture. The question may well be asked 'What has happened to the 8,615 ha logged but not reforested or converted to other uses?' The problem of reforestation or regeneration of logged-over forest was noted by several other speakers but no solutions were offered, other than general recognition of the problem. In the long term what are now buoyant industries will fall on lean times unless proper management and silvicultural practices are adopted to conserve and regenerate the forest resources.
Chapter 11

International trade in wood products in the Asia–Far East region

I.S. Ferguson

Introduction

Trade in wood products in the Asia–Far East region has developed rapidly over the last two decades. In the twelve years from 1961 to 1973 it grew 7 to 8 fold. Imports, however, grew even more rapidly than exports, so that the region's balance of trade in wood products remained unfavourable. The value of imports, in current US dollars, rose from $715 million in 1961 to $5600 million in 1973, while the value of exports rose from $395 million to $3070 million over the same period (FAO 1976a).

Earnings from exports of wood products now represent an important contribution to economic growth in a number of countries in the region. In the Philippines, for example, exports of wood contributed about 29 per cent of aggregate export earnings in 1973, making wood one of the top foreign exchange earnings. In Burma, Malaysia, and the Republic of Korea the value of wood exports represented from 13 to 16 per cent of total exports in 1971.

Although wood products represent only 2 to 3 per cent of the total value of imports for most of the other developing countries of the region, consumption of wood products tends to rise rapidly as real income increases, so that there may be strains on their economies unless appropriate action is taken. Many surveys and investment projects are currently underway in these countries to promote an economically efficient level of domestic production in wood products.

1Appendix A lists the countries dealt with, grouped within sub-regions as developed or developing according to FAO criteria.
North America, Europe and Japan

North America, Europe and Japan are the largest consumers and traders of wood products. Trends in these regions or countries largely determine the pattern of international trade and the prices for wood products involved in that trade.

Levels of production, imports and exports of the major groups of wood products are summarized in Table 1 and further details for these regions or countries are given in Appendix B. The years 1963 and 1973 were chosen because the peak of the recent boom in trade occurred in 1973 and the previous decade illustrates the trends before as well as during the boom.

Table 1

| Production, foreign trade in major wood products, N. America, Europe and Japan, 1963 and 1973 |
|---------------------------------|-----------------|-----------------|-----------------|
|                                 | Production      | Imports         | Exports         |
|                                 | 1963 1973 % increase | 1963 1973 % increase | 1963 1973 % increase |
| Newsprint (million tons)        | 13.4 19.1 43% increase | 6.5 9.9 52% increase | 7.5 10.5 40% increase |
| Other paper products (million tons) | 60.9 105.5 73% increase | 4.1 11.3 176% increase | 1.8 15.1 739% increase |
| Sawn wood^a (million m^3)       | 204.4 260.8 28% increase | 40.7 64.5 59% increase | 36.5 54.9 50% increase |
| Wood-based panels (million m^3) | 33.5 77.3 131% increase | 4.0 13.5 238% increase | 3.5 8.7 149% increase |

^a Includes sleepers.

North America dominated production and trade in newsprint, accounting for roughly 60 per cent of output in both years and in 1963 for three-quarters of foreign trade. However, its share of imports had declined slightly by 1973 as European trade expanded (Appendix B).

For other products listed in Table 1 North American dominance was less striking. Its output was around half the total for the three zones; its share of imports ranged between 5 and 36 per cent and of exports 14 to 67 per cent. Europe is by far the most important market for all these products other than newsprint. For 'other paper products' it accounted for 95 and 89 per cent of imports of the three zones in 1963 and 1973 respectively, for sawn wood for 52 and 58 per cent and for wood-based panels for 68 and 63 per cent.

Appendix B shows that trade in the major 'finished products' increased more rapidly than output in North America and Europe, but it increased very little in Japan, despite marked increases in the consumption of paper products and wood-based panels.

The situation with respect to 'raw materials', such as pulpwood, woodchips, sawlogs and veneer logs, was quite different (Table 2 and Appendix B). Although North America again dominated production and to a lesser extent export of these products, it played a relatively minor role as importer. Europe accounted for roughly a third of the three zones' output of pulpwood and sawlogs and for 55-65 per cent of the market for pulpwood (imports and exports).

Japanese imports of raw materials increased dramatically over the last decade, far outstripping the rate of increase for trade in the other regions. Thus, in a relative sense, Japan dominated the world import market for sawlogs and veneer logs by 1973; its net imports in that year amounting to 47 million m$^3$ or 71 per cent of total imports of the three zones, by comparison with 12 million m$^3$ for Europe, and 1973 net exports of 12 million m$^3$ for North America. Japan, with net imports of 11 million m$^3$ of pulpwood and woodchips in 1973, also closely challenged Europe's traditional role as the major importer of pulpwood, which amounted to 16 million m$^3$ in that year. North America was the principal beneficiary of this increase in Japanese imports, with exports amounting to 8 million m$^3$ a year.
Table 2

Production, foreign trade in pulpwood and sawlogs, 1963 and 1973

<table>
<thead>
<tr>
<th></th>
<th>1963</th>
<th>1973</th>
<th>% increase</th>
<th>1963</th>
<th>1973</th>
<th>% increase</th>
<th>1963</th>
<th>1973</th>
<th>% increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulpwood</td>
<td>182.4</td>
<td>252.0</td>
<td>38</td>
<td>11.8</td>
<td>28.4</td>
<td>141</td>
<td>8.3</td>
<td>18.0</td>
<td>117</td>
</tr>
<tr>
<td>Sawlogs or veneer logs</td>
<td>386.2</td>
<td>478.5</td>
<td>24</td>
<td>23.0</td>
<td>66.2</td>
<td>188</td>
<td>6.9</td>
<td>19.6</td>
<td>184</td>
</tr>
</tbody>
</table>


Price trends

What changes in real prices accompanied these developments in trade? For the most part, the real prices of paper products generally declined over the period 1960 to 1972 (Ferguson and Parkes 1976a). Manufacturers of paper products tended to increase the scale of both pulp and paper plants and their integration, thereby enjoying further economies of scale. The surge of new investment of this kind in the early 1960s created surplus production capacity in the world industry. Hence domestic sales and world trade in all major regions of the world remained relatively competitive. Real prices for hardwood, pulpwood and wood-chips imported into Japan increased somewhat over the same period, even though those for softwood remained relatively stable. This increase in hardwood prices was created largely by expanding demand rather than by prospects of supply scarcities.

Trends in real prices of other products are not so easy to interpret, the data being scanty and the trends differing for different products. Nevertheless, the real prices of sawn timber seem to have increased markedly in these industrialized regions (Ferguson and Parkes 1976a). Similar trends were probably true of plywood and veneer products. On the other hand, the real price of sawlogs and veneer logs...
imported into Japan decreased initially and then rose during the boom, so that the net gain over the period was very small.

The real price of particle board in the United States declined markedly over the period (Ferguson and Parkes 1976a), supply outstripping demand. However, particle board consumed such a small proportion of the raw material (pulpwood and wood-chip) that this expansion had no significant effect on its real price.

Economic activity in industrialized countries grew rapidly in the two years prior to the middle of 1973, placing an enormous and unparalleled strain on international resources and trade (Ferguson and Parkes 1976a). To a minor degree, an increasing scarcity of forest resources may have contributed to the bottlenecks in this period. Nevertheless the logistical problems of increasing the supply of co-operating factors of production, i.e. capital, skilled labour, marketing and shipping, were probably more important; the surge in demand outstripped all expectations and past experience.

The oil crisis of 1974 and the precipitous decline in economic activity which followed led to the most serious recession in trade and economic activity since World War II. A slow general recovery in economic activity is now apparent but the boom and recession sequence, and the associated crises, have changed expectations of future economic growth and trade. This is discussed in the final section of this survey on trade prospects for wood products.

Although recent data on real prices are fragmentary, the trends since 1972 for virtually all wood products show a rapid increase at the peak of the boom, and an equally rapid fall after it. The subsequent slow recovery of money prices has generally not been sufficient to offset inflation and hence real prices have fallen slowly since 1975. In general current levels of real prices are little different to those prior to the effects of the boom.

**Asia-Far East region**

In many respects, the Asia-Far East region is so diverse that it is difficult to summarize trends. The grouping of countries used here for this region does recognize
some of the obvious differences by treating Japan as one unit, Australia-New Zealand as another, the entrepôt countries and China as a third, and the log-supplying countries and the loose category called 'other' countries as the last two groups.

The entrepôt countries include Hong Kong, Singapore, the Republic of Korea, and Taiwan. The latter is the reason for also including mainland China in this group, because official FAO statistics no longer separate them. This means that domestic production figures for this group include main­land China and are therefore somewhat misleading for our purposes. Nevertheless, trade data should reflect the position accurately because mainland China has not engaged in much trade in wood products. The log-supplying countries include Indonesia, Malaysia, the Philippines, Papua New Guinea and the Solomon Islands. The 'other' countries group is obviously diverse and sometimes unsatisfactory, so that in some cases further details will be given on trade.

Sawnwood and panel products

Although consumption of sawnwood and panel products increased substantially over the period from 1963 to 1973, trade did not expand at the same rate. Table 3 summarizes data for production, imports and exports of these products in 1973 and Appendix C gives further details.

The dominance of domestic supplies in markets for each commodity group can be clearly seen in Table 3. Appendix C shows the dominance of Japanese production and imports relative to all others within the region with its 50-60 per cent share of the regional total. The figure for domestic production for the entrepôts is obviously con­founded by the inclusion of domestic production of China. Nevertheless the importance of this group in the export of plywood and veneer, and of particle board, is apparent from the statistics. The role of the log-supplying countries in exporting plywood and veneer is also worth noting. In 1973 they supplied 52 per cent of the Asia-Far East total.

A small amount of fibreboard, about one million tons per year, is also produced in the region but is largely used for domestic consumption and little is traded internationally.
Table 3

Production and foreign trade in sawnwood and panel products, Asia - Far East region, 1973

<table>
<thead>
<tr>
<th></th>
<th>Production</th>
<th>Imports</th>
<th>Exports</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sawnwood a</td>
<td>87.3</td>
<td>7.4</td>
<td>5.4</td>
</tr>
<tr>
<td>(million m³)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plywood</td>
<td>14.5</td>
<td>1.4</td>
<td>5.7</td>
</tr>
<tr>
<td>(‘000 m³)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Particleboard</td>
<td>1.5</td>
<td>1.3</td>
<td>0.1</td>
</tr>
<tr>
<td>(‘000 m³)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a  Includes sleepers.


Data in Table 4 summarize the pattern of trade in non-coniferous sawnwood, plywood and veneer for the major exporting countries. As noted earlier, Japanese imports are relatively small owing to tariff and non-tariff barriers and to economies which Japanese sawmillers can enjoy. Ad valorem tariffs on imports of sawnwood into Japan are 10 per cent for dipterocarp species and range from 0 to 10 per cent for coniferous species (FAO 1976a). Japanese sawmillers enjoy high recovery rates in milling timber because of their ability to sell small size material in the domestic market. Furthermore, imports of coniferous sawnwood from the United States and Canada have been able to compete in price successfully with dipterocarp sawnwood from the log-supplying countries. Much of this coniferous wood is used in house construction, principally in 100 mm by 100 mm 'baby squares'.

In general there are no tariffs on sawnwood imported into North America or Europe. Peninsular Malaysia, Sarawak and Singapore have been especially successful in developing European markets for sawnwood, as Table 4 shows, partly as a result of traditional links. Nearly half of Peninsular Malaysia exports went to Western Europe in 1973; however the country has also made strenuous efforts to diversify her markets, with some success. The Philippines, which has
Table 4
Exports of non-coniferous sawnwood, plywood and veneer, Asia - Far East region, 1973
'000 m$^3$

<table>
<thead>
<tr>
<th>Country of origin</th>
<th>North America</th>
<th>West Europe</th>
<th>Japan</th>
<th>Others</th>
<th>Total</th>
<th>% of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>N-c sawnwood</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P. Malaysia</td>
<td>130</td>
<td>980</td>
<td>130</td>
<td>830</td>
<td>2070</td>
<td>43</td>
</tr>
<tr>
<td>Singapore</td>
<td>40</td>
<td>630</td>
<td>50</td>
<td>390</td>
<td>1110</td>
<td>23</td>
</tr>
<tr>
<td>Philippines</td>
<td>120</td>
<td>90</td>
<td>110</td>
<td>110</td>
<td>430</td>
<td>9</td>
</tr>
<tr>
<td>Indonesia</td>
<td>-</td>
<td>120</td>
<td>140</td>
<td>20</td>
<td>280</td>
<td>6</td>
</tr>
<tr>
<td>Sarawak</td>
<td>20</td>
<td>180</td>
<td>-</td>
<td>50</td>
<td>250</td>
<td>5</td>
</tr>
<tr>
<td>Others</td>
<td>70</td>
<td>190</td>
<td>240</td>
<td>170</td>
<td>670</td>
<td>14</td>
</tr>
<tr>
<td>Total</td>
<td>380</td>
<td>2190</td>
<td>670</td>
<td>1570</td>
<td>4810</td>
<td>100</td>
</tr>
<tr>
<td>%</td>
<td>8</td>
<td>45</td>
<td>14</td>
<td>33</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

Plywood and veneer |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Korea rep a</td>
<td>910</td>
<td>50</td>
<td>350</td>
<td>10</td>
<td>1320</td>
<td>32</td>
</tr>
<tr>
<td>China a</td>
<td>660</td>
<td>70</td>
<td>350</td>
<td>70</td>
<td>1150</td>
<td>28</td>
</tr>
<tr>
<td>Philippines</td>
<td>440</td>
<td>50</td>
<td>20</td>
<td>-</td>
<td>510</td>
<td>13</td>
</tr>
<tr>
<td>Singapore</td>
<td>40</td>
<td>300</td>
<td>30</td>
<td>100</td>
<td>470</td>
<td>12</td>
</tr>
<tr>
<td>P. Malaysia</td>
<td>70</td>
<td>180</td>
<td>10</td>
<td>140</td>
<td>400</td>
<td>10</td>
</tr>
<tr>
<td>Others</td>
<td>130</td>
<td>50</td>
<td>10</td>
<td>40</td>
<td>230</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>2250</td>
<td>700</td>
<td>770</td>
<td>360</td>
<td>4080</td>
<td>100</td>
</tr>
<tr>
<td>%</td>
<td>55</td>
<td>17</td>
<td>19</td>
<td>9</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

a Includes Taiwan.

Source: Based on FAO:1976A Tables 31 and 32.
his historic links with the United States, has not been especially successful in penetrating that market; probably because of intensive price competition and the difficulty of marketing relatively unknown species in small and variable volumes.

Burma and Thailand are somewhat special cases, whose principal export is teak.

There are also some exports of coniferous sawnwood produced in the region, notably about 240,000 m$^3$ a year from New Zealand mainly to Australia and Japan, and about 110,000 m$^3$ a year from the Republic of Korea to Japan.

The international plywood and veneer markets display some of the most vigorous competition in the wood products trade, chiefly because of the importance of the industry in entrepôt countries such as Singapore, Taiwan and the Republic of Korea. The tariffs imposed on imports of plywood, veneer, and particle board by North America, Europe (E.E.C.), and Japan ranged in 1976 between 20 and 6 per cent (FAO 1976a). Plywood generally attracted the highest tariffs in the three zones (13 to 20 per cent ad valorem) and veneer the lowest (7-15 per cent). Despite these tariffs, a number of the log-supplying and entrepôt countries have developed substantial markets in North America, and to a lesser extent in Japan and Europe (Table 4).

**Sawlogs and veneer logs**

In general, North America, Europe and Japan do not impose tariffs on the import of logs. One difficulty in reviewing trade in sawlogs, plywood logs and veneer logs is that the FAO (1976a) statistics, along with most other official statistics, do not separate sawlogs from the remainder. One estimate, based on rather scanty data, placed the proportion of log volume exported from Indonesia to Japan which was intended for plywood or veneer manufacture at 55 per cent of the total (Ferguson and Parkes 1976a).

Production and exports of logs from the log-supplying countries of the region increased rapidly between 1963 and 1973, mainly owing to an increase in Japanese demand. Statistics for countries in the group and for other major exporters of logs are summarized in Table 5.

As Table 5 shows, production and export levels in both Indonesia and Sabah increased enormously during this
period. Production also increased rapidly in Peninsular Malaysia. However, exports of logs did not increase because of policies designed to increase local processing and industry which restricted the export of logs. These policies were more successful than might have been the case in other countries because Peninsular Malaysia's traditional markets are in Europe and the country aimed to diversify into new markets rather than to build a dependence solely on the Japanese market. Both the Philippines and Sarawak also increased production and exports somewhat. However, their scope for expansion was smaller because the limits of their forest resources were becoming apparent. Measures were also introduced in the Philippines progressively to reduce exports of logs and to increase local processing. Papua New Guinea and the Solomon Islands increased production and exports substantially during this period.

Table 5

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Indonesia</td>
<td>4.1</td>
<td>26.3</td>
<td>0.1</td>
<td>18.5</td>
<td>70</td>
</tr>
<tr>
<td>Philippines</td>
<td>9.4</td>
<td>11.4</td>
<td>6.5</td>
<td>7.8</td>
<td>68</td>
</tr>
<tr>
<td>Sabah</td>
<td>3.4</td>
<td>11.0</td>
<td>3.0</td>
<td>10.1</td>
<td>92</td>
</tr>
<tr>
<td>Sarawak</td>
<td>1.7</td>
<td>3.3</td>
<td>0.9</td>
<td>1.9</td>
<td>58</td>
</tr>
<tr>
<td>P.Malaysia</td>
<td>3.1</td>
<td>9.3</td>
<td>–</td>
<td>0.8</td>
<td>9</td>
</tr>
<tr>
<td>Papua New Guinea</td>
<td>0.2</td>
<td>0.8</td>
<td>–</td>
<td>0.4</td>
<td>50</td>
</tr>
<tr>
<td>Solomon Is.</td>
<td>–</td>
<td>0.3</td>
<td>–</td>
<td>0.3</td>
<td>100</td>
</tr>
<tr>
<td>Burma</td>
<td>1.5</td>
<td>1.7</td>
<td>0.1</td>
<td>0.2</td>
<td>12</td>
</tr>
<tr>
<td>Thailand</td>
<td>2.1</td>
<td>3.5</td>
<td>–</td>
<td>0.1</td>
<td>3</td>
</tr>
<tr>
<td>New Zealand</td>
<td>3.8</td>
<td>6.6</td>
<td>0.3</td>
<td>1.9</td>
<td>29</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>29.3</strong></td>
<td><strong>74.2</strong></td>
<td><strong>10.9</strong></td>
<td><strong>42.0</strong></td>
<td><strong>57</strong></td>
</tr>
</tbody>
</table>

The increase in exports from New Zealand largely reflected sales to Japan of Monterey pine logs derived from salvage operations. These operations have been completed, so that exports have declined.

Nearly two-thirds of the exports shown in Table 5 were destined for Japan, although a significant quantity went to the entrepôt countries, principally for plywood and veneer manufacture and re-export. Details of the destination of exports in 1973 are given in Appendix D.

The extraordinary boom in exports from Indonesia and Sabah triggered a scramble to secure and develop the remaining major forest resources in those countries. However, the recession caught some new projects at a critical stage of development. Drastic reductions were made in purchases by Japan and money prices fell by as much as 50 per cent over a ten-month period in 1974 (Ferguson and Parkes 1976a). Plans to accelerate the amount of local processing in these countries have had to be tempered accordingly.

In the aftermath of the recession, the South-East Asian Lumber Producers' Association (SEALPA) was formed embracing private and government interests in the industry in the log-supplying countries. This sets quotas and floor prices for its members periodically following negotiations with Japanese representatives. Although SEALPA has probably not had any appreciable effect on the aggregate volume of exports or on prices, it has been successful in allocating the limited volume of exports to Japan among its members, thereby averting cut-throat competition.

Pulp and paper products

Although imports of pulp and paper products are not at present a significant import cost for most countries in the region, consumption has been increasing rapidly and in some countries there is concern that they could become a significant component in the balance of payments. Since 1960, per caput consumption increased at an average rate of about 4.5 per cent per annum for developing countries in the region, while consumption in Japan increased at a rate of 10 per cent. There is also a considerable gap between the average levels of consumption; those in the developing countries ranged from 0.4 to 16 kg per caput while those in the developed countries were 130 to 150 kg per caput.
Table 6 summarizes the levels of production, imports and exports for the major product groups in 1973 and Appendix E gives details by groups of countries.

Table 6

Production, foreign trade in paper products and wood-pulp, 1973

<table>
<thead>
<tr>
<th>Product</th>
<th>Production</th>
<th>Imports</th>
<th>Exports</th>
<th>Net trade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newsprint</td>
<td>3.6</td>
<td>0.9</td>
<td>0.2</td>
<td>-0.7</td>
</tr>
<tr>
<td>Printing and writing paper</td>
<td>5.3</td>
<td>0.6</td>
<td>0.2</td>
<td>-0.4</td>
</tr>
<tr>
<td>Other paper and paperboard</td>
<td>16.3</td>
<td>1.5</td>
<td>0.6</td>
<td>-0.9</td>
</tr>
<tr>
<td>Wood-pulp</td>
<td>14.1</td>
<td>2.5</td>
<td>0.2</td>
<td>-2.3</td>
</tr>
</tbody>
</table>


These data show that Japan accounts for about 65 per cent of the total production of paper products in the region. Nevertheless, as noted earlier, the quantities Japan imports and exports are small in relation to its production. Australia-New Zealand is a net importer of paper products and there is also a substantial volume of trade between the two countries. All the other groups of countries are net importers, some being heavily dependent on imports.

The origins of imports of paper products and of wood-pulp are summarized in Appendix F for the major importing countries in the region. Japanese imports of wood-pulp are notably higher in relation to production but the general pattern is similar to that for paper products.

A high proportion of these regional imports come from outside the region, principally from North America, which supplied 30 per cent of paper and paperboard in 1973 and 72 per cent of wood-pulp. Apart from the trans-Tasman trade in wood-pulp, from New Zealand to Australia, New Zealand has also commenced the manufacture and export of wood-pulp through a jointly-owned New Zealand-Japanese company.
 Imports for developing countries would be higher still, if it were not for the use of non-wood fibres for much of the pulp furnish. In these countries an estimated 34 per cent pulp is made from non-wood fibres, 20 per cent from waste paper, 24 per cent from wood, and the remaining 22 per cent is imported.

**Pulpwood and wood-chips**

Trade in pulpwood and woodchips in the region was completely dominated by the rapid increase in Japanese imports over the decade before 1973. Yet, as Table 7 shows, the majority of these imports came from countries outside the region.

**Table 7**

*Imports of pulpwood and woodchips by Japan*  
'000 m\(^3\)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>–</td>
<td>4090</td>
<td>7501</td>
<td>8750</td>
</tr>
<tr>
<td>Australia</td>
<td>–</td>
<td>–</td>
<td>2048</td>
<td>2830</td>
</tr>
<tr>
<td>USSR</td>
<td>193</td>
<td>256</td>
<td>418</td>
<td>890</td>
</tr>
<tr>
<td>Malaysia</td>
<td>–</td>
<td>572</td>
<td>664</td>
<td>435</td>
</tr>
<tr>
<td>New Zealand</td>
<td>–</td>
<td>158</td>
<td>301</td>
<td>421</td>
</tr>
<tr>
<td>Indonesia</td>
<td>–</td>
<td>25</td>
<td>194</td>
<td>59</td>
</tr>
<tr>
<td>Other</td>
<td>–</td>
<td>183</td>
<td>97</td>
<td>552</td>
</tr>
<tr>
<td>Total</td>
<td>193</td>
<td>5284</td>
<td>11223</td>
<td>13937</td>
</tr>
<tr>
<td>Per cent USA</td>
<td>–</td>
<td>77</td>
<td>69</td>
<td>63</td>
</tr>
</tbody>
</table>


The data in Table 7 do not agree with those cited earlier, being taken from a different source, but they do indicate trends since 1973. There are, of course, important differences in the species and resultant pulp and paper properties between the different sources of these imports.
Imports from the United States, the USSR, and from New Zealand are mainly of coniferous species, while those from Malaysia and Indonesia consist mainly of mangrove, rubber and mixed rainforest species. Imports from Australia, on the other hand, are eucalypt species. The coniferous species present the least production problems, since they are the traditional furnish and are suitable for a wide range of products. Eucalypts exported are suitable only for kraft pulp, soda pulp and semi-chemical pulp which make up about half the Japanese consumption. Nevertheless for certain products, the use of eucalypt pulps has advantages. The Japanese import record indicates that mangroves, rubber and mixed rainforest species are less favoured, their use having diminished in recent years. However, the 'other' country category includes a joint Japanese-Papua New Guinea project based entirely in mixed rainforest species.

**Future prospects**

The situation in 1973 was deliberately used as a benchmark in earlier sections because it represented a peak in trade in the Asia-Far East region. Markets and trade in wood products are unlikely, on present estimates, to return to those levels until the early 1980s. In forestry and the forest industries, however, it is necessary to look at prospects much further in the distance than 1985 because of the long period of production required for many wood products, especially for sawlogs and veneer logs.

**FAO forecasts**

FAO has conducted a number of regional and world surveys of this kind over the past 20 years. The results of the most recent of these, in 1976a, are summarized in Table 8 and given in more detail in Appendix G.

The values shown for production in these estimates were based on the median of the range of estimates of sustainable supply from existing forest resources and planned future resources. Those for consumption were based on individual forecasts for the major groups of wood products, converted to roundwood equivalent volume. Each of the individual forecasts was based on relationships estimated between per caput consumption and the per caput level of gross domestic
Table 8

Forecasts of world wood products production and consumption levels in 1991

million m$^3$, roundwood equivalent

<table>
<thead>
<tr>
<th>Region</th>
<th>Production</th>
<th>Consumption</th>
<th>Balance</th>
<th>Fuelwood consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developed</td>
<td>1300</td>
<td>1455</td>
<td>- 155</td>
<td>-</td>
</tr>
<tr>
<td>Developing</td>
<td>1800</td>
<td>1845</td>
<td>- 45</td>
<td>1475</td>
</tr>
<tr>
<td>Asia–Far East</td>
<td>(500)</td>
<td>(750)</td>
<td>(-250)</td>
<td>(640)</td>
</tr>
<tr>
<td>Centrally planned</td>
<td>1015</td>
<td>940</td>
<td>75</td>
<td>210</td>
</tr>
<tr>
<td>World total</td>
<td>4115</td>
<td>4240</td>
<td>- 125</td>
<td>1685</td>
</tr>
</tbody>
</table>


product (Buongiorno 1977). Forecasts of fuelwood consumption were based on 1971 per caput levels applied to forecasts of future levels of population.

The general conclusion from these data, even excluding fuelwood consumption from consideration, is that there will be a moderate deficit in production relative to consumption by 1991. The marked imbalance within some regions also suggests a considerable scope for international trade in wood products. However, these conclusions warrant much closer examination.

The forecasts of production are certainly the best available but they leave much to be desired, especially in relation to many developing countries. Inventories of the forest resource are frequently incomplete or inadequate in these countries. Even where tolerably comprehensive and accurate data are available, examination shows that calculations of sustainable supply are generally based on outmoded concepts of yield regulation which bear little relation to levels which would be economically efficient. There are, of course, some notable exceptions to this, such as the work carried out in Peninsular Malaysia. Nevertheless, even for a number of developed countries the sustainable supply figure
is questionable, since it is based on a single strategy for wood production without evaluation of the alternatives. This approach generally leads to a very conservative estimate of production possibilities and is especially dubious where the bulk of the resource is over-mature or virgin.

The forecasts of consumption in Table 8 are already out of date. For example, FAO (1978) forecasts of world consumption of paper and paperboard are now some 60 million tons or 20 per cent below the level forecast in an earlier survey which forms the basis of the data in FAO (1976a). These changes mainly relate to the developed countries and some of the largest changes relate to Japan. Successive forecasts of the consumption of paper and paperboard in Japan are summarized in Table 9, which shows a 44 per cent fall between the two estimates for 1990–91.

Table 9

<table>
<thead>
<tr>
<th>FAO forecasts of paper and paperboard consumption in Japan</th>
<th>million tons</th>
</tr>
</thead>
<tbody>
<tr>
<td>FAO 1976a</td>
<td>FAO 1978</td>
</tr>
<tr>
<td>1970</td>
<td>12.6 (actual)</td>
</tr>
<tr>
<td>1981</td>
<td>26.0</td>
</tr>
<tr>
<td>1991</td>
<td>54.0</td>
</tr>
</tbody>
</table>


One reason for these changes is that expectations of future rates of economic growth in the developed regions have been revised substantially following the oil crisis and the recent recession. Forecasts for Japan were reduced more than for other developed regions. Nevertheless, earlier FAO forecasts have also been notably higher than those made by the countries concerned, especially in the case of Japan (Ferguson and Parkes 1974). The most recent forecasts seem more satisfactory from a methodological viewpoint. Three quite different methods were used and gave similar estimates. One of these included recognition of price effect as well as those of income. Another was based on estimates by a panel.
of industry experts and largely reflect the forecasts made by the major developed countries themselves. In this latter context, recent forecasts by the countries concerned showed a decline of 6.1 per cent over earlier forecasts in the level of consumption of paper and paperboard forecast for the United States in the year 2000, while those for Europe declined by 17 per cent. Changes of at least a similar order are probably reflected in the most recent FAO forecasts.

While forecasts of the consumption of other products will probably also decline once the lower rates of economic growth are taken into account, the effects are unlikely to be so dramatic. Sawn wood consumption in the developed countries already had a relatively low income elasticity and is therefore unlikely to be greatly affected. The situation is not so clear for plywood and veneer products, however, and some substantial reductions seem likely.

The methodology used by the FAO in their estimates can also be criticized. The aggregation of both production and consumption data in terms of roundwood equivalent volume and its treatment as a homogeneous product is largely meaningless because of the vast differences in the price and properties of the various roundwood products and the differences in the length of the planning period involved. Unlike sawlogs, for example, pulpwood can be produced under quite short rotations, as short as ten years in many locations. There is therefore no need to attempt forecasts over very long planning horizons for pulpwood. On the other hand, pulpwood cannot in general be substituted for sawlogs and hence the aggregate has little meaning in relation to the planning of sawlog production. The inclusion of fuelwood consumption in Table 8 is even more questionable. Fuelwood, unlike most other wood products, is a consumer good. In order to compete with other sources of fuel or warmth, it must therefore be grown relatively close to the point of consumption. Moreover the wood properties most desirable for fuelwood differ markedly from most other wood products.

A qualitative assessment

Because of the problems inherent in the FAO forecasts, especially those relating to production, a qualitative assessment of future prospects seems appropriate.

Future growth to the year 2000 in the markets for sawlogs and sawnwood, as distinct from logs used for
manufacture of panel products, seems likely to be low in the major developed regions of the world which dominate trade prospects. It is true that supplies of logs and sawnwood from Africa, traditionally the largest supplier of the European market, seem to be dwindling and this may offer an opportunity for log-supplying countries in the Asia-Far East region to increase their exports. Nevertheless, competition is likely to remain vigorous in this market. Opportunities for increasing local processing of sawnwood are limited by the economics of sawmilling and by tariffs, as in Japan. Prospects for increased exports of sawlogs or of sawnwood to Japan therefore seem rather bleak. Growth in consumption there is likely to be low. The movement of exchange rates in the immediate future seems more likely to favour imports into Japan from North America rather than Southeast Asian countries, as the United States dollar continues to devalue relative to the yen.

The prospects for plywood and veneer logs, and for plywood and veneer, seem much better. The consumption of plywood and veneer in Europe is expected to rise from 6.9 million m$^3$ in 1971 to 11.4 - 14.8 million m$^3$ in 1990 (EEC/FAO 1976). Some expansion in the Japanese market may also be anticipated. In both Europe and Japan the existing industries are dominated by small-scale plants. Industry there is in need of structural adjustment and this is already progressing. This seems to offer possibilities for expansion of plywood and veneer manufacture and export from the log-supplying countries once sustained economic growth resumes, especially in view of the dwindling competition from Africa. Competition from the United States is also unlikely. Indeed, the United States itself may offer a growing though relatively small market. In order to compete in these markets, the manufacturing plants will have to be of a large scale and utilize modern technology. Hence the impact on employment may be limited. This improvement in prospects also assumes a relaxation of Japanese barriers to imports and there are indications that this may materialize.

Exports of plywood and veneer logs, however, are likely to continue to dominate the pattern of trade to both Europe and Japan, and will show a continuing growth. Real prices, on the other hand, will probably rise at a very slow rate and will continue to be subject to the violent fluctuations which characterize trade in raw materials. Although a buffer stock system to alleviate these fluctuations has been discussed, the difficulties are formidable.
The prospects for expanding export markets for paper products still seem remote for the developing countries of the region, and even for countries such as Australia and New Zealand. Heavy reliance on export markets seems too risky a proposition because of the capital costs involved in production plants, and the fluctuations in these markets. Most of the increase in Japanese consumption is therefore likely to continue to come from domestic production. Movements in exchange rates will, however, favour increases in imports of paper products from North America.

Prospects for a sustained expansion of export markets for paper products within the developing countries themselves are poor. Most of these countries aim to develop paper production internally, by utilizing wastepaper and non-wood fibre, or where forest resources are meagre or unsuitable, on the basis of imported pulp.

Export markets for pulp offer better prospects. Again, however, movements in exchange rates will tend to favour exports from North America and Latin America to Japan and Europe. Within the Asia-Far East region, countries like Australia and New Zealand seem best placed to expand into this market but competition will remain vigorous and real prices are not likely to increase rapidly.

Similar considerations apply to exports of pulpwood and wood-chips. Recent forecasts of future paper consumption in Japan (Table 9) suggest a rapidly increasing market for the raw materials, albeit much less than earlier forecasts. But other sources of supply seem likely to make major contributions to meeting these increases; notably the increased use of waste paper, and increased imports from the USSR, North America and especially from Latin America. In the immediate future, movements in exchange rates are also likely to favour imports from North and Latin America over those from the Asia-Far East region. Within the region, countries like Australia and New Zealand seem best placed to expand into this market. However, real prices are not likely to increase much in the face of competition from other sources of supply. If the log-supplying countries are to expand their role in this market, they may have to accept lower prices to overcome the apparent resistance to mixed rainforest species.
Appendix A

FAO groupings for Asia-Far East region

<table>
<thead>
<tr>
<th>Developing market economies:</th>
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<td>South Asia:</td>
<td>Bangladesh, Bhutan, India, Nepal, Pakistan, Sri Lanka</td>
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<tr>
<td>Continental Southeast Asia:</td>
<td>Burma, Lao People's Democratic Republic, Thailand</td>
</tr>
<tr>
<td>Insular Southeast Asia:</td>
<td>Brunei, Indonesia, Malaysia, Philippines, Singapore</td>
</tr>
<tr>
<td>East Asia:</td>
<td>Hong Kong, Republic of Korea, Rukkyu Islands</td>
</tr>
<tr>
<td>South Pacific:</td>
<td>Fiji, New Caledonia, New Hebrides, Papua New Guinea, Solomon Islands</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Developed market economies:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>East Asia:</td>
<td>Japan</td>
</tr>
<tr>
<td>Oceania:</td>
<td>Australia, New Zealand</td>
</tr>
</tbody>
</table>

| Centrally planned economies:                          | China, Democratic Kampuchea, Democratic People's Republic of Korea, Socialist Republic of Vietnam |

Where separate data were not available, data for Oceania developing economies are included with those for Insular Southeast Asia. Estimates for China include the province of Taiwan. Some data on Kampuchea and Vietnam are included with Continental Southeast Asia.
Appendix B

Production, imports and exports for major products: North America, Japan and Europe
1963 and 1973

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<td></td>
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</tr>
<tr>
<td>(million tons)</td>
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<td>4.9</td>
</tr>
<tr>
<td>Europe</td>
<td>4.4</td>
<td>1.6</td>
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<td>0</td>
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<td>4.0</td>
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<td>Total</td>
<td>386.2</td>
<td>23.0</td>
<td>6.9</td>
<td>478.5</td>
<td>66.2</td>
<td>19.6</td>
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</table>

a Includes sleepers.

Appendix C

Production, imports and exports of sawnwood and panel products Asia-Far East region, 1973

<table>
<thead>
<tr>
<th>Country or Group</th>
<th>Japan</th>
<th>Australia</th>
<th>Entrepôt-Neuf</th>
<th>China</th>
<th>Log-suppliers</th>
<th>Others</th>
<th>Total listed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sawnwood a. (million m³)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Production</td>
<td>44.7</td>
<td>5.5</td>
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<td>7.4</td>
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<td>.8</td>
<td>-</td>
<td>1.8</td>
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<td>Exports</td>
<td>-</td>
<td>.3</td>
<td>1.6</td>
<td>2.7</td>
<td>0.8</td>
<td>5.4</td>
<td></td>
</tr>
<tr>
<td>Plywood and veneer ('000 m³)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production</td>
<td>8897</td>
<td>210</td>
<td>3535</td>
<td>1333</td>
<td>528</td>
<td>14503</td>
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<td>800</td>
<td>78</td>
<td>193</td>
<td>24</td>
<td>357</td>
<td>1452</td>
<td></td>
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<tr>
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<td>158</td>
<td>11</td>
<td>2910</td>
<td>1031</td>
<td>1459</td>
<td>5569</td>
<td></td>
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<tr>
<td>Particleboard ('000 m³)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>645</td>
<td>462</td>
<td>145</td>
<td>3</td>
<td>248</td>
<td>1503</td>
<td></td>
</tr>
<tr>
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<td>12</td>
<td>1</td>
<td>1</td>
<td>63</td>
<td>126</td>
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</tr>
<tr>
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<td>-</td>
<td>9</td>
<td>85</td>
<td>-</td>
<td>23</td>
<td>117</td>
<td></td>
</tr>
</tbody>
</table>

a Sawnwood includes sleepers.

Source: Based on FAO 1976a.
### Appendix D

**Asia-Far East exports of non-coniferous sawlogs and veneer logs, 1973**

*1000 m³*

<table>
<thead>
<tr>
<th>Country of origin</th>
<th>Exports to</th>
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<tbody>
<tr>
<td></td>
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</tr>
<tr>
<td>Indonesia</td>
<td>550</td>
</tr>
<tr>
<td>Philippines</td>
<td>460</td>
</tr>
<tr>
<td>Sabah</td>
<td>120</td>
</tr>
<tr>
<td>Sarawak</td>
<td>-</td>
</tr>
<tr>
<td>P.Malaysia</td>
<td>-</td>
</tr>
<tr>
<td>Papua</td>
<td>-</td>
</tr>
<tr>
<td>New Guinea</td>
<td>-</td>
</tr>
<tr>
<td>Solomon Is.</td>
<td>-</td>
</tr>
<tr>
<td>Burma</td>
<td>30</td>
</tr>
<tr>
<td>Thailand</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total listed</strong></td>
<td><strong>1160</strong></td>
</tr>
</tbody>
</table>

Per cent

|       | 2.9 | 64.8 | 30.9 | 0.5 | 100 |

---

**Note:**

a Excludes exports of New Zealand.

b Exports to North America totalled 40,000 m³, all from the Philippines.

**Source:** FAO 1976a:Table 28.
Appendix E

Regional production, imports and exports of paper products and wood-pulp, 1973

'000 tons

<table>
<thead>
<tr>
<th>Product category</th>
<th>Japan</th>
<th>% Japan</th>
<th>Australia</th>
<th>Entrepot</th>
<th>Log suppliers</th>
<th>Others</th>
<th>Total</th>
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<td></td>
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<tr>
<td>Production</td>
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<td>417</td>
<td>845</td>
<td>70</td>
<td>164</td>
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<td>262</td>
<td>118</td>
<td>115</td>
<td>316</td>
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<td>14</td>
<td>215</td>
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<tr>
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<td>-139</td>
<td>-108</td>
<td>-91</td>
<td>-302</td>
<td>-687</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production</td>
<td>2820</td>
<td>53.4</td>
<td>169</td>
<td>1464</td>
<td>111</td>
<td>714</td>
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<td>-388</td>
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<td>Other paper and paperboard</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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Appendix F

Source of imports of paper, paperboard, and wood pulp, 1973

'000 tons

<table>
<thead>
<tr>
<th>Product and country</th>
<th>Origin</th>
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<td>-</td>
<td>-</td>
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<tr>
<td>Total</td>
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<td>10</td>
<td>320</td>
<td>180</td>
<td>2260</td>
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<tr>
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<td>Japan</td>
<td>910</td>
<td>100</td>
<td>-</td>
<td>40</td>
<td>-</td>
<td>50</td>
<td>1100</td>
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</tr>
<tr>
<td>Australia</td>
<td>140</td>
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<td>90</td>
<td>-</td>
<td>-</td>
<td>300</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Korea Rep.</td>
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<td>120</td>
<td>20</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>280</td>
<td></td>
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<tr>
<td>China</td>
<td>210</td>
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<td>10</td>
<td>-</td>
<td>10</td>
<td>80</td>
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<tr>
<td>Philippines</td>
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<td>10</td>
<td>-</td>
<td>-</td>
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<td>20</td>
<td>160</td>
<td>-</td>
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</table>

Source: Based on FAO 1976a:Tables 36, 39.
### Appendix G

**Forecasts of world wood products production and consumption levels in 1991**

<table>
<thead>
<tr>
<th>Region</th>
<th>Production</th>
<th>Consumption</th>
<th>Production minus consumption</th>
<th>Fuelwood consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developed</td>
<td>1300</td>
<td>1455</td>
<td>-155</td>
<td></td>
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<tr>
<td>N. America</td>
<td>790</td>
<td>720</td>
<td>70</td>
<td></td>
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<tr>
<td>W. Europe</td>
<td>305</td>
<td>440</td>
<td>-135</td>
<td></td>
</tr>
<tr>
<td>Oceania</td>
<td>70</td>
<td>35</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>135</td>
<td>260</td>
<td>-125</td>
<td></td>
</tr>
<tr>
<td>Developing</td>
<td>1800</td>
<td>1845</td>
<td>-45</td>
<td>1475</td>
</tr>
<tr>
<td>Africa</td>
<td>400</td>
<td>470</td>
<td>-70</td>
<td>435</td>
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<tr>
<td>Latin America</td>
<td>900</td>
<td>570</td>
<td>330</td>
<td>400</td>
</tr>
<tr>
<td>Asia-Far East</td>
<td>500</td>
<td>750</td>
<td>-250</td>
<td>640</td>
</tr>
<tr>
<td>Asia-Near East</td>
<td></td>
<td>55</td>
<td>-55</td>
<td></td>
</tr>
<tr>
<td>Centrally planned</td>
<td>1015</td>
<td>940</td>
<td>75</td>
<td>210</td>
</tr>
<tr>
<td>Asia</td>
<td>360</td>
<td>330</td>
<td>30</td>
<td>210</td>
</tr>
<tr>
<td>Europe</td>
<td>85</td>
<td>110</td>
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<td></td>
</tr>
<tr>
<td>USSR</td>
<td>570</td>
<td>500</td>
<td>70</td>
<td></td>
</tr>
<tr>
<td><strong>World</strong></td>
<td>4115</td>
<td>4240</td>
<td>-125</td>
<td>1685</td>
</tr>
</tbody>
</table>

*Source: FAO 1976a.*
References


Chapter 12

Potential for increased export of value-added timber products from Peninsular Malaysia

Muhammad Jabil

Introduction

This study deals with the timber trade of Peninsular Malaysia, which is succeeding in a long-term policy of upgrading its wood exports to processed form. This is in contrast to the trade of Eastern Malaysia, especially Sabah, where large-scale timber exports are almost all of logs.¹ But there, too, a beginning has been made in the switch to higher added-value products.²

Peninsular Malaysia supplies almost 40 per cent of world exports of tropical sawn timber (Ministry of Finance 1977: 44), although its commercial forest area forms only about 1 per cent of the world's tropical forest resources (ASEAN 1977). Its products, mainly plywood, also account for a significant share of world trade in tropical hardwoods.

This leading position is due to several factors: the government's policy of gradually restricting log exports over the past three decades to encourage local processing;³ the

¹ Timber (and its products) has recently become Malaysia's second most important export earner. In 1977, Malaysian logs and sawn timber exports amounted to roughly M$2437 million (US$1 billion), 16 per cent of the total (Ministry of Finance 1977). Of this sum, about 53 per cent was from logs, mainly from Sabah and to a lesser extent Sarawak, 30 per cent was sawn timber and 17 per cent was timber products, both very largely from Peninsular Malaysia. In addition, wooden articles made up 15 per cent of exports of manufactures.

² In 1977 Sabah adopted the policy of reducing log exports progressively by 10 per cent a year to encourage local processing (Ministry of Finance 1977: 42).

³ Peninsular Malaysia currently prohibits the export of 11 species of logs and bans shipments of logs over 400 mm in diameter from time to time.
abundant supplies of logs made available by the clear-felling of large tracts of forest for agri-conversion schemes; the increase in demand for tropical hardwoods since the end of the Korean war and the lack of effective competition from other timber-rich countries; and finally to the vigorous response of local entrepreneurs to opportunities to create timber processing industries.

Malaysia's favourable competitive position cannot prevail for ever, for to assume that the vast resource in South America and other tropical regions will remain unutilized would be sheer folly. However, it may be correct to assume that it will be some time yet before development in these other areas will be as effective as in Peninsular Malaysia today. The industry in Peninsular Malaysia should utilize this time to develop in scale and sophistication of manufacture, upgrading the value added element of its timber production by further processing and product diversification. This is, in fact, one of the recommendations of the UNDP/FAO Forestry and Forest Industries Development Project (UNDP/FAO 1975). It is also one of the strategy elements recommended by the New Zealand/ASEAN End-Use Survey of ASEAN Wood Products (ASEAN 1977), which is considered to be particularly relevant to Peninsular Malaysia, although directed to the ASEAN nations in general.

While it is easy to accept this rationale for the future of forest industries in Peninsular Malaysia, the problems of implementing this new policy should first be assessed. Probable net costs and benefits must be considered, as well as the state of preparedness of the industries and the problems of marketing. Only then should we embark upon any action program.

Benefits from further processing

The principal timber products exported from Peninsular Malaysia are rough-sawn and airdried timber and plywood. Except for plywood and some special grades of sawn timber and a small proportion of semi-finished goods, the remaining products require further processing by the importing country. This usually entails storage, re-manufacturing, waste disposal and pollution control. If the importing country is a developed country, as is usually the case, storage costs and wages are generally much higher than in Peninsular Malaysia, as are standards for waste disposal and pollution control, resulting
in a higher final product cost. Transportation and shipping costs could also be reduced by exporting higher value added products.

Manufacture and waste disposal could be carried out more economically in Peninsular Malaysia to the benefit of the country. Of especial importance would be the generation of additional employment opportunities. Being usually rural-based, any new forest industries would benefit the rural economy and thus alleviate one of the nation's pressing socio-economic problems. Export of more value-added timber products would also yield more foreign exchange earnings. All in all, benefits would accrue to both the importing and exporting countries from upstream processing, with the latter enjoying the more tangible benefits.

**Industrial sector capacity**

The question which now arises is whether the industrial sector in Peninsular Malaysia has the managerial and technical capacity to carry through such an expansion program.

The backbone of the sector in Peninsular Malaysia is the existing 551 sawmills and 35 veneer and plywood mills. The former produced 4.64 million cubic metres (m$^3$) of sawn timber in 1976 and the latter 92.76 m$^2$ of plywood. Export volumes for the same year were 2.78 m$^3$ and 80.05 m$^2$ respectively (Forestry Department 1978). There are also more than 700 wood-working factories (including mouldings, joinery and furniture). Most of these are small manufacturing units catering at present for the domestic market. The number of manufacturers oriented towards the export market is, however, increasing. Over the four-year period from 1974 to 1977, the value of mouldings exported increased from M$40.2 million in 1974 to M$77.0 million in 1977\(^1\) (Table 1). Another physical indicator is the export of graded kiln-dried sawn timber which can qualify as a value-added product. Volumes rose from 94,035 m$^3$ valued at M$30.9 million in 1974 to 170,478 m$^3$ valued at M$75.4 million in 1977. From

---

\(^1\)The exchange rate ranged between US$1.0 = M$2.3 and M$2.6 between 1974 and 1977.
Table 1
Export of kiln-dried timber and mouldings from Peninsular Malaysia 1974-77

<table>
<thead>
<tr>
<th>Year</th>
<th>Kiln-dried timber</th>
<th>Mouldings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Volume (m³)</td>
<td>Value (M$ million)</td>
</tr>
<tr>
<td>1974</td>
<td>94,035</td>
<td>30.9</td>
</tr>
<tr>
<td>1975</td>
<td>66,135</td>
<td>19.6</td>
</tr>
<tr>
<td>1976</td>
<td>134,752</td>
<td>55.9</td>
</tr>
<tr>
<td>1977</td>
<td>170,478</td>
<td>75.4</td>
</tr>
</tbody>
</table>

Source: The Malaysian Timber Industry Board

these data, it is clear that further processing of primary timber products for export has already begun in Peninsular Malaysia, albeit on a relatively small scale.

Direct employment was estimated to be approximately 64,000 workers in 1976 (Forestry Department 1978), comprised of workers in the logging, sawmilling, plywood, woodworking and the other minor wood-based industries but not including employees operating at the commercial level. In addition, there are workers employed by firms which are registered under specific categories with the Malaysian Timber Industry Board (MTIB), a quasi-government agency. These include 897 exporters, 242 packers, 438 timber graders and 18 jetty operators. Forward linkage industry manpower is employed in activities such as transportation, stevedoring, shipping, foundries, workshops, etc. In short, we have a hard-working human resource, well-versed in commerce and possessing reasonable technical skills, with the capacity to strike out into new ventures.

As for physical infrastructure, Peninsular Malaysia is well serviced with a network of more than 16,000 km of public all-weather roads spread over a land area of 13 million hectares. In addition, there are many private estate roads and forest access roads. Heavy investment in the construction of more and better roads and other infrastructure
facilities is being undertaken as part of the national development plan. Railways serve all but one of the states. For its external trading, two world-standard ports in Port Kelang and Port of Penang have been in operation for many years and two new ports, one at Masai, Johore Bahru, and the other at Kuantan, have recently become operational.

**Governmental support**

As one of the measures adopted to encourage the establishment of timber (and other) industries, the Malaysian government has provided an attractive package of tax incentives through the Investment Incentives Act 1968 (Dato' Jamil Mohd. 1976). This Act is administered through the Federal Industrial Development Authority (FIDA). Among the more important incentives offered are the following: (i) 'Pioneer Status' which offers from 2-8 years of tax relief based on the size of capital investment and other criteria; (ii) 'Labour Utilization Relief' which also offers from 2-8 years of tax relief based on the number of employees and other criteria; (iii) 'Investment Tax Credit' which allows a company to deduct from its taxable income an amount equal to at least 25 per cent of its fixed capital expenditure; and (iv) 'Locational Incentive' which offers from 5-10 years of tax relief based on the location of the project, the level of capital investment/employment and other criteria.

Government support is also given through the provision of technical services provided by its research and development agencies. The Forest Research Institute (FRI) of the Federal Forestry Department is in the course of implementing a 'Production-Oriented Research' program which includes research on the technology for manufacture of value-added products (Lew 1976). Other research agencies include the Standards and Industrial Research Institute, Malaysia (SIRIM) and to a lesser extent, the four relevant universities. Development efforts are also being expanded by both the Federal Forestry Department and the Malaysian Timber Industries Board (MTIB).

Recognizing the importance of upgrading technical skills and the need to train new workers, the government has set up a training centre for woodworking and sawmilling. Training can also be obtained to a lesser degree at the various vocational schools and technical institutes. The Forestry Department's FRI conducts ad hoc courses on specific subjects.
A proposal has also been tabled at the ASEAN–EEC dialogue to establish a timber industries centre, to be located in Peninsular Malaysia, not only to train workers but also to carry out research and development investigations.

**Tariff and quota problems**

Constraints on export prospects must, however, be recognized. A principal problem is the high tariff barriers erected by importing countries. Time and again, we in the developing and underdeveloped countries have heard from the developed countries noble expressions of intent to help uplift our economies. We then discover to our dismay that not only are such expressions empty but also that measures are often adopted which directly or indirectly tend to weaken the rate of growth of our economies.

High import duties are levied and restrictions imposed from time to time which could decimate our industries. Quotas are allocated which are usually reached before the full period is up and thereafter import duties are imposed. For example, the EEC keeps a secret quota for wood mouldings on a year-to-year basis for developing countries and once this is reached, an import duty of 5 per cent of the c.i.f. value is imposed. Under its Generalized System of Preferences (GSP), applied to plywood, the current rate of duty after completion of quota is 13 per cent. Quota allotment too is less than fair for tropical plywood when compared to coniferous plywood. For example, the latest EEC zero-duty quota for plywood of coniferous species was 642,000 m³ which is six times the quota of 105,000 m³ allotted to non-coniferous plywood. Since the bulk of coniferous plywood is exported from developed countries such as Canada and Finland, it can be construed that the EEC-GSP quota is biased in favour of the developed countries.

Australia is yet another importing country well protected by high tariff rates which make it an extremely difficult market to penetrate. For example, for plywood and mouldings the existing import duties are 44 per cent and 22.5 per cent respectively, while for sawn non-coniferous timber the equivalent rates are between 2.3 and 5.8 per cent. We welcome the recommendations of the Australian Industries Assistance Commission to reduce the rates for plywood and mouldings by 4 percentage points and 7.5 percentage points respectively. However, we view with grave concern the
proposal to raise the duty on all types of sawn timber, including kiln-dried timber, to a flat rate of 15 per cent. This would be three to six times the present rates, depending on the type of product.

We realize that tariff barriers cannot be torn down without upsetting the importing country's own manufacturers but at the same time we ask that due recognition be given to our plight should harsh restrictions and/or excessive import duties be imposed.

Conclusions

This chapter has presented an outline of the benefits to be gained from further processing to produce more sophisticated value-added timber products, the capacity of the Malaysian forest industry sector, government support given to wood-based industries and the problems created by tariff barriers in foreign markets. It is strongly felt that, on balance, Peninsular Malaysia must press ahead with an accelerated program to expand, upgrade and diversify its processing industries. It is hoped that importing countries will be reasonable in approaching the issue of tariff and non-tariff barriers so that the industries in developing countries, like Malaysia, do not suffer drastically. Given such conditions, plus the proven capacity of its industrial sector to respond with vigour, a substantial increase in the export of value-added timber products from Peninsular Malaysia can be expected before very long.

References


Chapter 13

The utilization of tropical hardwood from Indonesia

D. Sadikin

Forest resources

The forests of Indonesia consist mainly of tropical rain forests. They are dominated by the Dipterocarp species also known as the Meranti group (Lauan in the Philippines, Seraya in Malaysia). In some regions there are also conifers such as Pinus merkusii and Agathis. In Java, the main commercial species is teak.

According to the latest forest inventory of the Directorate General of Forestry, it is estimated the total forest area is about 121.5 million hectares covering 65 per cent of the total land area of Indonesia. Forest areas are shown in Table 1 by major use categories.

Table 1

Forest areas in Indonesia, 1976

<table>
<thead>
<tr>
<th>Classification</th>
<th>Area '000 ha</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production forests</td>
<td>47,242</td>
<td>38.9</td>
</tr>
<tr>
<td>Protection forests</td>
<td>24,537</td>
<td>20.2</td>
</tr>
<tr>
<td>Nature reserves</td>
<td>3,752</td>
<td>3.1</td>
</tr>
<tr>
<td>Forest reserves</td>
<td>45,965</td>
<td>37.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>121,496</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Source: Directorate General of Forestry 1976.

These figures include substantial areas of 'bare land' or damaged forest, where trees have been cut or burned by swidden farmers, which have reverted to low scrub or coarse grass.
The geographic distribution of these forest areas is shown in Table 2.

### Table 2

**Distribution of forest areas in Indonesia**

<table>
<thead>
<tr>
<th>Island</th>
<th>'000 ha</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kalimantan</td>
<td>41,981</td>
<td>34.6</td>
</tr>
<tr>
<td>Irian Jaya</td>
<td>31,000</td>
<td>25.5</td>
</tr>
<tr>
<td>Sumatra</td>
<td>26,005</td>
<td>21.4</td>
</tr>
<tr>
<td>Sulawesi</td>
<td>11,388</td>
<td>9.4</td>
</tr>
<tr>
<td>Maluku</td>
<td>5,800</td>
<td>4.8</td>
</tr>
<tr>
<td>Java/Madura</td>
<td>3,082</td>
<td>2.5</td>
</tr>
<tr>
<td>Bali/Nusatenggara</td>
<td>2,240</td>
<td>1.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>121,496</td>
<td>100.0</td>
</tr>
</tbody>
</table>

*Source: Directorate General of Forestry, 1976–*  

The forest inventory recently compiled for the forest concession scheme covers approximately 30 million hectares of forest land. Based on these surveys, a forest development plan is now being worked out.

It is planned to raise the area of 'designated' forest land from its 1976 level of 75.5 million hectares to 80 million. This 80 million ha 'designated' forests will be divided into three categories: (i) 45 m. production forest; (ii) 25 m protection forest in which cutting will be prohibited and (iii) 10 million nature and recreational reserves. Apart from this, 2 million hectares of forest land will be allocated to settled farming, including transmigration schemes and 28 million hectares will be left for shifting farming and eventual settlement. The remaining 11 million, much of it in Irian Jaya, has not yet been considered.
 Marketable timbers

Out of more than three thousand species of trees in Indonesia only one hundred and seven are being utilized. The main commercial species are teak (Tectona grandis) in Java, meranti (Shorea sp) in Kalimantan, Intsia sp and matoa in Irian Jaya. For exploitation and marketing of logs, the industry has classified the species into two categories, the 'floaters' and the 'sinkers'. Floaters, consisting of low density wood (specific gravity less than 1.0) are estimated to make up 60-70 per cent of timber volume. They include most members of the dipterocarp group, pulai (Alstonia spp) and other lightweight species. Such timber commands a premium since its logs can be made into rafts for river transport down to the buyer's logpond at a considerable cost advantage over other means of transport. The 'sinkers' are species of higher density, such as keruing (Dipterocarpus spp), kapur (Dryobalanops aromatica) and bangkirai. A small proportion of 'sinkers' are sometimes incorporated in 'floater' rafts, but the bulk have to be loaded on barges for river transport to the logpond, or hauled by truck. Because such special handling adds to costs, logging companies are more likely to consider upcountry sawmilling for 'sinkers' than 'floaters'.

Several studies have been made by the Directorate General of Forestry to identify the production potential of the forests. According to these surveys, the standing stock of the forest in Indonesia is estimated at 3.4 billion m$^3$ of which 2.7 b.m$^3$ are classified as commercially extractable at present prices (Table 3). The dipterocarp group includes the meranti group, kapur, keruing, and other dipterocarp species which might be floaters or sinksers. Among the non-dipterocarp species are ramin (Gonystylus sp), agathis (Agathis alba), pulai, and other species some of which are sinksers and others floaters.

Production of logs has risen rapidly over recent years in response to export demand. Up to 1967, output was fairly steady at around 1.9 m.m$^3$ annually, of which roughly 400-500,000 m$^3$ was teak. Between 1968 and 1977 (Table 4) output expanded by a factor of 7. Although teak production rose by about 50 per cent during these years, the great bulk of the expansion consisted of other timbers, especially of the meranti group.
## Table 3

### Estimated standing stock

<table>
<thead>
<tr>
<th>Island</th>
<th>Forest area '000 ha</th>
<th>Stock volume million m³</th>
<th>Non-commercial</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Dipterocarps</td>
<td>Non-dipterocarps</td>
<td></td>
</tr>
<tr>
<td>Sumatra</td>
<td>26,004.8</td>
<td>533.2</td>
<td>63.9</td>
<td>131.3</td>
</tr>
<tr>
<td>Java</td>
<td>3,081.6</td>
<td>-</td>
<td>1.6</td>
<td>0.7</td>
</tr>
<tr>
<td>Kalimantan</td>
<td>41,981.0</td>
<td>1,189.5</td>
<td>236.4</td>
<td>264.9</td>
</tr>
<tr>
<td>Sulawesi</td>
<td>11,388.5</td>
<td>36.1</td>
<td>40.4</td>
<td>23.2</td>
</tr>
<tr>
<td>Nusatenggara</td>
<td>2,240.3</td>
<td>4.6</td>
<td>1.0</td>
<td>0.5</td>
</tr>
<tr>
<td>Maluku</td>
<td>5,800.0</td>
<td>120.6</td>
<td>62.7</td>
<td>33.7</td>
</tr>
<tr>
<td>Irian Jaya</td>
<td>31,000.0</td>
<td>141.7</td>
<td>293.1</td>
<td>205.3</td>
</tr>
<tr>
<td>Indonesia</td>
<td>121,496.2</td>
<td>2,025.4</td>
<td>699.1</td>
<td>659.6</td>
</tr>
</tbody>
</table>

a Error in addition of subtotals to total in original.

Source: Directorate General of Forestry 1976-.
Output is expected to rise to about 36 m.m$^3$ by 1980 and to level off at around 50.4 m.m$^3$ annually by 1990-2000.

Table 4
Production of logs 1968-77 and forecast to 2000

<table>
<thead>
<tr>
<th>Recorded output</th>
<th>Estimated potential</th>
</tr>
</thead>
<tbody>
<tr>
<td>1968</td>
<td>1980</td>
</tr>
<tr>
<td>1969</td>
<td>1985</td>
</tr>
<tr>
<td>1970</td>
<td>1990</td>
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<tr>
<td>1971</td>
<td>1995</td>
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<tr>
<td>1972</td>
<td>2000</td>
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<td>1973</td>
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<td></td>
</tr>
<tr>
<td>1976</td>
<td></td>
</tr>
<tr>
<td>1977</td>
<td></td>
</tr>
</tbody>
</table>

Sources: a Director General of Forestry 1977-.  
b Directorate General of Forestry 1976-.

It is expected that in 1990 all production forests will be under proper management and that the annual cut will then reach the estimated maximum potential of 50.4 m.m$^3$. Actual production and export of a particular period will depend on several factors such as investment in the industry, the establishment of wood-based industries in the country, and the prices of the products - logs as well as processed timber.

Management of the forest and a system of utilization

The central organization of the forest administration is the Directorate General of Forestry, a subordinate body of the Ministry of Agriculture. This body has four main functions: planning, control and management of the national forest; co-ordination of forest utilization; reforestation and afforestation of forest land; management of reservations and protection forests. In carrying out its function, the Directorate General of Forestry operates through the regional
forestry agencies in the provinces which administratively are part of the office of the Governor of the province concerned. The regional forestry agencies thus have a dual responsibility in executing their functions.

To facilitate forest utilization the government has developed three groups of management systems, for cultivation, for exploitation, and for utilization and marketing, consisting of: (i) forestry agencies in the provinces; (ii) state enterprises; and (iii) private companies to which forest concessions are granted by the government.

The provincial forestry agencies can utilize forests under their jurisdiction, unless the right of utilization is granted either to a state enterprise or to a private company. This type of utilization is in practice confined to non-commercial areas or zones where concessions have not been granted.

Before 1967, practically all forest management and utilization was carried out by the government, either directly by the Forest Service or through state enterprises. State enterprises were established in 1960 to manage all production forests in Indonesia, but owing to a lack of capital and skill did not proceed far with development.

A new policy was therefore called for, and the government sent officials abroad to study systems adopted for granting concessions to private enterprise which could be adapted to Indonesian conditions. A new policy was outlined through the Basic Forestry Law (Law No. 5/1967), under which the granting of forest concessions to state enterprises was limited to the areas already designated, of which the majority are located in Java, East Kalimantan, South Kalimantan and Central Kalimantan. The management of the forests in Java is entrusted to Perum Perhutani, a state enterprise specializing in teak forest management. In Kalimantan there are three states enterprises, Inhutani I, II and III, which together manage an area of approximately 3 million hectares out of total Kalimantan forests of around 42 m.ha.

When the granting of forest concessions to private companies began in 1967, concessions could be granted to (i) national companies; (ii) foreign companies; and (iii) joint venture companies. These companies were required to fulfill terms and conditions set by the government. In 1975, policy
changed to restrict logging concessions to national companies. This policy was introduced to protect the national logging companies which had become capable of controlling the logging operations themselves. Foreign companies are still permitted to participate as logging contractors, but the control of the forest concession remains in the hands of the national company. Foreign companies are, however, still permitted to participate in the form of joint ventures in wood-based industries.

Indonesia has also tried a 'production sharing' system under which the government provides the concession through a state enterprise and the foreign investor furnishes the needed capital and know-how. The profits from such ventures were to be shared by both parties. This system was to be used in full-scale logging as well as wood-based industries. However, these projects have not been very successful. After several shipments of logs, many of the projects have been scaled down and others have been terminated or transferred completely to the Indonesian partner.

Investments

Two other investment laws were enacted in 1967-68 to expand opportunities for private enterprise in forest management and utilization. The laws are: (i) The Foreign Investment Law, Law No. 1/1967; and (ii) The Domestic Investment Law, Law No. 6/1968.

These laws were enacted at almost the same time as the Basic Forestry Law, and hence investments in logging and wood-based industries were made possible for both domestic and foreign investors. This system is lucrative to investors in that the incentives given include tax facilities and tariff relief, especially for those operating in the outer islands who are granted 'pioneering status'.

Interest in obtaining forest concessions under these laws was at first limited. At the beginning most of the investors took a 'wait and see' attitude; but after the first group was successful a stream of investments was proposed.

There are three possible systems of investment: (i) pure foreign investment; (ii) domestic investment; and (iii) joint-venture investment. In the framework of this
scheme, a careful study and consideration of those companies fulfilling the requirements can be made by the government and, based on findings, concessions can be granted. Since the new policy was initiated, production and export of logs have grown in an impressive way. Today, the government of Indonesia feels that the number of investments for logging purposes is sufficient and that any new investment must be linked with an industrial plan, in particular for up-country sawmilling.

Concessions are granted for a period of 20 years, with opportunities for renewals. They covered 38 million hectares between 1968 and 1976 (Table 5). Cumulative investment proposals amounted to the equivalent of US$1 billion. Three-quarters of the area of concessions was granted to national investors, whose proposed investments amounted to 69 per cent of the total. Foreign companies most interested in investments in logging were those of the Philippines, Malaysia, Korea, Japan and America.

Table 5
Forest concessions and investment in Indonesia, December 1976

<table>
<thead>
<tr>
<th>Type of investor</th>
<th>Number of units</th>
<th>Size of concessions '000 ha</th>
<th>Per cent</th>
<th>Investments US$ '000</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>National</td>
<td>323</td>
<td>28,388</td>
<td>74.5</td>
<td>733,203</td>
<td>68.6</td>
</tr>
<tr>
<td>Direct foreign</td>
<td>14</td>
<td>2,073</td>
<td>5.4</td>
<td>79,800</td>
<td>7.5</td>
</tr>
<tr>
<td>Joint venture</td>
<td>70</td>
<td>7,632</td>
<td>20.0</td>
<td>255,916</td>
<td>23.9</td>
</tr>
<tr>
<td>Total</td>
<td>407</td>
<td>38,093</td>
<td>100.0</td>
<td>1,068,919</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: Directorate General of Forestry 1977--.

These figures give an average area of nearly 100,000 hectares per concession and an average proposed investment of about US$2.6 million equivalent each. It should be pointed out, however, that the area of a concession usually greatly exceeds the area of productive forest within it, so that the figures given in Table 5 cannot be directly related to the country's total productive forest areas given in Table 1. Moreover, actual investments made may not be identical with
the investment approvals registered which are shown in Table 5.

Reafforestation provisions

It is recognized that measures must be taken to prevent depletion of the forest resources and to provide for sustained yield. Each prospective concessionaire must prepare for the government studies and several surveys so as to be able to formulate a proper plan proposal. If the proposal is regarded as suitable the company is then required to sign a forestry agreement which stipulates the legal obligations of the concessionaire. It must include a utilization plan, annual cutting plan, provision for industrial development, regeneration schemes, participation in local and regional development, and other measures to enable the government to conduct proper supervision. Failure to abide by the laws and regulations may give cause for the government to cancel concessions.

Modern logging is a capital intensive operation requiring also large funds for working capital. Some of the concessionaires lacked capital for efficient operations, so the government launched a policy to allow them to cooperate with other local companies under a work-contract system until they were able to commence their own operations. Such work-contracts, which may also be with foreign contractors, must have the approval of the Director General of Forestry. According to the latest report, out of the 407 concessionaires officially registered, 108 companies have signed work-contracts with other companies covering 8,000,000 hectares of forest for an average period of 5 years.

The role of forestry in the national economy

The forests of Indonesia, which cover about 65 per cent of the total land area, are considered one of the most important economic resources after oil and other minerals. In fulfilling its function, forestry, in response to the various requirements of the national economy, has to supply a steady supply of timber and other forest products. On the other hand, the forest has to serve the function of conservation of national land and water resources, promotion of health and recreation, and to maintain the environment so as to be beneficial to the people.
Supplies to local industry

Domestic demand for timber has increased greatly since 1970. Sawn timber consumption in 1970 was about 800,000 m³ while in 1975 it reached 2,400,000 m³, tripling in five years. Domestic plywood mills began producing in 1973 and domestic consumption has continued to rise since then. Total earnings from domestic sales of sawn timber in 1977 have been estimated at the equivalent of US$190m, and domestic sales of plywood around US$53m.

Table 6

<table>
<thead>
<tr>
<th>Year</th>
<th>Timber</th>
<th>Rubber</th>
<th>Coffee</th>
<th>Tin</th>
<th>Oil</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>1968</td>
<td>1.66 a</td>
<td>23.27</td>
<td>5.88</td>
<td>6.50</td>
<td>40.16</td>
<td>22.53</td>
</tr>
<tr>
<td>1969</td>
<td>3.04 a</td>
<td>25.84</td>
<td>6.01</td>
<td>6.20</td>
<td>45.45</td>
<td>13.46</td>
</tr>
<tr>
<td>1970</td>
<td>9.07 a</td>
<td>23.52</td>
<td>5.94</td>
<td>5.60</td>
<td>39.16</td>
<td>16.71</td>
</tr>
<tr>
<td>1971</td>
<td>12.37</td>
<td>16.27</td>
<td>4.05</td>
<td>4.67</td>
<td>43.27</td>
<td>19.37</td>
</tr>
<tr>
<td>1972</td>
<td>12.70</td>
<td>10.78</td>
<td>3.99</td>
<td>3.66</td>
<td>53.12</td>
<td>12.59</td>
</tr>
<tr>
<td>1973</td>
<td>17.80</td>
<td>12.10</td>
<td>2.37</td>
<td>2.63</td>
<td>52.34</td>
<td>12.76</td>
</tr>
<tr>
<td>1974</td>
<td>10.09</td>
<td>6.78</td>
<td>1.41</td>
<td>2.21</td>
<td>71.41</td>
<td>8.10</td>
</tr>
<tr>
<td>1975</td>
<td>7.04</td>
<td>5.04</td>
<td>1.41</td>
<td>1.98</td>
<td>74.77</td>
<td>9.76</td>
</tr>
<tr>
<td>1976</td>
<td>9.15</td>
<td>6.22</td>
<td>2.78</td>
<td>1.93</td>
<td>70.25</td>
<td>9.67</td>
</tr>
<tr>
<td>1977</td>
<td>8.76</td>
<td>5.42</td>
<td>5.52</td>
<td>2.31</td>
<td>67.25</td>
<td>10.74</td>
</tr>
</tbody>
</table>

a Up to April 1970 export values of commodities other than oil and tin were recorded at 'check price' (nominal) values. This particularly undervalued timber, which was assessed at half its f.o.b. values. Adjustment for this would raise timber's share of total exports to 5-6 per cent in 1969.

Source: Bank Indonesia 1975- various issues.

Export earnings

It is, however, in export markets that the contribution of forestry to national development has been most striking. Since Indonesia has abundant forest resources, timber should continue to be an important source of foreign exchange in the future. For the time being, earnings will be mainly from logs rather than from sawn or processed timber, but it is expected that an increasing proportion will gradually be contributed by higher value products.
It is striking that, by 1976, the value of wood product exports, at US$781 million, exceeded the recorded value of all exports in 1968. Since then there has of course been a large rise in total export value, due largely to the jump in oil earnings. Even so timber has increased its share of the enlarged total and is now Indonesia's second most important export earner after oil, having surpassed rubber since 1973 (Bank Indonesia 1975-).

During the world recession of 1975, forest products were seriously affected. Export earnings from timber dropped back that year to US$502 million, after having reached US$726 m in 1974. But by 1976 they had recovered to US$782 m and expanded to US$951 m in 1977. A level in excess of US$1 billion can be anticipated.

Employment and rural activity

The benefits created by these activities have included more employment for Indonesians; the opening up of communication networks in remote areas; the stimulation of rural development, and creation of many other opportunities for growth and development in Indonesia. For example, Table 7 shows the recorded labour force engaged in logging and woodbased industries since 1969.

<table>
<thead>
<tr>
<th>Year</th>
<th>Indonesian labour</th>
<th>Foreign labour</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1969</td>
<td>9,865</td>
<td>2,130</td>
<td>11,995</td>
</tr>
<tr>
<td>1970</td>
<td>21,300</td>
<td>5,200</td>
<td>26,500</td>
</tr>
<tr>
<td>1971</td>
<td>32,425</td>
<td>6,600</td>
<td>39,025</td>
</tr>
<tr>
<td>1972</td>
<td>41,300</td>
<td>6,535</td>
<td>47,835</td>
</tr>
<tr>
<td>1973</td>
<td>41,947</td>
<td>6,240</td>
<td>48,187</td>
</tr>
<tr>
<td>1974</td>
<td>42,915</td>
<td>5,206</td>
<td>48,121</td>
</tr>
<tr>
<td>1975</td>
<td>49,661</td>
<td>5,249</td>
<td>54,910</td>
</tr>
<tr>
<td>1976</td>
<td>49,984</td>
<td>5,079</td>
<td>55,063</td>
</tr>
<tr>
<td>1977</td>
<td>62,000</td>
<td>4,600</td>
<td>66,500</td>
</tr>
</tbody>
</table>

Source: Directorate General of Forestry 1977-.
Policies and development plans

Development planning for the forestry sector in Indonesia emphasizes the establishment of more wood-processing plants in order to promote a larger proportion of higher value added products in exports. In line with this policy the government recently banned the export of certain species such as ramin logs from East Kalimantan, ramin processing in this region being considered adequate. In addition, export of logs from other concessions will be progressively reduced in accordance with the raw material needs of domestic industries. Recently, the export of teak logs from Java and other fancy wood logs such as ebony has also been banned. The reduction of allowable log export for 1977-78 has already begun. Support and encouragement to the processing industries have been extended, including the cancellation of the 10 per cent export tax on wood-based products.

Present planning also emphasizes more strongly the safeguarding of long range production for sustained yield, including the afforestation of bare lands and enrichment planting in the concessions. At present, forest regeneration programs are carried out by the government as well as by private companies in the concession areas, and it is planned to implement them more intensively in future.

The government has recognized the problems of its role in controlling the utilization of Indonesia's natural resources, and the benefits that could be gained from them. Studies of the experience in neighbouring countries, data collected from international organizations such as FAO, its own experience and assessment of national needs are the basis of present policies. The intention is to promote more efficient utilization of timber resources by a mix of incentives and regulation. General principles are as follows:

(a) royalties levied on logs which are allocated for the wood-based industries will be reduced;

(b) the volume of log exports will probably be reduced;

(c) each concession-holder should intensify the reforestation and enrichment planting in their concessions;

(d) concession-holders are obliged to set up wood-based industries;
(e) concession-holders unable to set up a wood processing plant are obliged to sell 10 per cent of their forest products to domestic woodbased industries;

(f) companies exporting logs are encouraged also to export sawn-timber.

These regulations show that the government is serious in its efforts to make the best possible use of the country's natural resources and to promote woodbased industries. However, experience has shown that the implementation of such policies is not easy.

Holders of small concessions with a capacity of one shipment every two or three months are certainly not in a position to set up an industry on their own. Moreover, the location of the industry in relation to the concession is important because it involves the regular flow of raw materials. Therefore the government allows concessionaires to carry out joint investments and to choose a feasible location of their own.

To promote the woodbased industries, the government has reduced royalties and taxes, such as the abolition of additional royalties and export taxes on woodbased products, and has set check prices well below realized prices. (Check or nominal prices are the basis for remaining export taxes i.e. on logs.)

In spite of such actions the industrialists still have to overcome problems in production processes and marketing overseas.

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Part D
The role of international aid for forestry
Foreign aid can play an important role in assisting the orderly development of forestry sectors in many of the less developed countries within the Asian-Pacific region, and their governments have shown that they would welcome aid. However, foreign aid must adapt itself to the requirements of recipient countries. Several governments have introduced guidelines for the receipt of aid. For example, there are the seemingly strict provisos which Papua New Guinea imposes on donors, outlined by Brown Bai. These guidelines, which have not so far hindered aid flows, require that projects enjoy sufficiently high priority to find a place in the National Public Expenditure Plan, that they are at internationally competitive prices and so on. Many of the policy objectives with respect to aid acceptance by PNG are matched by criteria for aid-giving by New Zealand as outlined by Famliton and Rockell.

The time period of aid projects is clearly important. A relatively long-term commitment encourages donor-recipient involvement, the exchange of technological know-how, the training of counterpart staff and follow-up consultations at the conclusion of the active phase of a project.

Another element necessary for successful aid relationships is a commitment by the recipient government of financial resources to the aid project, demonstrating that priority is to be given to the project in national planning. Famliton and Rockell, for example, note that one criteria New Zealand looks for is a 'tangible recipient contribution to implementation of the project'. Bhodhipuks of Thailand, who puts the view of a counterpart aid worker, suggests that this 'ensures that the recipient country carries through its part of the contract effectively.'
The aid worker may play a vital but difficult role. The so-called 'expert' sent out by a donor country needs to be a person of many parts, skilled and knowledgeable in the professional field involved, diplomatic, adaptable, socially aware, innovative and patient, to mention but a few of the attributes required. The expert must at least match the level of training and quality of the counterpart officers. Professional skills alone are not enough. There is a need to translate expertise into the local scene, to take account of local customs and traditions, and to make the best use of materials and skills available in the country.

Many of the problems of an unsuitable expert could all too easily be transferred to counterparts from less developed countries trained abroad. They can learn inappropriate technology, lose touch with the social and political realities of their own country during a long absence, and fail to take part in the innovative processes involved in the development of a project. Thus in-country training was judged to be preferable whenever possible.

Innovations developed during aid projects were seen as a vital part of the total aid process. Bhodhipuks distinguished two forms of material aid. One is to supply sophisticated goods which a developing country could not hope to be able to produce locally. The other was to invent and build machinery adapted to local technology, using local materials and skills. For this, innovative people are required, and as Slee notes' it is no coincidence that many successful aid experts are very skilful technicians with a flair for improvisation and the initiation of new techniques'.

The actual means of transfer of technology was discussed as part of the role of aid for forestry. Two studies concentrated on the transfer of technology. Nikles discusses the improvement of the genetic foundations of forest plantations to improve productivity. He notes that there are similar developments taking place in a number of countries which could benefit from co-operation in planning, training, exchange of genetic material, conduct of appropriate research and in implementing effective tree breeding programs. The aid process could be utilized to stimulate such co-operation especially in tree breeding programs.
In a complementary survey Slee explores in a more general way the role which research can play in improving the exchange of technology from developed to developing countries. The development of research organizations provides opportunities for acquiring innovative skills. The development of new skills will also improve local capacity to evaluate and modify new technology for local use. Several ways are suggested for fostering research in the developing countries. Aguenza and Angeles suggest that foreign assistance can be especially valuable to forestry in carrying out resource appraisal programs or in training local professionals to handle complex data involved in large-scale planning.

These diverse studies contain an insight into many of the practical problems of providing aid. The importance of foreign aid in development in the forestry sector is not in dispute; all agree an important role exists. The way in which aid operates, the personnel involved and the sectors to which it flows differ markedly between countries. Some elements, especially reforestation, seem thus far to have been relatively neglected. Clearly aid transfers in forestry could improve as experience is gained.
Chapter 14

The role of international aid in forestry development: the Philippine example

G.A. Aguenza and L.D. Angeles

Introduction

The end of the Second World War stimulated the emergence of a number of new independent states in our region in countries formerly held as western colonies and territories. The change led to a political metamorphosis. With few exceptions, the withdrawal of established capital and uprooting of managerial and technical skills left serious economic voids in many of these new countries which impeded smooth political and economic transition.

The concentration on immediate political self determination at times diverted the energies of new states from undertaking balanced, or planned, socio-economic development. Rational planning and development of their national resources, including land, forests, mineral and aquatic resources, could have contributed significantly to the general stability of governments and a better standard of living for the people. However, in many instances the intense concentration on political affairs checked development programs for natural resources. In many instances, exploitable natural resources were employed as part of the game of power politics.

Thus, in many of these countries there has been massive despoliation of natural resources and of the delicate environment. There is no better example of this than the rapid and widespread destruction of the tropical forest during the last quarter century. The situation has changed somewhat in that the role of the forests in achieving economic and environmental goals has now been recognized by the people and their leaders. Somewhat belatedly, the forest has become an area of national concern. This concern includes the optimization of the forest as an economic asset and its perpetuation as an environmental heritage. To achieve these objectives the forest needs to be developed and
managed along accepted lines to optimize utilization and proper conservation.

Where it was recognized that the forest was a vital tool in economic prosperity, effective programs for exploitation, development and utilization of the resource was possible. In many instances international aid played a key role in strengthening these forestry development programs, particularly in the areas of forest resource appraisal, policy formulation and in advice on the establishment of institutions. Aid assisted in the devising of new programs and establishing priorities, in generating information and experience, in the handling of forest resources, and in the implementation of specific forestry projects.

International assistance, it now appears, is still needed in a number of key areas. Aid will be required in meeting the basic needs of people, in the transfer of science and technology, in upgrading forestry and environmental education, as well as in generally assisting developing countries with problems related to forestry development in accordance with their national priorities. Perhaps very importantly, international forestry aid may encourage joint regional planning and development which is a global necessity in the face of rising demand and diminishing supply of timber.

The Philippine experience

The Philippines has a long historical relationship with other countries and this may explain its receptivity to international aid. Its leaders have appreciated the value of acquiring from abroad such tools as are effective in national development. Thus, forestry in the Philippines owes some of its multifarious development to external assistance by international, multilateral or bilateral aid programs. Our own early appraisal of the total forestry situation enabled us to give priority to the various forestry development areas where we felt external assistance could be initiated or continued.

Forest resource inventory

The Philippines had formerly very sketchy information on the location, composition and magnitude of its forest resource. Exploitation of some resources went ahead
based on fairly crude notions of resource management. Government timber lands were parcelled out through licences and permits and forest utilization was poor.

Recognizing the importance of planning for development, a nation-wide inventory was initiated. In this work we had the assistance of US AID which:

(a) trained local counterpart personnel in the Philippines as well as in the USA;

(b) designed an inventory system using conventional aerial photography and ground verification;

(c) helped to collate, analyse and interpret a mass of data;

(d) helped to assess basic information about the forest, as to area reduction and timber drain, growth and volume increment;

(e) assisted in prescribing management alternatives for the forest; and

(f) drew up a program for continuing forest resource assessment.

From this modest but significant beginning we greatly expanded knowledge of our forest resource. This resource consists in all of 17 million hectares of forest land containing 1.6 billion m$^3$, (b.m$^3$). Most of this resource is concentrated in Mindanao (0.86 b.m$^3$), on the island of Luzon (0.45 b.m$^3$), in the Visayas (0.19 b.m$^3$) and in Palawan (0.14 b.m$^3$). About 90 per cent of the volume consists of dipterocarp species which have a growth rate of about 1.5 per cent a year. About 200,000 hectares of land was at this time being cleared of forest every year.

We have used this information to develop various models for the exploitation, utilization and development of our forest resource. Using these models we have been able to prescribe national and sectoral objectives, devise policies and legislation, lay down rules and regulations for the forest resource. The information collected between
1961 and 1967 has been verified and improved using the latest methods of resource inventory - LANDSAT and IMAGE 100. Today, UN-FAO is assisting us to embark on a second stage forestry inventory and we have just begun a preliminary inventory in sections of Mindanao prior to undertaking a national inventory program.

Forest manpower, development and education

Formal forestry in the Philippines began in 1863 with the establishment of a forestry service, the Inspeccion General de Montes, under the Spanish administration. The Americans further promoted forestry from 1900, when the Bureau of Forestry was organized and in 1910 started formal schooling in technical forestry.

A demand for more professional and skilled forestry workers, after independence, prompted the country to seek formal external assistance in training and research. The vast improvement in the quality of forestry teaching, research and extension in the Philippines owes a debt to the Cornell (later Syracuse) – UP Contract, funded by US AID. Under this arrangement buildings and facilities were rehabilitated and augmented, professionals were sent on scholarships to various colleges and universities in USA. At present, mainly owing to this program, 24 and 30 per cent of our teaching force possess doctoral and master's degrees respectively.

Complementing this manpower development was the assistance extended by the UN, the Colombo Plan, and various government and private foundations such as the Rockefeller, Ford and Eisenhower foundations. There have also been volunteer scientists from the US Peace Corps who worked with our young scientists. One notable benefit of this diverse training is that our professionals now belong to many schools of thought. This has been made possible by external grants from many countries, especially the USA, Australia, New Zealand, Japan, People's Republic of China, USSR, W. Germany, France, Sweden, Canada, Italy and Rumania. While our people were being trained abroad we also requested forestry consultants and experts to come on short-term contract to the Philippines to work with our own forestry people. In this we have relied upon UNDP, FAO and the related agencies of the UN. They, too, have enriched our knowledge in forestry and watershed management, and in research into forest and forest products utilization.
Manpower development and education in forestry has a substantial international aid component. Amongst examples of manpower training projects benefiting from foreign aid are:

(a) a centre for erosion control, which received initial technical assistance from the West German government;

(b) a centre for afforestation and reafforestation which is being established with Japanese government technical assistance, and which is to control 50,000 hectares of land,

(c) an institute for forestry research, higher training and demonstration, guided by the UNDP/FAO;

(d) an institute for forestry education, being built with World Bank loan assistance at Los Banos, which will have satellite branches in state institutions throughout the country; and

(e) the establishment of an advanced program for forestry with skilled manpower needs, which will also receive loan assistance from the World Bank.

Forest research

We are currently seeking international or bilateral assistance to train people in agro-forestry - a new form of development. We hope to develop new concepts in agro-forestry and to train a corps of technicians who will teach the new practices throughout the country for the ultimate benefit of our rural people. We are also continuing technical and industrial training programs for forestry workers to provide a reservoir of skilled and semi-skilled workers for our various woodworking plants and logging operations.

The prestige gained by our research institutions, particularly our forest products research and industry development institute, was made possible by international aid, particularly aid from UN. Our laboratories are helping wood manufacturers to venture into high quality, if not new, products. Our testing facilities have maintained, if not up-graded, the quality standards of our timber and timber products exports. The newly created forest research institute is currently carrying out basic and applied research.
We look to these institutions to guide us to better ways of using a precious commodity in wood and in prescribing appropriate alternatives in managing our natural forest as well as in creating high yielding forests or industrial tree plantations.

Forest and wood industry development

With a 2.7 per cent annual rate of increase in population, the Philippine government has the problem of providing for a population, now 47 million people, requiring land, housing and construction materials. It is also necessary to expand export markets in forest products to contribute to the national economy and the balance of payments. In carrying out these tasks, the government must also ensure, both for the present and future citizens, a healthy environment in which to live.

Estimates of long range requirements for wood and fibre, a little beyond year 2000, foresee domestic consumption of roundwood increasing from the present 2.25 million m$^3$ (m.m$^3$) to about 7 m.m$^3$. Domestic consumption of fibre is expected to increase from 1.50 m.m$^3$ to about 6.00 m.m$^3$. Timber and timber products exports will have to grow from their present levels of 2.50 m.m$^3$ and 1.50 m.m$^3$ respectively. This reassessment has three main implications for development. It suggests that:

(a) to conserve the nation's forest estate, our timber production from natural forests should be limited to about 8 m.m$^3$ a year;

(b) to meet expanding demand there will have to be big developments in plantation forestry, in industrial tree plantations, tree farming, government reafforestation and community forestry,

(c) we must continue to rationalize our wood industry, which at present represents an investment of P4600 million (US$620m.), employs 116,000 workers and earns about US$350 million annually in foreign exchange.

As well as using our own resources we have once more asked for international assistance in this task. We have requested UNDP/FAO assistance to establish model multi-use forestry districts, a World Bank loan has been approved
to continue smallholder tree farming and large-scale demonstration tree farming using pines, Australian aid will assist tree farming partly in an area short of fuelwood for the tobacco industry, and ASEAN-New Zealand assistance is currently being discussed for a pine plantation project.

**International aid: its potential application**

From Philippine experience in international aid for forestry development, the following items would figure largely in any agenda between parties considering or discussing technical or managerial aspects of external assistance programs: (i) forestry resource appraisal; (ii) forest and wood industry policy formulation and the devising of program priorities; (iii) forestry education and forest manpower training; (iv) forest resource management and renewal programs; and (v) transfer of appropriate technologies.

In our view priority in capital assistance should be given to: (i) the improvement and expansion of the local wood processing industry; (ii) the rehabilitation and extension of the forest resource to provide the basic needs of the people of fuel, food and clothing, and employment. All of these will provide a better standard of living and a better living environment.

There is at present a very favourable global climate for effecting forestry development, especially in developing countries. The World Bank now considers forestry development projects essential and is considering a five-fold increase in its funding commitments to forestry projects. We would urge those countries with sufficient means similarly to consider extending assistance to forestry development, either in the form of multilateral or bilateral assistance.
Chapter 15

Foreign assistance for developing forests in Papua New Guinea: past, present and future

Brown Bai

Introduction

Forests constitute an important resource base for Papua New Guinea's development. Apart from land, they are PNG's most widespread natural resource, the wise utilization of which not only presents a unique challenge, but also offers one key to the development of the country. Papua New Guinea welcomes foreign assistance and participation in the exploitation of forest resources, in technology, equipment and private investment on mutually beneficial terms consistent with our national goals. The first part of this chapter will survey the forestry sector and forestry policy. The second part will discuss aid to forestry in the context of Papua New Guinea's general aid policies.

The forestry sector

Eighty per cent of Papua New Guinea's land area is covered by forest. While some 60 per cent of the forests are considered inoperable at present prices for commercial development, the remaining 40 per cent (an estimated 15 million hectares) are commercially viable and accessible for development. Of this accessible forest area, some 10 million hectares have potential for immediate commercial logging, and are estimated to contain a saw log volume of 500 million m³ (m.m³). Only 10 per cent of the commercial area is at present held under permit, licence or local forests area, that is about 1 million hectares. It produces a saw log harvest of about 1 m.m³ a year. FAO has estimated that the log harvest could be increased by a factor of ten and maintained in perpetuity, without extensive reforestation. The two particular aspects of Papua New Guinea forest resources are: (i) their fairly even spread throughout the country, holding potential for benefiting many rural areas in Papua New Guinea; and (ii) location of the main resources in coastal areas, often close to reasonably good natural harbours.
The forestry industry is important to Papua New Guinea for many reasons. It is widely distributed and it supplies sufficient essential construction materials to local markets to make Papua New Guinea self-sufficient in these timber products. There is a surplus for export, which is being vigorously developed. The forests now have a total downstream processing industry of 130 factories, employing some 4,000 people, paying wages of the order of Kina 5 million a year (U$ 7m.) with an investment of some Kina 30 million (U$ 42m.) in land, buildings and plant. The industrial development of forest resources is a major component of the secondary industry base in Papua New Guinea. The value of import replacement is estimated at K17 million (US$ 23.8m.) and of export earnings at K15 million (U$ 21m.). Although this is only around 3 per cent of the total value of foreign trade, it is an area which appears to have much potential for growth. The extraction and processing industry is currently almost entirely owned and managed by expatriates.

**Forestry policy and organization**

Forestry policy is in principle a matter for central government under the PNG constitution. Central ministries are responsible for deciding which forest industry developments are to go ahead and what the foreign involvement is to be, whether in the form of private enterprise or government to government technical or financial assistance. Provincial governments have sole control of small-scale local operators. They collaborate with central government on the implementation of larger-scale projects, especially on the choice of sites and the control of company day-to-day activities and practices.

In accordance with the National 8-point plan calling for self-reliance, localization, equal distribution of social and economic opportunities and a decentralized economy, the National Forest Policy of 1974 emphasized increased local participation in forest enterprises, promotion of small-scale rural forest industries as well as large-scale profitable forest industries which would provide revenue, royalties and taxes. The Office of Forests, in the Department of Primary Industry, which is responsible for implementing this policy, is taking the following steps in particular:

(a) revision of existing forest laws for better involvement and sharing by timber owners, for optimizing economic, social and financial returns from the development of forest resources;
(b) development of training schemes and facilities to equip nationals to participate in all aspects of the forest industry, through ownership, employment and management;

(c) encouragement to the development of forest industry, both large and small, stepping up the proportion of local processing, with special attention to less developed areas;

(d) promotion of diversification of markets; and

(e) development of forest research and management activities to enhance productivity, subject to environmental safeguards.

How has this policy worked in practice? Since forests are a major national resource, the people have high expectations of them. But the development of the forest resources has not so far matched these expectations. Concession allocated areas cover less than 10 per cent of the country's productive forests. Moreover, commercial production is below targets on many of these concessions and many timber operations are currently unprofitable. There are two major reasons, the first of which may be temporary. First, export markets have been poor recently for our timber products. Prices have been low over the past few years, since increases anticipated in building and construction activity in the countries that import our sawn timber have not been realized. Second, the international 'fuel crisis' has caused an apparently permanent adverse change in the cost/price structure of our forest industry, production cost increases having moved much ahead of selling prices. Our forest development program and policies therefore need to be revised, and a far-reaching review into the industrial timber sector of the economy has already begun.

Review of forestry policy

In order to implement a wise forest utilization program, some very difficult choices must be made. For obvious practical reasons, all productive forest areas cannot be developed simultaneously. Also, if Papua New Guinea is to obtain a fair return for its forest products, the rate of forest resource exploitation must be in keeping with the size of the internal and external markets. The availability of internal and external venture capital is yet another constraint.
Forest development priorities must be clearly established in conjunction with provincial authorities.

With these factors in mind, forestry policy has recently been intensively scrutinized, in order to draw up a realistic policy for the development of forest industries within the framework of the national plan. The policy review surveyed: (i) the cost/pricing structure of the existing timber industry; (ii) permit conditions; (iii) the conditions sought by PNG in the negotiation for new concession areas to ensure these are not too onerous; (iv) the establishment of clear procedures for negotiating timber agreements; (v) the granting of priority to the most needy areas in development of new forest concessions, where consistent with the commercial realities of the market place; (vi) the encouragement of greater use of Papua New Guinea's products in the domestic housing and construction industry; (vii) the contribution that forest resource utilization makes to the standard of living in the rural areas; (viii) the means of financing and organizing reforestation projects; (ix) the appropriateness of present criteria for increasing the proportion of concession areas that is allocated to enterprises controlled by the citizens of Papua New Guinea; and (x) the increased emphasis to be given to joint agricultural-forestry areas in order to implement the government's program of decentralization.

The review is expected to be completed and a White Paper published by the end of 1978.

Principles and operation of foreign aid policy

Foreign aid is to play its part in the development of the Papua New Guinea forest sector, but this has to be seen in the context of Papua New Guinea's general aid policy. This is governed by four basic principles: (i) aid received should be for a group of projects which enjoys sufficiently high priority to find a place in the National Public Expenditure Plan (NPEP); (ii) such aid should be untied, with freedom to obtain expertise, equipment and stores from the best value source of the world; (iii) management of the project, including the disbursement of funds, should be in Papua New Guinea's control; and (iv) the largest possible component of the Kina costs of the project should be financed by donors, not off-shore costs alone. In addition, all donors are informed of Papua New Guinea's strong preference for aid in the form of untied grants to the budget, as is available
from Australia at present. The Department of Foreign Affairs and Trade is the primary point of contact for donors, although other ministries are also concerned. For example, the Ministry of Finance negotiates on the types and proportion of costs to be financed by donors and, in the case of loans, the interest rates and repayment terms applicable.

Project-tied aid is also accepted, subject to similar conditions on the choice of project from the NPEP priority list, open competitive purchasing and control of project management and flow of funds by PNG authorities. Even tied aid is considered, provided that the terms which it is offered are internationally competitive.

Technical assistance arrangements are also subject to constraints. Papua New Guinea may seek direct government to government exchange of expert teams, in which the experts are seconded government employees. PNG reserves the right to interview nominees for suitability and prefers to hire consultants itself from a list of internationally qualified consultants, using funds offered by donors to meet salary costs. As in capital aid, it may accept 'tied' consultancy offers, subject to safeguards as to the terms of the contract, suitability of the applicant etc.

These conditions have not prevented a flow of capital aid and technical assistance to Papua New Guinea from many sources, including aid to the forest sector.

Forest development activities aided

A wide variety of forest development activities has been funded by the UNDP, the Commonwealth Fund for Technical Assistance, Japan, New Zealand, UK and other donors. These activities range from forest research, education, teaching aids, harvesting, reforestation, and law-making to processing, grading, quality-control and export-marketing. A major activity being assisted by New Zealand is the establishment of a Timber Industries Training College at Lae, to train Papua New Guineans in timber technology.

NPEP and aid

Forestry aid projects are undertaken only if they qualify for priority within the National Public Expenditure Plan, as has been explained. In the Plan for 1978-81, four important feasibility studies have been funded: (i) a wood processing plant at Port Moresby, which would provide
import-replacement of costly construction materials; (ii) Madang pulpwood reforestation, to establish a forest plantation to ensure further pulpwood supplies to the Madang wood chip mills; (iii) Gogol salvage logging, to assist local business groups in salvage logging in association with the major woodchip operation at Gogol; and (iv) Sai River reforestation, to study and to hold trials into feasibility of planting 10,000 hectares of land in the Open Bay area to supply pulpwood to operators in the area.

If project evaluation shows these projects to be economically viable and socially sound, they may find places in future plans; and aid would be welcome to carry them out. Project designs for NPEP 1979-82 are at present under study. Approved projects will be offered to donors for aid-funding.

Future outlook for aid

In addition to these proposals, the national government may also give priority consideration to the following areas for aid funding:

(a) Promotion of small-scale forest industries. This basically refers to small sawmills which involve investment of no more than K500,000. It is in this area that many Papua New Guineans and Church missions are greatly involved in the industry. These small-scale industries are closer to the majority of our local people and they supply good building materials to local markets. This area must be encouraged, especially since Papua New Guineans can operate better on this scale.

(b) Training of local foresters. Training of Papua New Guineans to be involved in the forest industry must continue to receive high priority. Training could be undertaken overseas or through colleges, such as the Forest Industry Training College in Lae which is part-funded by the New Zealand Government.

(c) Local logging companies. The government seeks to promote Papua New Guinea involvement in logging operations. This concept is new and its usefulness to the local community still remains to be tested. However, the principle involved is very sound, and assuming that it proves feasible, it will be
vigorously encouraged by the central and provincial governments.

(d) Minor forest products. This refers to forest products such as gum, resins, etc. which are used for manufacturing pharmaceuticals and liquor. If potential markets can be identified, they will be encouraged.

(e) Reforestation and agro-forestry. Very little intensive reforestation has been carried out so far. Various trials are being conducted to determine their economic, social and environmental implications. If the need is established, they will be actively encouraged.

Conclusions

Development of the forests is an important aspect of the social and economic development of Papua New Guinea. Assistance to the forestry sector from foreign donors would expedite the development of the country. Papua New Guinea has an aid policy which is tuned to its social and economic philosophy; and aid and economic participation in conformity with such policy is welcome. The forestry sector in Papua New Guinea has a great potential and it is hoped that international co-operation will be forthcoming for its exploitation for the benefit of Papua New Guinea and of the rest of the world.
The role of international aid in Thai forestry

Prasert Bhodhipuks

Introduction

This chapter summarizes the experiences of a forester who for many years has been a counterpart in a developing country receiving aid in many forms from other countries. It records the impressions of these experiences from the point of view of the professional man working in his own country who, as the host to aid workers, has the responsibility of assisting the aid worker to achieve overall aid project objectives.

Thailand has been a recipient of foreign aid for a very long time. The Royal Forest Department of Thailand was established in 1896 by King Rama on the recommendation of an Englishman hired for consultancy, Mr H. Slade. The King then appointed Mr Slade as the first Director-General of the Department, and he remained in that position until 1901. He was succeeded in the position of Director-General of the Forestry Department by two other Englishmen, Mr W. Tottenham and Mr W. Lloyd, who between them occupied the position until 1923. During this period some Thai officials were sent abroad to obtain an education in forestry. In 1925, a Thai graduate in forestry was appointed to the position of Director-General of the Department, and for the first time the administration of the Department passed increasingly into the hands of local people. By 1932, it was almost completely localized.

It is obvious then that the Thai government has been aware of the gains to be obtained from foreign aid for a very long time, at least in the form of consultation and scholarship.

Forms of aid

At present we are recipients of aid from many countries and many organizations, either in the form of bilateral agreements or as part of more general regional and
international aid. Essentially, aid has two very important elements, a research component and an economic component, both of which in the long term can bring considerable benefit to the community at large.

The forms of forestry aid most frequently given by aid organizations, such as the FAO and the UNDP, are in silviculture, management and utilization. This aid can be divided into three essential components:

(a) man: experts, advisers, consultants,

(b) materials, vehicles, equipment, tools, etc.; and

(c) finance, fellowships and operating budgets, etc.

These categories are weighted according to the project's needs so as to accomplish its social and economic objectives.

Role of man in aid projects

Man plays the most important role in foreign aid undertakings, as an expert, as an adviser or as a consultant. Because of national sensitivities this form of aid which involves person to person contact must be arranged in such a way that no ill feeling occurs.

In most of the recipient countries where aid projects are being undertaken there are government officials who have been educated in developed countries such as the USA, the UK and Europe and who earned Master's and Doctor's degrees. Where these qualified people are asked to act as counterparts to foreign experts, it becomes harder for the donor countries to provide staff of comparable quality. Therefore before a project is set up a preliminary survey ought to be carried out to determine the level of expertise required for the successful completion of the task.

It is not sufficient for an expert to be able to deal with technology alone. He must also be able to conform to the cultural requirements needed for acting in an aid project. He must be able to get along with the counterpart and with the local people if he is to make a success of the project. All too frequently an adviser will think that
something should be done this way or that although in reality this is quite impracticable. Very frequently what he is suggesting is contrary to the normal social practices of the country. Speaking as a counterpart officer with more than 20 years of experience, I know how all too frequently the compromises required between the expert on the one hand and my superiors on the other have been too great because of a lack of appreciation of these local social problems. The educated counterpart living in his own country will understand many of the problems better, and may be able to suggest the compromise necessary for the project to succeed. Only such methods will lead to what we expect of all aid projects, that is, it will generate international good will.

Materials for aid

Most developing countries are poor and cannot afford to buy heavy equipment and the modern, highly efficient apparatus used for research work. They are not yet able to design or build such equipment and so this form of technology must be imported from abroad. Aid in supplying equipment and materials of this highly sophisticated type is particularly welcome and in many instances extremely effective.

The other way of providing material aid is to invent and build machinery or equipment adapted to local technology. Such equipment can be constructed from local materials and must be of a form which the local labour force can use efficiently and economically. It is here particularly that the aid expert needs to have ability to adapt and to be innovative.

Finance and aid

The financing of aid projects takes place in a number of ways: in providing salaries of experts, in providing fellowships and training of counterpart staff, providing equipment, and in assisting with local financing of many aspects of the operation. It is not possible to say which of these forms of finance is the more important as they will all interact in different ways depending on the type of project. What is important is that there should be a counterpart budget applied within the recipient country. Even though the recipient country may have difficulty in providing this counterpart budget, it is important that it does so as it focuses attention of the recipient government on the importance of the project.
Some case studies in aid projects

It is necessary in describing these projects to try to disguise the identity of the people involved. However, in writing this chapter I am attempting to draw some lessons from the case studies and so apologize if some of the comments are a little blunt.

Case 1. An expert in silviculture was sent by an aid organization to a Thai forestry project on which I was the counterpart. He was an older man, accompanied by his wife and a Thai maid. They were vegetarians and for this reason it was difficult, especially when travelling, to provide the right food for them. It was often difficult to find suitable accommodation, especially in a country where kitchen facilities are usually not provided in rented accommodation.

The aid expert was a man of great experience and had written more than two hundred scientific papers based on experience gained in his own country. But his experience was essentially domestic to his own country so that during his stay in Thailand he was more likely to learn from us than to teach. When it came to advising on practices in our country we were questioned in very minute detail, and had to pass on information already well known to us. His subsequent report was in fact derived from these answers, and the whole exercise seemed of little use. As a consequence we condemned the organization which had sent this expert to us.

Case 2. The second experience concerned a fairly large project for which an organization had sent a group of experts to Thailand. I was a counterpart in silviculture dealing with planting trials. One of two silviculturists whose job as an expert was on planting trials lacked training in statistical methods. The other silviculturalist was the project manager and of very nervous disposition. Both had served in Africa for a very long time and seemed to think that Thailand was the same as Africa. Much of the trouble in this project stemmed from the fact that the experts as a group were too strong willed and aggressive. Their manners were such that they seemed to us to act and speak rudely, using low class vulgar expressions. Thai people, and in fact many Asian people, have quite different cultures which are not always appreciated by foreigners. We could not bear this form of behaviour, so we notified the organization concerned
which later recalled the project manager, who was then sent to another Asian country. Complaints followed that he was not fitted for the job and he was in turn transferred to another country in central Africa. The other expert realized how to get along with the Thai people and worked with us until the project ended.

Under these conditions co-operation was not possible. The counterpart in this situation is caught in the middle. Mostly the recipients of aid in these situations are too polite to point out these failures in the project when the best solution would be to do as we did, advise the agency concerned and have the offending aid expert recalled.

Case 3. A developed country through an aid organization sent an expert to Thailand to help to establish a new forestry training school. The school was to train people at several levels and I was the first director of the school and a counterpart officer. The young aid expert was quite well qualified in technical matters but not well qualified in theoretical aspects of the job. We requested that a more highly qualified man be sent but this request was refused. When the project ended the young expert wished to extend his stay for the second term. What we needed at this stage was equipment but instead, because the aid donor country did not make such equipment, we were offered further expert assistance. The project would have gone forward better if aid had been differently arranged and we concluded that further assistance of this type would be useless to us.

Case 4. This project involved supplementary aid to a project on bamboo research. A group of experts was sent to Thailand and once again I was the counterpart on the project. The expert group came from another eastern country and got along very well with us in research. The problem here was that the group came into conflict with the European experts in the project, mostly owing to group nationalist feelings. As the counterpart officer I was placed in the rather awkward situation of communicating between the two groups and acting as an intermediary, and all of this negotiating was carried out in the English language which made it all very difficult.

Case 5. Somewhat more recently in my career I was a lecturer, co-ordinator and collaborator in an environmental course sponsored by an international agency. The problem
arose because of cultural barriers between participants in the group. I also found their point of view quite different to my own as co-ordinator of the project. This particular experience persuaded me that an expert should if possible live in a country for some time before he gives advice on that country.

Case 6. Quite recently I was transferred to the silviculture research sub-division and became counterpart officer on a bilateral aid project involving teak and pine. The donor country is giving aid in three stages. The first is an active stage in which it provides advice and consults with us. This active stage runs for ten years with experts working in co-operation with counterparts. An advisory stage will follow, to run for five years with advisers staying on annual permits. Finally, at Thailand's request, a follow-up consulting stage will run for a further five years. The consultant team will make a two months' inspection tour annually. In this project everyone will work very closely together and in this situation there should not be any failures. Full training within the duration of the project is possible and men now being trained are beginning to come back to work within the project while the aid program is still operating.

Conclusions

A project run by any country or organization, if it is to be successful, must evaluate all of the aspects of the problem in terms of personnel, of materials required and the overall financing of the project. The qualifications of the people going in to the project as experts or advisers should be equivalent to those of the in-country counterparts taking part in the project. Because of the cultural differences and backgrounds involved between expert adviser and counterpart, the aid worker must be patient and adaptable so as to be able to establish good human relationships when stationed in an overseas country.

The provision of opportunities for recipient countries to send staff abroad for training is a very important aspect of any aid project, especially where technical education is required to enable the country to carry on with the project after the aid period ceases. On his return the trainee can bring back new and modern technology which can be applied progressively in his own country. The recipient
country should also make provision for an improvement in its own education facilities so that local teaching and training can be developed for local needs.

The provision of equipment is an important part of the aid process. Of course, it is even better if the aid process is able to teach local people how to make and use equipment suited to their own needs. However, many developing countries cannot afford the level of technological development which will enable them to make many sophisticated items of equipment and these will for a long time have to be bought outside the country. Provision of aid in this form is very important; even quite small items of equipment may need to be supplied under aid programs, such as for example mini-computers.

Financial support for aid projects is very much more effective when it is set in conjunction with a counter-part budget. This focuses the attention of decision makers in the aid recipient country on the priorities of aid projects. Moreover, local funding of a project tends to ensure that the recipient country carries through its part of the contract effectively.
Chapter 17

Recent developments in New Zealand aid to forestry projects: the training and education element

A.K. Famliton and A.L. Rockell

Introduction: the foreign aid program

During the past decade, New Zealand's foreign aid program has placed increasing emphasis on bilateral aid, which has recently accounted for about 80 per cent of its annual allocation of $50 million for official development assistance. In principle, there is no regional emphasis in the distribution of aid funds throughout the world although it is logical that the effort has tended to concentrate on countries of the South Pacific. All foreign aid is administered by the New Zealand Ministry of Foreign Affairs through its External Aid Division. Each major government department provides the necessary liaison with the Ministry through departmental foreign aid co-ordinators.

In general, the New Zealand government seeks to comply with several criteria in responding to bilateral aid requests 'providing, always that the view of the developing country is paramount. Projects are favoured if they: (i) help developing countries to help themselves; (ii) make a direct impact on social and economic development; (iii) help to raise living standards of the poorer elements of the population; (iv) create substantial employment opportunities; (v) include a tangible contribution to implementation of the project; and (vi) include an identifiable New Zealand element.'

Forestry projects seem especially capable of meeting these criteria, provided that they are suitably designed

Aid to forestry projects

The foreign aid program tends to concentrate on agriculture, forestry and certain engineering projects such as geothermal and hydro-electricity generation, since these are areas in which the country has built most expertise. It
has sponsored or assisted projects in all aspects of forest industries. These range from establishment and staffing of a small training school for junior field supervisors in the Solomon Islands, resource inventory and forest development policy planning in Peru, to setting up a fire detection and protection system in India. In addition there are projects on timber industry training, logging and sawmill training, creation of a forest service, reforestation with tropical hardwoods, afforestation with coniferous plantations, end-use timber surveys, preservation and seasoning equipment and training needs, and applied research in forest management and timber properties design and use. The country's largest single aid involvement is in Fiji, in pine plantation work under the control of the Fiji Pine Commission.

The main purpose of this chapter is to outline the more important lessons learnt, sometimes painfully, in the implementation of forestry projects, particularly those involving training and education. New Zealand enjoys a world-wide reputation for ability in the establishment, management, utilization, processing and end-use application and marketing of softwood plantations. It is most important to appreciate that such a reputation is as much a result of the 80-odd years of hard and varied experience in producing man-made forests from what was once an obscure pine species from the Monterey Peninsula, as it is due to any superior prowess on the part of our forest managers. Quite simply, we have had a great deal more time to learn and, one hopes, to profit from our mistakes than many other countries. After all, the great majority of the world's man-made forests is still less than 25 years old.

Lessons of experience

Hence one most important consideration in designing foreign aid projects in forestry is to attempt to avoid repeating mistakes already known from New Zealand experience. This is much easier said than done, especially as conditions in the recipient country may make much of what we have learned inapplicable.

Three problems tower above all others in the implementation of forestry aid projects throughout the South Pacific. These are:

(a) the complex and sensitive issue of land ownership,
(b) the great shortage of experienced forestry staff, especially at middle management levels; and

(c) the problem of the acclimatization of New Zealand staff to a new working environment, culture and life-style, and above all to very different administrative procedures and back-up services.

New Zealand seconded staff must make a tremendous effort to come to grips with these problems in terms of what is practical and achievable in local circumstances. The first and most important consideration is to adapt New Zealand experience and knowledge to local institutions and not to attempt the reverse process of enforcing inappropriate New Zealand standards and procedures on to recipient countries. This philosophy is especially important in training and education.

Forestry training and education

The most important element is not in practice the training of local staff, but the training required for seconded aid staff who must often assume in the recipient country responsibilities of much wider scope and range than those to which they are accustomed at home. A knowledge of local habits, customs, traditions, social and political hierarchies and language is very important. If this is inadequate, it can throw a considerable strain on staff from both countries and divert their energies.

A second element to beware of is the fairly common misconception that local counterpart training will allow an early retirement of seconded foreign aid staff from a project. In general it is a mistake to assume that 'localization' of an afforestation or reforestation project can be accomplished within a 2 or 3 year term. There are two important factors which require careful evaluation before any decision is taken on the type and number of staff to be seconded to an overseas aid project and on the duration planned for their association with it. These factors are, firstly, the availability, attitude and experience of local staff available to work on the project; secondly, the expectation of the recipient country on implementation of the scheme and the importance that the local administration places on producing readily demonstrable results.
It has been New Zealand's experience that counterpart training usually takes second place to the exigencies of setting up and implementing work programs. Often training is forced to be on a day-to-day basis. If there are experienced local counterpart staff then training functions can be assimilated fairly well through simple association and observation. However, even this very informal method will fail unless the project is initiated and developed within the constraints which will apply once the project becomes wholly localized. Hence the emphasis stressed earlier on the need to ensure that the basic approach should be to adapt New Zealand expertise and practice to local usage rather than attempt to change local capacities to conform to New Zealand standards and attitudes.

Once a decision is made to proceed with a forestry aid project it is essential that training needs be assessed. Evaluation must take the following factors into account:

(a) the availability and experience of local staff;

(b) the availability and educational levels of prospective staff recruits;

(c) the extent of dependence on foreign aid back-up servicing, as compared to local capacity;

(d) local training facilities;

(e) critical staff shortages likely to develop during the work program; and

(f) time horizons for accomplishment of objectives of the project.

Lower level training

New Zealand experience suggests that the greatest current training needs are at basic and practical levels of field supervision for most forest operations. One urgent need is usually a crash program to provide an adequate number of junior field supervisors. Ideally this requires a blend of fairly straightforward classroom instruction and practical fieldwork backed up by on-job experience and guidance.
This, however, is but one of a comprehensive range of training requirements including: leading hand-foremen, forest rangers, professional foresters, technicians, executive and administrative officers, survey and draughting staff, trade training of mechanics, carpenters, fitters, sawmill staff etc.

A variety of teaching methods has to be utilized to impart a wide range of skills depending upon the depth of knowledge and the qualifications required. The simplest approach is on-job training. This has the virtue of economy to the donor and of time to the recipient. But it has the disadvantage of taking up time of seconded staff whose priority may well be to ensure job performance rather than job training.

A second training method is through short formal course instruction. Such courses can be held at the project site itself or by using training facilities in New Zealand. In practice both methods have been used. The short course has proved satisfactory for training junior field supervisors and to provide skills in certain specialist activities such as power-saw operation and maintenance, forest inventory field procedures, simple sawmill operation and maintenance and timber preservation plant operation. In general it has been found preferable to conduct short training courses in an environment similar to working conditions in the trainee's home area. New Zealand therefore prefers to use either recipient or third country facilities or else to arrange for a specially designed course in New Zealand for students from countries with similar training requirements.

Upper level education

Canterbury University accepts overseas students for professional forester training and the Forest Service Training Centre at Rotorua undertakes ranger training. The academic performance of students from South Pacific countries has varied considerably. Moreover, the relevance of the course structures and syllabuses to the subsequent professional career needs of graduates from less developed countries has been questioned. There has recently been greater awareness of the need to relate the type and duration of training and education offered to the practical needs of forest management and development of these countries.
An area of some sensitivity is the contrast between the formal qualifications obtainable by graduates from a university as compared to the informal recognition provided by training schemes and on-job qualifications. On the one hand, it is thought that the greatest need at present is for practical working experience. On the other, candidates naturally prefer academic honours. It is up to individual countries to determine what mix of candidates they present to the various learning streams.

Present training policy trends

The present trend is to make as much use as possible of local on-job training whenever practical and applicable; to use third country facilities where these more closely identify with the needs and circumstances of the project; to establish simple training facilities on the spot where there is an urgent need to build up the strength of junior staff and provide semi-specialized courses for post-graduate studies in New Zealand.

Another useful approach is to provide practical on-job specialized training in New Zealand tailored for particular purposes. For example, the Fiji Pine Commission recently foresaw an urgent need for trained logging crews. It was therefore arranged for a Fijian staff member to spend several months training in all aspects of field logging operations in New Zealand forests, both state and private. This official then returned to Fiji to select and give preliminary training to a work team. This entire group is to be brought to New Zealand as a work crew to familiarize themselves with all aspects of small wood logging. Upon return to Fiji each will then assume a logging training role.

Conclusions

It is apparent, however, that useful as these many training efforts are, they tend to be on a piecemeal and ad hoc basis, and that they fail to take account of economies of scale. It could well be argued that forestry training in the South Pacific should be based on the regional use of two or three permanent training centres. As local needs increase or decrease then forestry training could be phased in to temporary training centres or integrated with other training facilities.
There is probably potential to make more use of existing training centres such as Lololo in Fiji and Bulolo in Papua New Guinea, since these centres have similar environmental and forestry problems as New Zealand.

Given the will and the necessary determination to achieve regional co-operation and reorganization, it is contended that most servicing and necessary facilities are already adequate in the South Pacific to cater for present and future forestry training needs.
Chapter 18

Role of international co-operation and local expertise in establishing and improving the genetic foundations of forest plantations in the tropics

D.G. Nikles

Introduction

Forest plantations can make an important contribution to economic development through local employment, industrialization, import substitution and export earnings. Many tropical countries have a comparative advantage in supplying world demand for wood products. Woods of tropical species are in strong demand (Myers 1978), and many developing countries have, in addition to extensive natural forests, large areas of land on which plantations could be developed. If advantage is to be taken of opportunities in forest industries, the genetic foundations of tropical plantations must be improved.

This chapter outlines some of the ways in which international aid and research can help developing countries to achieve sound economic management of forest projects and discusses systems for improving the genetic foundations of plantations through international research and collaboration. Factors essential to efficiency are choice of species and source of planting materials, the establishment of the broad genetic foundations of these species, and the selection and breeding of genetically improved trees.

The species most commonly chosen for use in forest plantations in the tropics are fast-growing exotics, so that natural forests containing such species constitute valuable genetic resources. They are reservoirs of genetic variability comprising species, sources and genotypes for sampling, seed collection, evaluation of performance, and re-collection of proven superior types. These genetic resources can be utilized most effectively in the establishment of new forests, because this provides the maximum opportunity to control their genetic composition.
The international spread of genetic stock has already been extensive. Indeed, many of the favoured plantation species are now of greater importance in plantations than in their natural habitats, as, for example, some eucalypts and central American pines. Both the international spread of knowledge on tree breeding and exchange of plant material have so far, however, been rather haphazard, and the time has now come to develop international cooperation and co-ordination of efforts more systematically. International liaison is needed to obtain comprehensive samples of seed for species and seed source trials, to arrange for conservation of the genetic resources, to supply commercial quantities of source-identified seed to international purchasers, to disseminate information on results of trials and to select and distribute germ plasm of superior stock (Kemp et al. 1972). At the local level, means must be found to sustain a high standard of research and development work to support good management of the plantations.

Organizations establishing forest plantations in the tropics often have inadequate financial, human, physical and genetic resources to assure success in all aspects of major forest planting projects. Some of these resources, however, can be found in developed countries, while others are available within the region. Joint development of plantation projects is therefore desirable, in which land and human resources are provided by the developing countries, while developed countries supply technical expertise and capital in the form of direct investment, aid of various kinds, or loans. There is scope for more efficient use of the special contributions that can be made by each partner in such joint ventures.

**Improving the genetic foundations**

**Species and sources of seed**

Large-scale planting is rarely delayed until the most suitable species and sources of seed have been identified through adequate local trials. The species used initially is often introduced fortuitously and proves unsuitable for long-term use. The few exceptions are adaptable species with little inherent geographic variability, such as *Pinus radiata* D. Don. Even in this case, however,
it was recently judged necessary to return to the remnants of the natural gene pools to collect more of the natural variability (Eldridge 1978).

As technical knowledge increases, changes can be made in species or in sources of plant material. For example, tropical pines have now virtually replaced US. southern pines in the subtropics of Brazil; *P. caribaea* Mor. has largely replaced *Pinus elliottii* Engelm. on 'good' sites in subtropical low-lands of Queensland; *Pinus oocarpa* Schiede is replacing much *Pinus kesiya* Royle ex Gordon in Zambia; there is a trend to plant more *P. oocarpa* and *P. caribaea* in parts of the tropics; and finally, Nicaragua stock of *P. caribaea* and *P. oocarpa* is likely to replace the traditional Belize and Honduras sources in many parts of the tropics. There will be more changes of this type. For example, the superior *Araucaria* and possibly one *Agathis* species will probably be substituted for *Pinus* now being planted on some high-forest sites in Asia, Africa and Brazil. Moreover, previously untried or inadequately tried species such as *Acacia mangium* Willd. are constantly being 'discovered' as well suited to different purposes and locations.

Because such dynamic change creates heavy demand for 'new' genetic material, sufficient seed may be virtually un-obtainable. Moreover, when seed must be imported and the best sources of supply are not known precisely, then several genetically-broad, primary and secondary stocks of plant material1 should be sought for introduction. This will later allow a better choice of source to be made and permit earlier local use of the chosen seed stock and of superior individual trees for breeding. At the same time, duplication of effort should be avoided. These various factors make it essential to co-ordinate exploration, collection, evaluation and protection of the natural gene pools for conservation and provision of commercial quantities of seed.

**Enriching the genetic bases**

Local breeding and seed producing stock can be

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1 Primary stock is derived directly from natural stands and secondary from plantations. The latter may already be improved genetically to some extent.
enriched genetically by incorporation of germ plasm from superior individuals selected elsewhere (Nikles and Burley 1977). This is especially so if the source of the imported material is wisely chosen, and if the environments and criteria selected for the source material are similar to those of the recipient area and breeding program. Organizations concerned with genetic improvement of local plantations are usually generous in releasing bulk samples of improved material. Such samples can be of great value as an interim base for seed production in similar environments and occasionally for selection of superior trees. Potentially useful new and improved genetic material can also be imported as seeds, scions or pollen from individual superior trees (Nikles 1978a).

Development of local seed sources

There are advantages in developing local seed sources quickly, provided that the environment is suitable for good seed set and that imports are not stopped completely when local self sufficiency is attained, thus cutting off access to additional variability. The advantages of local seed production are not only genetic. They also include development of expertise, knowledge and confidence; the provision of employment; and the conservation of foreign exchange.

The procedures used for local development of seed sources are well known. These include, in order of increasing complexity and delay until seed production, the following: mass selection, primary seed production areas, improved seed production areas, seed orchards (clonal and seedling), and advanced orchards. Advanced techniques now enable skilled personnel to manage seed sources effectively (Nikles 1978b). In the tropics few seed orchards are in production yet, although many are being established. There is need for technical improvement and for much greater development of all five of the seed production methods. In particular, there is large scope for improving the genetic composition of local seed sources through selective importation of different kinds of 'new' genetic material, especially from co-operators breeding the same species.

One example will illustrate such international collaboration in tree breeding. A co-operative progeny test of *P. caribaea* var. *hondurensis* was established at 11
sites in Australia and Fiji in 1971-72 (Nikles et al. 1978). At one of the Fiji sites 40 stock sets (progeny of superior trees) were established (25 from Queensland trees and 15 from Fiji trees) and growth and tree quality were assessed at 4.5 and 6 years of age. Results showed significant differences in production and tree quality between sets, almost all the better ones proving to be from the phenotypically superior Queensland stock. Notable results from these Fijian trials were: (i) the identification of several first-generation parents with superior breeding characteristics for the Fijian breeding program; (ii) the conversion of progeny tests to an excellent local seed source; (iii) the choice of superior, second generation trees for addition to the local breeding and seed producing stock; and (iv) the rapid development of local staff expertise and confidence.

Studies of many stock sets planted at many sites may also be used to investigate stock-by-site interaction. This permits the breeder to regionalize the breeding program, to identify the most useful test sites, and to plan more effective co-operation. A co-operative study of this type has been carried out with P. caribaeae since 1972 in several countries and further trials are to be started in 1979. It is hoped to extend this valuable co-operative work to several other species with financial assistance from aid agencies.

Strategies to support local breeding programs

Staff training and technical progress

It is essential to devise an appropriate strategy for the genetic improvement of forest species adapted to local needs and resources. An effective strategy must necessarily rely on good communication links which can develop the exchange of technical knowledge and of superior genetic materials. Such links are rare at present and there are few specialists in the field to create them. If available, use can be made of a local tree breeder, a leader of a co-operative breeding program or a foreign consultant. There are opportunities for aid agencies to help to arrange technical and professional training. This is best done by offering to well qualified trainees on-the-job training with successful tree breeders who can demonstrate to them convincing data and forest trials which show significant genetic gains.
Tree breeding programs in developing countries have many personnel problems. Amongst these are a rapid turn-over of staff, a lack of opportunity for specialization and inadequate time to devote to research and assessment of long-term trials. Services such as data preparation, statistical analyses, preparation of progeny test programs and orchard designs should preferably be carried out locally since this develops local expertise and confidence. However, if local staff are not available, some services can be obtained from certain well-established foreign research institutes.

Areas in which additional training are needed include grafting; selection of superior trees; knowledge of flowering habits and cone maturity; orchard management; all aspects of pollen handling and control; and the design and control of field tests.

Tackling genetic research problems

There are many genetic problems on which research is urgently needed. One example is the genetic improvement of coniferous species planted in tropical lowlands. Here research is required to determine: (i) factors controlling seed production, seed set and the normal reproductive cycle of each species; (ii) simple, inexpensive means for mass pollination and mass vegetative propagation; (iii) improved techniques for collecting, extracting, cleaning and storing seed; (iv) stock-scion incompatibility; (v) source-stock environmental interaction; (vi) selection and establishment of more effective mycorrhizal associations (fungus and root combinations); (vii) environmental and genetic effects upon wood properties and physiology of shoot growth; (viii) nutritional requirements of the plantation species; (ix) 'leafless shoots' of P. caribaea var. hondurensis; and (x) excessive upper-stem kinking of P. caribaea var. caribaea and var. bahamensis after canopy closure on many sites. This list could be extended.

International collaboration

There are already some examples of internationally assisted seed centres within the areas of natural occurrence of some of the currently more important species, such as those in Honduras, Australia and Thailand. Similar centres are vitally needed in several other countries and these would have a better chance of attracting international funds if
joint approaches were made for support. Work in this field by international and national bodies such as the FAO and Australia's CSIRO should be expanded.

Efficient national breeding programs for the various tree species can best be built up through co-ordinated local and international work. At present, liaison among tropical institutions is largely lacking. For example, there are 45 organizations in 30 countries involved in pine planting, but collaboration between them is desultory and highly informal (Nikles 1978a). Only the close knit character of the forestry profession has enabled the present communication system to work as well as it has. Many in the profession, however, now urge that institutional contacts be extended and formalized.

There is no international research and extension agency for forestry which can be compared to the several agricultural institutions which are supported by international agencies and foundations. Funds for forestry research, from the World Bank and others, have so far flowed exclusively to national programs (see Anon 1978). Foreign aid could perform its most valuable role in tree breeding in helping to organize and finance international work and liaison. Borlaug (1976) has suggested that an international institute for forest tree breeding be established. This may not be possible immediately. In the meantime, experienced professionals could be appointed as co-ordinators and attached to the larger existing forestry institutes, whether university or state-sponsored, who could organize the dissemination of knowledge in the various forestry fields. Alternatively, suitably skilled personnel might be seconded for a period from their present organizations, at least initially.

Conclusions

Support for additional genetic research and basic development work on forest plantations in the tropics could and should come from several sources. Amongst these are governments of developing countries, perhaps interested in a particular aspect or project; governments of developed countries, operating through bilateral aid programs on a grant or loan basis; multilateral programs financed by national governments or such international agencies as the FAO and the World Bank; and finally universities and other institutions of higher learning.
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Chapter 19

Aid programs to stimulate on-going forest research in developing countries

M.U. Slee

Introduction

The major agent of social change in modern societies is not the capitalist or the proletariat but the professional (Goode 1960). Indeed, massive emergence of the professional complex can be seen as the crucial structural development of 20th century society (Parsons 1968). The professional has been defined (Moore 1970) as someone who practises a full-time occupation, is committed to rules of competence, conscientious performance and service and enjoys autonomy due to a high degree of technical specialization. It is in the ranks of the professionals that one finds the innovators and the active modernizers (Hodgkin 1972).

Professionals have played a modernizing, indeed a revolutionary role, in many developing countries, including those of Southeast Asia (Silcock 1977). Consequently a belief in the strategic importance of professions for development has led to an emphasis on higher education in developing societies. Similarly, aid programs have engaged in wholesale deployment of professional experts¹ to assist development of third world countries.

The results have been varied. Local professionals have not always been trained to cope with local problems as their development through school and university has been based on knowledge gained from foreign textbooks which is inappropriate to their context. The basis of their skills is a fluency and technique memorized from foreign sources or developed overseas, rather than adaptation, improvisation and discovery in the local scene.

¹ Throughout this chapter the term 'expert' will be used to indicate a professional employed full-time by an aid agency to provide on-the-job guidance and assistance.
Aid programs can be structured to overcome these deficiencies. Particular attention should be given to encouraging the development of innovation in local research stations and universities.

Aid programs in forestry

Aid programs in forestry have the potential to be extremely effective. The professional corps of foresters in each country tends to be relatively small. The foresters have good intercommunication and most will remain within the profession and their country for their working life. For- esters also usually have the responsibility for carrying out their programs with little need to work through another party. This situation contrasts with many other professions. For example, doctors have skills which are frequently in demand elsewhere and they migrate. Agricultural extension workers have to work through and with peasant farmers to be able to implement programs.

Forestry aid programs have usually aimed to fulfill one or more of the following functions:

(a) To review the local situation, establish the existence of a resource and develop recommendations as to how it may best be utilized, for instance, FAO surveys of pulp and paper demand (1967) and of forest resources (1968).

(b) To initiate and develop a program for utilization or establishment of a resource base, including supervision of the initial program, development of suitable techniques and training of local personnel. Examples are the joint ADAB/ANU\(^1\) program in Nepal and Laos, the FAO programs of afforestation in Venezuela, reforestation in Malaysia and utilization of the high altitude hardwood forests of Iran.

(c) Development of university (undergraduate) or technical college training programs. Examples are the establishment of the Forestry Faculty at the Agricultural University of Malaysia (UPM)\(^2\) by

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\(^1\) ADAB/ANU = Australian Development Assistance Bureau/Australian National University.
\(^2\) UPM = Universiti Pertanian Malaysia.
AAUCS/ADAB and the training college at Kepong, Malaysia by FAO.

(d) Development of research stations. FAO assistance with establishment of stations in Bangladesh and Burma and the DANIDA\(^4\) aid for the Thai/Danish centres in northern Thailand are instances.

It is pertinent to consider how much each of these different programs has actually encouraged development of local innovation and the extent to which it could do so. These comments are necessarily general and should not be interpreted as applying to particular projects.

Resource base reviews are essentially advisory with resource development either left to the locals or the subject of a separate aid program. Thus they frequently encourage innovation and development.

Program development projects have several aims. Notably, these are: (i) development of suitable technical procedures for local conditions; (ii) training of local sub-professional staff in these techniques; (iii) training of local professional staff in the administrative requirements and procedures; (iv) fostering in the local staff an understanding of the principles of the program so that expertise may be passed on; and (v) fostering an understanding of the local forests, particularly of their ecology and simple physiology so that the program can be implemented with a full understanding of the processes involved and their effects.

Of these (i) and (ii) are usually achieved satisfactorily. Indeed forestry aid programs have generally been extremely successful in developing technical procedures. It is no coincidence that many successful aid experts are very skilful technicians with a flair for improvisation and the initiation of new techniques. Examples of some techniques developed by aid projects include small portable sawmills in the Iranian hardwood forests, bursery techniques in *Pinus caribaea* in Malaysia and machine planting of tubed *P. caribaea* in Venezuela.

However, the fact that the experts are the innovators may exclude the local professionals from that very important role and aims (iii), (iv) and (v) may not be achieved.

\(^3\) AAUCS = Australian-Asian University Co-operation Scheme.

\(^4\) DANIDA = Danish International Development Agency.
The local professionals may even be divorced from the innovative processes. All too frequently during the life of a project the local professional counterpart may be sent for a lengthy period to an overseas university, usually in a developed country. He will gain postgraduate qualifications but develop skills which may be inappropriate for the particular project. Even more importantly the local professional will be absent for a substantial part of the life of the project and has little chance to participate in the innovative process and to develop a full understanding of the project.

This should not be interpreted as recommending against the sending of local staff to overseas universities but rather that this be co-ordinated with project development. Ideally the local personnel should have a lengthy period with the project before going away. Expert guidance should also be available for these staff when they return to assist them in the application of their newly acquired skills.

The development of research organizations in developing countries provides excellent opportunities for a blossoming of innovative talent in local staff as local problems are assessed and the methods to overcome these are evolved. However, the program must be designed to do this. Innovation must not be the sole prerogative of the expert.

The development of local research studies will indicate to the local staff the quality and depth of programs which may be useful. The importance of simple straight-forward studies cannot be over emphasized. In many under-developed countries, particularly those in the humid tropics, forestry knowledge is scanty, and simple observations can often yield useful information. Indeed, completion of such simple observational studies may be a necessary prerequisite for more complex research. For example, there has been a tendency in tropical forestry to assume that trees which are dormant during the dry season have their growth pattern controlled by the availability of moisture (see Richards 1952). However, simple but careful observation reveals that many of these trees enter dormancy at the height of the rainy season and other controls must be operative (Williams and Joseph 1973). Further studies can develop from this premise.

In developing research projects, overseas post-graduate training of the local research staff must be implemented in accord with project development. In some projects it may be desirable for expert advice to be maintained for a
long time. This has occurred in the development of the Thai/Danish teak centre. The Danish experts were present on a full-time basis for ten years and have been engaged on a part-time basis for a further five years with likelihood of further extension.

University training

There will always be two very serious drawbacks to the programs outlined so far. First, staff rarely remain in one position or location for a long time and thus, even if an expert is present for many years, it is doubtful if the local staff will remain unchanged during this time. Similarly, when the expert leaves and local staff changes occur there is some danger of the acquired expertise being lost unless the program and the techniques are fully understood and it has all been carefully documented.

Second, there is the danger that the expert will be regarded as an authority who cannot be questioned. Many experts are no more experienced in the local conditions than the local professionals and their expertise lies in their ability to understand the situation, to be innovative, and in having the confidence to make decisions. That expert advice can be fallible and open to question is not always appreciated by the local staff, nor, perhaps even more importantly, by their superiors. Certainly this point is not appreciated by many experts themselves.

Thus there is a need to develop in local professionals an understanding which allows critical assessment of all viewpoints and encourages them to make their own decisions with confidence. One way of achieving this is by the establishment of vigorous local universities and technical colleges, which teach under local conditions, delineate and inquire into local problems and then incorporate the results into their teaching.

Local undergraduate training of forestry is now the norm in Papua New Guinea, Fiji, Malaysia and the West Indies, and aid schemes which have encouraged development of these schools are to be congratulated. However, it is important to emphasize again that university teaching must not be regurgitation of overseas techniques at the undergraduate level. There must be generation of local knowledge, integrated with overseas material and adapted to local conditions to generate a pool of local expertise. This is a major challenge for the university staff.
University staff in developing countries have, however, generally received postgraduate degrees overseas and may have had little practical forestry experience. Thus of the present staff of the Faculty of Forestry at UPM, Malaysia, only 5 per cent received postgraduate training locally and most proceeded to the higher degree soon after completing their first degree. Such staff members need some guidance in developing research projects in their home country, and aid programs could be structured in various ways to achieve this.

The simplest procedure to stimulate research would be to develop research projects which involve experienced staff at a university in a developed country and staff at the developing country university. Such projects need not of course be confined to single organizations or countries, nor necessarily to universities. For example, a simple study of *P. caribaea* shoot growth patterns has already commenced at ANU in conjunction with university staff at UPM, Malaysia and forest research workers in Sabah, Queensland and the Northern Territory. It is hoped this will be extended to include workers in Fiji, Hawaii and Puerto Rico in the near future. Simple observational studies of this nature which involve local staff are extremely cheap, yet provide important information and training for the staff and provide the foundations for later intensive research. Co-operative studies of this nature also assist staff in the developing country to build wider contacts with other researchers.

Aid could be given to a developing country university for establishment of postgraduate studies. This could be achieved by establishing joint M.Sc. degrees in conjunction with an established university. These degrees could be co-supervised by staff from each university and might require some residence qualification in each and possibly even be jointly awarded.

Establishment of joint Ph.D. degrees would be more difficult. These degrees at English or Australian universities generally require more or less full-time residence and evidence of manipulative and experimental skills rather than simply observational skills. Field forestry experiments are generally longterm and assessed by different staff from those initiating the study. These are generally unsuitable for Ph.D. study under these rules. Thus current Ph.D. conditions severely restrict experimentation in field forestry generally and have made experimentation in many aspects of tropical forestry almost impossible at the research student level.
There is need to recognize observational skills in forestry Ph.D. degrees. These are skills which may be more difficult to acquire than manipulative skills. Indeed competent field observational skills take years to develop, for assessment of forestry experiments involves initial recognition of patterns, the development of observational assessment scales and interpretation of the results in field layouts. This is a much more demanding exercise than, say, manipulation of the controls of a glasshouse and interpretation of the results of this action. Thus Ph.D. study based on intelligent observational interpretation of data should be acceptable for forestry study.

It may be possible to make arrangements between universities for joint Ph.D. degrees, similar to those proposed for M.Sc. study. The Institute of South East Asian Biology at Aberdeen has shown how this may be achieved. The student works in conjunction with the University of Malaya and the Malaysian Forest Service to obtain a degree awarded by Aberdeen. There are joint supervisors in Aberdeen and Malaysia and a period of residence at both universities.

An alternative aid form would be for university staff from developed countries to take study leave in developing universities. The AUCCS/ADAB scheme announced last year which enables Australian university staff from several disciplines to take leave in a number of Asian universities, is welcome in this respect. This type of scheme would, however, have more appeal to staff members from developed countries if an active research program were under way at the developing university.

Conclusions

Co-operation between research organizations in developed and developing countries is seen as essential for forestry in the developing country. University to university co-operation may be of particular value and establishment of joint studies should be encouraged.
References


Part E
Discussion and conclusions
In this final chapter an attempt has been made to draw together the threads of the conference. In bringing together such a wide diversity of experience and opinion there is inevitably a varied mosaic in the pattern. The discussion reflected very different backgrounds and approaches to the problem of how forestry might contribute to national development in developing countries. However, an attempt was made in the final session to reach some form of general consensus and on many important issues agreement was reached.

As so often happens at conferences of this type, the wide-ranging discussion of the final session either raised new aspects to be considered or focussed attention on problems which had not been dealt with effectively earlier.

At this meeting one such issue was the vexed question of tariff and non-tariff barriers to trade. It was emphasized that there is little point in a donor offering aid designed to increase or upgrade a developing country's exports of forest products unless it is prepared to allow fair opportunities for the new products to compete in its own market by reducing import duties or enlarging import quotas, or at least by ensuring that its trade policies do not worsen. Again, escalation of advanced countries' tariff structure, under which ad valorem rates rise with the degree of processing, make a mockery of aid designed to increase the added value content of developing countries' wood product exports. The conference was urged to see the issue in a broader focus than just forestry products or a bilateral trade/aid relationship. Trade in forest products cannot be viewed in isolation but needs to be considered in the context of multilateral trade negotiations which involve many trading nations and a much wider range than forest products alone. In spite of this it was agreed that the tariff problem was of quite fundamental importance in assessing the projected returns from aid to the forestry sector and that this problem had not been adequately considered at the conference.

**Exploitation of extensive forest resources**

Central to the discussions was an appreciation of the diverse problems facing many countries in our region. In countries such as Nepal and India, under conditions of population pressure, the forests have been severely overused and shortages of forest products, erosion and landslides are common. In other countries, as for example in parts of Indonesia, exploitation of seemingly ample forest resources is proceeding principally for export. In these cases, more
attention should be paid to the net contribution to national income and welfare made by forest projects, including of course reinvestment of earnings in other sectors. The repercussions of forest projects, both foreign and domestic, are often not adequately assessed. Social costs may not be fully taken into account in evaluating projects and sufficient provision may not be made for the long term conservation of a valuable forest resource.

The conference recognized that the recent adoption by many developing countries of forestry technologies evolved in advanced countries may be quite inappropriate. The exploitation of the forests generates new problems, problems often peculiar to a particular locality or forest type, which require the application of the latest scientific information at the local level. But trained people and a local technology are not available to meet this challenge. There is a need for more indigenous people who can make informed judgements and decisions on new systems, processes, raw materials and products. They must be capable of rejecting inappropriate technology and of adapting appropriate technology to local conditions. Much of the discussion centred around the role of aid programs in assisting with the problems of applied technology and how such programs might best meet the immediate future needs of the developing countries in the forestry sector in our own region.

With regard to those countries which obtain substantial income from the sale of their forest products, there was a recognition that Australia could use its expertise to assist in raising the level of scientific knowledge in such countries. In doing this we would be ensuring that local expertise would be developed, with local people fully cognizant of their country's needs and approaches. There was also a recognition that the less developed countries will make their own decisions as to where trained people are to be used. In seeking to provide aid, Australia looks for areas in which it can make a contribution of a special nature, for example in tree breeding or tropical pasture establishment, but in such bilateral aid the potential recipients have the right to choose between potential donors and to accept what is most suited to themselves.

Land tenure has proved to be an important institutional constraint to the exploitation of forest resources on a large scale. This is especially true where land is held under communal title, often involving large ownership groups.
As the process of economic development proceeds, communities and governments do, however, seem capable of evolving new forms of land title that allow long-term investment to take place on consolidated tracts without dissipating land ownership. Usually these involve a strong element of landowner participation in all phases of the forestry project. These may take many forms, including agro-forestry, complementary or sequential use of land and so on. A number of different models appropriate to the region were cited. Thus, while there are problems of land tenure, and certainly none of the conference participants could ignore their existence, it did seem that these were not insurmountable. There appeared to be some accord that the land tenure question in forestry development was a less pressing current issue than other aspects of technological development.

The main discussions concentrated on two central issues. The first was the 'basic needs strategy' for national development in developing countries which gives priority to the satisfaction of the basic needs of the population and the promotion of local industries and employment. In the forestry sector this involves the production of timber, fuel and fodder from local forests and also the wider issue of catchment protection and erosion control on both a local and regional scale. Second, the conference considered the infrastructure and managerial arrangements needed in developing countries to enable them to apply science and technology to their own development in the forestry sector. This topic relates to the role of education, how science and technology of advanced countries can be transferred to developing countries and adapted to their needs, how the research capacity of developing countries can be expanded with the assistance of aid donor countries and what priorities should be set for this research.

Basic needs and community forestry

Forests have to meet very elementary needs of the rural poor for fuel, building materials and fodder for their animals. For fuel, better designed stoves could help to alleviate shortages but in the main, the problem can only be met by increased supplies. It is of interest that about 10 MJ per person per day energy intake is required as food whereas about 12-15 MJ daily per person is required for minimum levels of cooking.

In some regions wood shortages are approaching desperation point and everywhere they will worsen as growing
populations press on land resources if nothing is done. In some densely populated places such as Java, vividly described by Soedarwono, forest guards are already fighting a hopeless rearguard action against villagers taking timber from forests that they have traditionally regarded as providers of 'free gifts of nature'. Foresters in such regions will have to reorientate their thinking and seek to provide wood for local people rather than for distant industries. This will mean the creation of new social organizations, the choice of different species, planting and cutting regimes and a bigger infusion of food and cash crops in the production mix.

It was, however, recognized by the conference that designated forest in most timber-scarce regions cannot meet local needs for wood products. This means that the forestry profession generally will have to enlarge its vision to the growing of trees in collaboration with local communities for multiple purposes in non-forest areas. This will be a very complex business. Amongst other things it will require:

(a) multiple choice of suitable species for different habitats and purposes;

(b) spatially diffused small-scale production units;

(c) devolution of authority to allow autonomous management by user-groups.

Several examples of successful community forest projects are discussed in earlier chapters, all of which stress the crucial importance of collaboration and trust between the producer-users and the outside experts who assist them. It is clear, too, that relationships within the communities themselves must be collaborative. There will thus be great difficulties in spreading such models widely.

There has of late been a general recognition of the role which forestry programs can play in local rural development. Both F.A.O. and the World Bank have recently emphasized:

(a) the nature and extent of forestry at the community level;

(b) policies or programs necessary for developing forestry activities for the benefit of rural communities; and

(c) technological aspects of implementing community forestry activities.
It is recognized that forestry at the community level is an integral part of rural development and, in association with agricultural development, education, and the fostering of local industries, can do much to alleviate the persistent rural poverty of many developing countries.

However, it was also recognized at the conference that there are inherent problems in this form of aid program for both donors and recipients. There is a need for realization in aid circles that community forestry aid programs are usually long-term and may not alter measurable GNP by a single dollar, although they could improve the standards of living of the rural poor substantially. An adequate provision of forest or wood products makes life easier for a rural community but does not necessarily have any effect upon their income. One particular aspect of this problem is the use of aid to subsidize local communities to compensate them for temporary loss of the use of land while such land is brought into production. There is the danger that projects may fail once such subsidies are withdrawn.

Similarly, where there are no measurable material benefits of an aid program, it will be difficult for the recipient government to quantify benefits from such aid and to evaluate its worth in comparison to alternative uses of aid. Governments of less developed countries in the past have tended to opt for technical aid which has boosted GNP mostly through industrial development in the cities. The rural poor have benefited little. There has been a new general recognition of the significance of these aspects of aid policy and certainly both FAO and the World Bank have in recent months placed much emphasis on the social benefits of rural community forestry. The Australian-Nepal Forestry Project was discussed in some detail at the meeting as an example of this approach to aid. In this case there are benefits not only for the local people but also, perhaps more important in this mountain setting, benefits for communities downstream through the control of soil erosion.

Science and technology development

The meeting concentrated, as has this monograph, on the role of foreign aid in science and technology for forestry development, both direct, through the provision of experts, goods and services, or indirect through the promotion of national training, innovation or research. Some attention was focussed on the people involved in aid programs.
They have not always been the most suited to the job as Thailand's Bhodhipuks so aptly illustrated. It was generally agreed that only first class people who were doing a good job in their own country were acceptable as aid workers. They should not only possess the expertise necessary but also a degree of humility which would allow them to adapt to local social and economic conditions. They must be able to appreciate the social and political realities of the recipient country and be capable of developing a degree of genuine rapport with the local people, and most particularly with counterpart staff. The importance of adequate language training was emphasised, a minimum of three months should be allowed for tuition. Good communications would be of especially critical importance in community forestry projects. It was equally agreed that the recipient country should endeavour to match the enthusiasm, drive and general expertise of the aid worker with local staff of an appropriate calibre.

Two aspects of the aid personnel problem were raised both during the conference and in the contribution by Slee. One is the preference for aid workers to remain in the recipient country long enough to be really effective, and the Thai/Danish Teak program can be cited as a good example to be followed. However, there is a view that beyond a certain period an expert becomes remote from his resource base and can no longer be considered 'expert' in the normal aid sense but has virtually made a career as a forester in a developing country. As for diplomats, a recharging of batteries in the home country is occasionally necessary. The second point relates to counterpart staff. The visiting experts are usually the innovators and all too frequently the local professionals become divorced from the innovative process through long absence overseas while training during the currency of the aid program. This was not seen as an argument against overseas training as such but it was suggested that absence from the project should be arranged only after a period with the project during which the counterpart has had ample opportunity to participate in the innovative process and to develop a full understanding of the project's ramifications.

Training and Research

(a) Training

There was common agreement that less developed countries must have enough people with technological expertise to make informed and discriminating judgements on their own problems. Training was the key and this must take place at many levels.
Wherever possible the forestry training should be in-country or in social and economic conditions comparable to those in the project country.

There is now general acceptance of in-country training up to at least the undergraduate level and most countries in the region now have local institutions to train their own people to this standard. There are, however still ample opportunities for aid programs to assist at these levels. Two examples which have been the particular concern of the Australian National University are:

(i) providing equipment and other facilities for the Hetauda Forestry Institute in Nepal where forest rangers are being trained; and

(ii) assisting with curriculum development and some specialist teaching for undergraduate courses in forestry at the Universiti Pertanian Malaysia by the A.N.U. Department of Forestry under the AAUCS/AVCC scheme.

Graduate level training will still mostly be taken outside the home country. If and when national training can be provided, there will be considerable benefits, both in preventing the student from developing skills inappropriate for his own country and suffering on his return from a social shock, generated by a long period of absence in a foreign country. In the meantime, overseas training must serve. Where aid can play an important part here, is in developing technology suited to the home country by facilitating home-based research as part of the degree program, but most universities in Australia do not have funds to allow this degree of flexibility in designing graduate research programs.

Several special problems of post-graduate training were discussed. The new M.Sc. degree by coursework at the Department of Forestry, A.N.U., was judged most useful for people from developing countries who wished to acquire a knowledge of a broad spectrum of forest management at an advanced level. Funding for overseas students needed to be investigated for this form of training. Post-doctoral training is a special problem and there appears to be little alternative to attempting to accommodate such specialist needs by individual arrangements. Often only a particular laboratory or person could satisfy these needs. Industrial inspections, by persons from overseas already skilled, fell into much the same category. It would be preferable if visits by such people were co-ordinated so as to form small
groups but this did not always seem possible. ADAB certainly appeared willing to facilitate such small group tours. Finally a need was seen for some foresters to receive more training as business managers. Foresters from Malaysia were being sent to the United States for training but some more appropriate form of training might be possible within the region.

The long-term nature of post-graduate study is a disadvantage where skilled staff can ill be spared from their normal work. Short 'crash' courses of 3 to 4 months could help but university staffing conditions in Australia make it difficult to respond to this form of training need.

(b) Research

Some common problems were identified. The most pressing appears to be the need to promote the use of lesser known tree species by consumer industries. Other problems noted included the need to investigate methods of harvesting in tropical forests and in minimizing associated catchment damage; the old problem of renewal of forest resources following harvesting; and the provision of adequate seed sources for both native and exotic plantation species.

There was considerable discussion of methods of determining research priorities and of looking for ideas leading to technological development which can readily be absorbed into the home country at its current level of technology. This point is linked to the question raised earlier in relation to training, since all too frequently overseas post-graduate training is at a level of technology completely unsuited to transfer to the home country.

The development of collaborative research was seen as an important facet of bilateral aid programs. Such research could assist greatly with the graduate training program noted earlier, graduate students could participate in field research as part of an ongoing program in their own country in partial fulfillment of the degree requirements of an overseas university. Mr Ingram, head of ADAB, also expressed in his opening address interest in the proposal that regional co-ordinated research should be sponsored under Australian aid.

(c) Co-operation in training and research

Because similar forest resources are spread over national boundaries in Southeast Asia and common problems exist, there is a need for some regional co-operation, or a
central agency, for co-ordination of research effort especially, but also possibly with training.

The establishment of a co-ordinating centre which could incorporate many of the features of the 'self-help' approach was favoured by a number of participants. This suggestion has been raised before (see Florence 1971). Other speakers were not in favour of this idea, as acceptors (of aid) are cautious of overt overseeing of their internal research and development. There are, in fact, some existing avenues for such co-ordination such as through the sub-committees of the International Union of Forestry Research Organizations. The Australian aid agency would be reluctant to help to set up such a centre until all possible other ways of achieving these objectives could be ruled out.

An alternative suggestion which appeared to obtain more support was a specialist working group (WG) approach, with no fixed geographical base and no fixed composition. The purpose of the WG would be to act as a catalyst for developing new ideas, for the ready exchange of research information, to suggest modification to research policies to governments and to try to minimize research overlap. Such WGs should be primarily concerned with applied problems. Nikles developed this idea in his chapter for one particular area of technological development.

Younger scientists and technologists should participate in WG meetings to broaden their horizons and to develop their confidence. One particular advantage of the WG approach would be to assist the professional who has done post-graduate work overseas, then returned to his own country, to keep up-to-date. Only with such experienced local people would research be developed to suit local systems and incorporate those ideas which are capable of being absorbed into the existing level of technology.

Forestry aid projects and technological development

Griffin stressed that inappropriate technology transfer between developed and less developed countries can be a question of whole idea sets and not only of unsuitable choice of machines and techniques. Organization and industrial inter-relationships within advanced countries are invalid for countries at a different stage of development or with a different type of socio-economic structure. All too frequently the technology of a developed country, such as Australia, is geared
to high energy input and a low manpower usage. Moreover, detailed cost:benefit analysis of projects must necessarily be different. He cited as an example an instance in Nepal where it proved necessary to protect new plantings from marauding stock. The developed country's solution would be to erect a barbed wire fence but such a fence is very expensive and in Nepal involves the purchase of the wire with valuable foreign currency. The more appropriate local solution is to employ a herdsman at a modest salary who can do the job quite efficiently and spends his (aid) income in the local community.

The developed countries tend to think in terms of 'packages' of technology, often with a very high machinery component. For example, current plantation establishment techniques in Australia have a high technology-energy component in the package. By contrast, Australian methods of the late 1940s had little of this high technology-energy component and would be quite appropriate for transfer to a less developed country today, where ample manpower, but only simple tools, are available.

In discussion it was suggested that technology could be transferred in three ways: (i) by people in the developing countries first learning basic science and then developing for themselves a suitably modified technology appropriate to their own needs; (ii) by transferring technology in 'package' deals; and (iii) through collaboration between scientists and technologists from developing countries, each with their particular knowledge and contributions, who together could evolve technologies appropriate to the unique situation of each country.

It was agreed that the time scale of the first option was generally too long for most countries of the region, save
as a long term objective, as it involves a science → technology → application transfer path which would be quite lengthy. Alternative (ii) was seen as particularly inappropriate in forestry where local ecological and marketing conditions are often quite singular and modification to local circumstances is almost always required.

For most countries the third mode of operation was seen as most appropriate, at least in the short term until the first option could operate. Some countries in our region are however, moving rapidly into a position where local expertise is able to devise technology for local needs. Foresters and technologists from developed and less developed countries could get together and over a three to five year period usually effect a workable technological compromise. Such mutual aid endeavours have already raised the level of technology in a number of recipient countries. This is resulting in the emergence of the scientific infrastructure which is so critical to the evolution of the independent scientific and technical competence necessary to create a nation in which the people are able to enjoy the material benefits of modern science and technology.

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