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AGROFORESTRY AS AN AID TO RATIONAL RURAL DEVELOPMENT IN VANUATU

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SUMMARY

Vanuatu is a small Pacific island nation with over 80% of its population rural based and dependent on subsistence agriculture. One of the few natural resources is the land which thus forms the basis of national development. Agriculture and forestry have been given priority. The rapid expansion of forestry development in recent years has led to difficulties over land acquisition. All land is customary owned and lease agreements with the local landowners must be obtained.

Concern of the landowners over the loss of land for future subsistence gardening prompted the Forest Service to initiate demonstration/trial agroforestry plots. To date, mainly subsistence crops have been grown between lines of *Cordia alliodora*, the principal forest tree species. Work has also been initiated on growing cash crops (cocoa, coffee) within the forestry plantations. This agroforestry approach is in accordance with the Government's development policy and appears to offer more rational and optimum use of the country's limited land resources.

C. alliodora is well known in agroforestry combinations elsewhere. However, the need for research in other potentially important forest tree species in agroforestry associations is recognised and discussed. The potential benefits of this approach in Vanuatu and in other countries, where conditions may be comparable, are seen as considerable.

RÉSUMÉ

Vanuatu, c'est une petite île de l'océan Pacifique dont 80% de la population compte sur l'agriculture de subsistance.

Le Service Forestier doit démontrer au propriétaire foncier que l'arboriculture soit compatible avec l'agriculture. On a interplanté les plantations de *Cordia alliodora* avec les récoltes de subsistance et aussi avec le cacao et le café. On discute les résultats et il paraît que les perspectives pour développer la technique et la gamme des espèces soient encourageantes.

RESUMEN

El país de Vanuatu es una isla pequeña en el Pacífico en la cual el 80% de la población depende de agricultura de subsistencia. El servicio forestal tiene que demostrar a los propietarios de terreno que la cultivación de árboles puede ser compatible con agricultura. Parcelas de *Cordia alliodora* han sido establecidas en combinación con cultivos y plantaciones de cacao y café. Los resultados son discutidos y las perspectivas de aumentar esa técnica con un mayor ámbito de especies son bastante prometedoras.

Introduction

Over 80% of Vanuatu's 130,000 people (1983 estimate) live in rural areas and depend on subsistence agriculture for their livelihood. Rural development, which aims to improve the quality of life for these people, has been a Government priority since the country (formerly the New Hebrides) gained independence from Great Britain and France in 1980.

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The country consists of an irregular 'Y'-shaped chain of some eighty islands stretching for more than 800 kilometres in the S.W. Pacific Ocean (Figure 1). Nearly 90% of the total land area (11,800 km²) is covered by the ten largest islands which are mountainous and covered in either natural rain forest or secondary bush. Vanuatu has very little in the way of natural resources apart from its land. Fortunately, much of this land is highly fertile and it was soon recognised that land would have to form the basis of any economic development.

Consequently, the first 5-year National Development Plan (Anon. 1982) for 1982-86, emphasised that the way to economic self-reliance lay through increased food production. This involves growing sufficient crops to meet everybody's needs and to replacing costly (and often less nutritious) imports, as well as growing cash crops to earn foreign exchange and to generate national wealth to enable the country to fund future development.

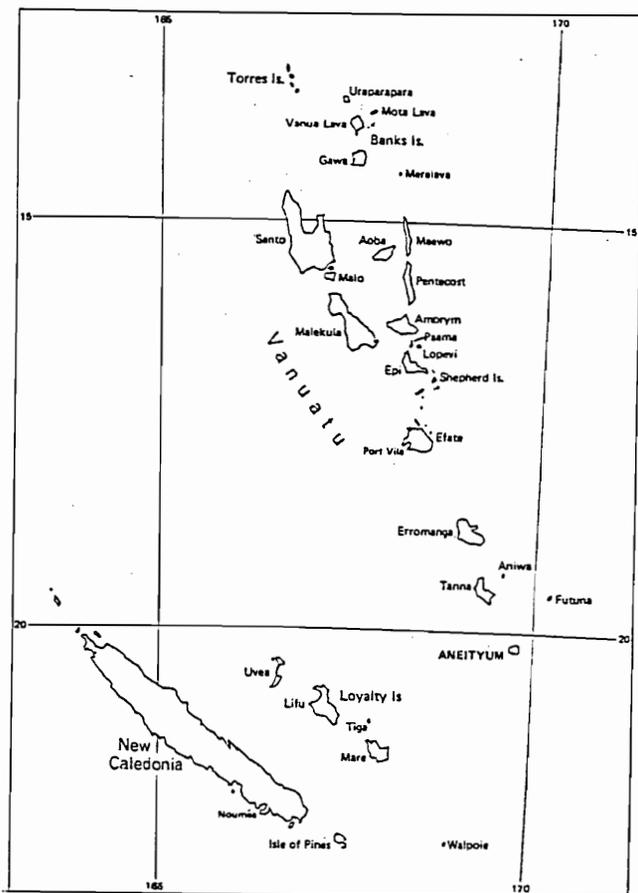


Fig. 1. Map showing the main islands of Vanuatu and the relation of the country to other Pacific countries

Agriculture And Forestry

In accordance with the Development Plan, major cocoa and coffee development projects have been initiated as joint venture enterprises between the Government, the Commonwealth Development Corporation and local landowners. Also, a large cattle development project is soon to start on Espiritu Santo.

Forestry development to produce high quality timber for export and for local needs has also been given high priority by the Government. The natural forest resource in Vanuatu is generally very poor in valuable timber trees, which are widely scattered thus making logging an expensive operation. Consequently, forestry development has been largely with exotics.

Following a number of species trials established in the early 1970s, *Cordia alliodora* emerged as the most promising species for the wetter sites, whilst *Pinus caribaea* var. *hondurensis* proved to be well suited to the drier southern islands (Neil, 1983). Once suitable species had been identified, a number of small-scale (5-10 ha) 'Local Supply Plantations' (LSPs) were established on various islands. More recently, however, larger, export-orientated 'Industrial Forest Plantations' (IFPs) have been established, for example, on Aneityum, Erromango, and Pentecost.

It should be emphasised that most of the land on which forest development is occurring is very fertile, hence the success of *C. alliodora* which is known to be a rather demanding species. In other countries such land would normally be utilised for agricultural development.

The rapid expansion from LSPs to IFPs, some of which involves planting up to 200 ha per year on one site, is not without its problems, of which land is often foremost.

Land Issues

When Vanuatu gained independence, the new Constitution decreed that all land revert to its indigenous owners (apart from land the Government sees fit to acquire in the public interest). This marked a turn-around in policy following a long period since the mid-nineteenth century when most of the 'best' land (i.e. accessible coastal areas generally) had been gradually alienated particularly for coconut plantations, first by missionaries and small traders, but later by much larger concerns. Such dealings were often unscrupulous, showing little or no respect for the customary significance of land in Vanuatu.

Custom issues tend often to be considered a constraint on development because of their apparent resistance to accept change. However, it is Government policy to see 'custom' and the traditional ways used as a force for development. Custom is dynamic and in the words of the Prime Minister, 'There is no reason why it should not continue to change and adapt itself as it obviously has done in the past' (Lini, 1980).

It soon becomes evident to anyone dealing with land-related issues that 'land has values which transcend issues of use and property' (Lane, 1971). Land is of fundamental importance in Melanesian culture — an importance which is often difficult for 'outsiders' to fully appreciate. '... custom land is not only the site of production, but it is the mainstay of a vision of the world. Land is at the heart of the operation of the cultural system. It represents life, materially and spiritually' (Bonnemaïson, 1984).

The land tenure pattern in Vanuatu is no easier to understand. In brief, land is generally held in common ownership by clans, there being no individual ownership as such.

Boundaries are often ill-defined, due to the oral tradition of land ownership declining with increasing Western influence.

Rural development inevitably disrupts this traditional land tenure system, although since Independence, the customary values have been given priority. Before any forestry development takes place now, the customary landowners of the land in question must first be identified and permission obtained for the use of their land for tree planting. It is important to note that the land always belongs to the custom landowners who retain the right to use the land as they wish, provided that no damage is done to the trees. A lease must be drawn up which is acceptable to the landowners and the Government. Whilst this is undoubtedly a fair system, ensuring that any rural development has the full backing of the landowners, it usually involves a great amount of time and effort in securing such agreements.

All forestry development in Vanuatu thus depends completely on extension work to obtain sufficient land for plantations. With the small LSPs, a verbal agreement from the landowners was generally sufficient. However, forestry in this country has recently come of age and larger scale plantations currently being established require considerable amounts of land. Obviously, these IFPs were sited on islands where there is little population pressure and adequate areas of suitable land. Even so, the protracted procedure for obtaining land agreements has meant in the past that plantations have been started on some islands without all the land needed to economically justify such projects being leased.

PENTECOST — A Case Study

As a prime example of the land problems forestry faces in Vanuatu, the Pentecost IFP will be briefly outlined.

The IFP was started in mid-1983, the original project proposal calling for some 7,000 ha of land to be planted with *C. alliodora*. However, despite early enthusiasm for the project by landowners, requests for additional areas of land for forestry have met with some reluctance on the part of the landowners. Many meetings and conversations with the local people have revealed that their main concern is a worry over the loss of possible future garden areas. As population pressure is minimal in the proposed project area, undoubtedly, there are other issues involved. For example, the difficulty in comprehending something as new and the long-term nature of forestry development, as well as intangible traditional concepts regarding land use.

This is where the idea originated that an approach more sympathetic to their traditional land use patterns — particularly subsistence gardening — would help alleviate their worries over leasing land for forestry by demonstrating that forestry and agriculture can work together.

Current silviculture of *C. alliodora* is to cut 10 m lines through the natural bush poisoning, frill girdling, burning or felling the remaining unwanted trees to gradually open the canopy. Stumps of *C. alliodora* will then be planted at 2.5 m intervals in each line, which are regularly weeded (Hudson, 1984; Neil, 1984A).

Agroforestry demonstration plots and trials have been established inbetween the lines of *C. alliodora*. These have concentrated on local subsistence crops which would traditionally be grown in 'gardens' created during shifting cultivation operations. Root crops, especially yam, taro, manioc and sweet potato are the staple food of Ni-Vanuatu and thus are the main garden crops. Other crops frequently planted include 'island cabbage', sugar cane, bananas and pawpaw. Table 1 lists the common subsistence crops grown in Vanuatu.

Table 1
Common Subsistence Crops of Vanuatu

TARO	ISLAND TARO	(<i>Colocasia esculenta</i>)
	FIJI TARO	(<i>Xanthosoma</i> spp.)
	WATER TARO	(<i>Cyrtosperma chamissonis</i>)
	GIANT TARO/NAVIA	(<i>Alocasia macrorrhiza</i>)
YAM		(<i>Dioscorea</i> spp.)
MANIOC/CASSAVA		(<i>Manihot esculenta</i>)
KUMALA/SWEET POTATO		(<i>Ipomoea batatas</i>)
ISLAND CABBAGE		(<i>Abelmoschus manihot</i>)
SUGAR CANE		(<i>Saccharum</i> spp.)
CORN/MAIZE		(<i>Zea mays</i>)
KAVA		(<i>Piper methysticum</i>)*
BANANA		(<i>Musa</i> spp.)
PAW-PAW/PAPAYA		(<i>Carica papaya</i>)
PINEAPPLE		(<i>Ananas comosus</i>)
PUMPKINS, MELONS, etc.		(<i>Cucurbita</i> spp.)
COCONUTS		(<i>Cocos nucifera</i>)**
LAP-LAP		(<i>Meliconia</i> spp.)

+ beans, cabbages, etc.

* Kava is also a cash crop on a limited scale.

** Coconuts, as well as being the most important export product, are consumed locally and can thus be considered a subsistence crop.

Note: Where markets are close by (e.g. Port Vila and Luganville), these subsistence crops are sold. In most of Vanuatu, however, the markets for such perishable food crops are extremely limited.

Kava (*Piper methysticum*), too, is commonly found in gardens, the roots of which are used to prepare a traditional custom drink — an integral part of the Melanesian cultural heritage.

The custom practices of planting these crops were followed at all times to enhance the demonstration value of the plots and to show that traditional methods are still applicable in an agroforestry situation.

The following demonstration/trial plots have been established in one year old *C. alliodora* plantations:

- a typical 'Pentecost garden' with a mixture of virtually all the common subsistence crops;
- a trial with eight varieties of sweet potato;
- a manioc/cassava trial (6 varieties) Plate 1;
- a taro trial (3 species/13 varieties);
- a yam trial (12 varieties);
- a plot of kava;
- trials with coffee (arabica and robusta), cocoa and cardamon are in preparation.

In other *C. alliodora* plantations on Pentecost, kava and taro are being successfully grown between lines of three year old *C. alliodora*.

Initial findings show that there is no apparent reduction in yield of these crops and no interference with the trees under such conditions. From these early results a general set of guidelines as well as notes on specific crops have been drawn up (Jacovelli & Neil, 1984).



Plate 1. Two varieties of manioc (*Manihot esculenta*) planted in the inter-rows between the lines of *Cordia alliodora* (4-5 months old) on Pentecost Island.



Plate 2. Plots of kava, *Piper methysticum* (foreground), and manioc, *Manihot esculenta* (rear), either side of a row of *C. alliodora*.

Another example of agroforestry within the current forestry programme includes cattle grazing under both *C. alliodora* and *P. caribaea* in LSPs and IFPs on various islands (Erromango, Aneityum, Pentecost, Espiritu Santo).

Other Agroforestry Possibilities

The acceptance by the customary landowners of the combination of subsistence gardening and forest plantations is a first step in encouraging the expansion of forest development. An obvious next step would be to encourage the establishment of cash crops between the lines of trees, which would offer earlier returns to the landowner and should contribute to the national economy.

This is in accordance with the Government's policy within the National Development Plan and would appear to offer a more rational and optimum use of the limited land resource that Vanuatu has available for its development. The Forest Service is at present establishing trials with coffee and cocoa under *C. alliodora*.

C. alliodora In The Agroforestry Situation

C. alliodora is well known in agroforestry elsewhere (Johnson & Morales, 1972; Combe & Budowski, 1979; Beer, 1981) as it is well suited to such associations. It is a strong light demander which can be grown in an open situation and yet form a straight, self-pruned trunk. Despite having a fairly dense crown when young, as the trees get older, the crown becomes thinner, thus producing some shade, but still allowing light to reach the ground. Generally, the bark of *C. alliodora* appears to be unpalatable to cattle and assuming the trees are old enough to withstand trampling, receive no damage when plantations are grazed.

Despite the apparent suitability of *C. alliodora* to conditions in Vanuatu and our agroforestry work, the limitations of using only one tree species at one spacing (10 m x 2.5 m) are recognised. A number of problems are now emerging with the species. On some sites, it has not performed as well as originally expected and also may be severely attacked by a root rot, *Phellinus noxius* (Neil, 1984, in press). Also, under certain conditions, *C. alliodora* forms a large lateral root system which may compete with the roots of agricultural crops.

Hence it is important to consider other possible forest tree species that could be used in place of *C. alliodora*.

Species such as —

- Terminalia brassii*,
- T. calamansanii*,
- Eucalyptus deglupta*,
- Swietenia macrophylla*,
- Toona australis* and
- Cedrela odorata*

have all shown promise in species trials. As yet none have been tested in the agroforestry situation in Vanuatu, but if one or more should become important from a forest point of view, then they should be incorporated into the agroforestry research programme.

Likewise, the effect of espacement should also be considered with these species and *C. alliodora* too. The spacing of a forest plantation has a direct relationship on the time taken to achieve canopy closure. This in turn directly affects the kind of crops that can be incorporated into an agroforestry system.

