



Smallholder tree farming in the Philippines

A comparison of two credit programmes

E.L. Hyman

E.L. HYMAN is an environmental planner with the Office of Technology Assessment of the United States Congress. He wrote this article as a result of work in the Philippines under a grant from the Environment and Policy Institute of the East-West center, Honolulu, Hawaii. The author would like to acknowledge in particular the assistance of E. Seggay, B. Bareng, R. Joves, and C. Sarsadias of the Development bank of the Philippines.

The increasing awareness of the importance of forestry to the economic, social and environmental well-being of developing countries has prompted international aid agencies and governments to look for new ways to encourage tree farming. One way to do this is to remove the financial constraints caused by lack of credit that make it difficult for small, private landowners to establish tree farms even if the potential profits are large. In conjunction with the Development Bank of the Philippines (DBP), the World Bank selected this market-oriented approach for two tree-farming projects. This analysis is based on a survey of participants and interviews with officials.

The first project involves loan financing of small landowners in the vicinity of the mill of the Paper Industries Corporation of the Philippines (PICOP) for pulpwood production. The second project aims at reducing the fuelwood shortage affecting small tobacco farmers in a different region of the country. Additional components of the second project, not discussed here, are for other purposes and in different parts of the country - wood for industrial charcoal use, leaf meal for fodder, and continued financing of pulpwood tree farming under the PICOP project. The second project also broadens the range of potential beneficiaries to include "kaingineros"-landless slash-and-burn farmers.

Other countries or aid agencies interested in replicating this approach elsewhere should be aware of the experience of these two projects and the differences in the specific factors that affected their partial success in one case and failure in the other. This comparison points out the possible dangers of applying a development model that works in one area to diverse conditions elsewhere, even within the same country. Another key question is whether this approach has any potential for improving the welfare of kaingineros, who differ economically, socially, and culturally from small landowners.

I. The PICOP Project

PICOP is the sole domestic producer of newsprint and a major producer of paper in the Philippines. It is one of the few large pulp and paper operations using short-fibre tropical hardwoods as its primary source. After depleting the "red" pulpwood (*Shorea negrosensis* and *Eucalyptus deglupta*) from the concession it received from the Philippines Government, PICOP

began in 1968 to enlist nearby private landowners into tree farming by guaranteeing technical assistance and a minimum purchase price for a fast-growing "white" species (*Albizzia falcataria*). However, the programme did not gain momentum until 1972 when PICOP entered into an agreement with DBP for provision of credit to the participants.

The programme expanded after the World Bank granted US\$2 million in financing in 1974. Loans were offered to tree farmers to cover 75 percent of the costs of tree-farm development and maintenance (excluding land acquisition or harvesting costs); the other 25 percent was expected to be provided by the tree farmers in the form of household labour.

The basic goal of the World Bank project is the supply of 284000 cubic metres of pulpwood to PICOP's mill by 1985, representing about 44 percent of its annual demand. The target requires an estimated 10400 ha of new tree farms.

A second goal is the generation of additional income for small landowners.

A third goal is to provide wage employment for the substantial number of kaingineros in the project area. However, the landless were not eligible for the loans for tree-farm development under the PICOP project.

The fourth goal is the improvement of environmental quality by reducing the depletion of forests and maintaining a forest cover on private lands that are supposed to be submarginal or marginal for agriculture.

The project was conceived as a sustained management system for agroforestry based on area control. Under the original plan, smallholders were expected to (i) plant 80 percent of the site with *falcataria* over a four-year period; (ii) follow a 4 x 4 metre spacing; (iii) apply fertilizer twice a year in the first and second years; (iv) weed three times a year during the first two years and remove underbrush in subsequent years; (v) harvest one-eighth of the total area planted each year, starting in year nine and continuing until year fifteen.

The loan agreement has created an assured market for the wood since PICOP has agreed to purchase all of the pulpwood of the financed tree farms (eight years or older) at a set minimum stumpage price. PICOP is responsible for providing seedlings and technical assistance to participants as well as undertaking some road construction and insect control in the project area. PICOP also pays a small log-loading subsidy and hauling costs for tree farms located within 70 km of the plant.

The project area covers a 100-km radius of the Bislig Bay plant on the island of Mindanao. Five hectares are considered the minimum economically viable tree-farm size for these loans. Loan applicants were required to show either a legal title to the land or proof of legal occupancy. The loans carried a 12 percent interest rate if secured by land collateral or 14 percent if unsecured. Land covered by homestead or free patent leases was not accepted as loan collateral until 1975 when the policy was liberalized due to its limiting effect on recruitment. There is an eight-year grace period for repayment of the loan. Repayment is deducted by PICOP from the harvesting revenues paid to the tree farmer.

Profile of the participants. Of the 3805 tree farmers recruited by PICOP as of January 1981, over 1159 (30 percent) received financing from the DBP. Over 62 percent of the financed tree farms are 10 ha or less, while barely 9 percent exceed 26 hectares. The average size is 11 hectares. Practically all the borrowers already owned the land for their tree farm, which eliminated land-tenure disputes as a problem, but meant that the project did not reach the landless poor. Although few of the borrowers are rich, the average reported income of those in the sample (8700 Philippine pesos) exceeds the national average of 3179 Philippine pesos and survey respondents generally understate their incomes. (In December 1982 the exchange rate was 9.4 Philippine pesos per US dollar.) The sites have an average distance of 1.3 km to

the hauling roads and 58 km to the PICOP mill. Most of the labour for plantation development and harvesting is provided by the households that own the land although there is some hiring of labour at peak periods.

In order of prevalence, the surveyed sites previously had been used for growing food crops, non-food crops, and trees for fruit, firewood, construction wood, or pulpwood. Only 25 percent of these sites previously had been idle or covered with a grass species of little economic use (*Imperata cylindrica*) Thus the use of this land for tree farming has an opportunity cost. For the most part, the project's contribution has been the conversion of land to a higher-value use rather than the expansion of cultivated areas.

Changes in project design during implementation. In the course of implementation, some aspects of the project design have been changed. These changes include the tree-farm development period, agroforestry approach, frequency of fertilizing and weeding, and harvesting schedule.

The original staggered planting scheme has proved impractical. The majority of tree farmers planted their entire area at once for good reasons: lower labour requirements and costs in clearing and planting land and taking care of even-aged tree farms.

In actual fact, the agroforestry approach has never been implemented. Because of a DBP policy against mixing loan purposes, the 20 percent loan portion for financing other crops or livestock has not been provided. Participants who are interested in raising crops or livestock are required to take out separate loans for those purposes. PICOP management and some tree farmers also mentioned that it is better to devote more resources to tree farming because it is more profitable and requires less labour.

The PICOP project

Positive features

An assured market exists;
There is good technical assistance;
Recruitment of participants is boosted by extensive publicity;
The basic infrastructure for supply of seedlings and for tree farming in general already exists;
Smallholders can produce pulp-wood at low costs;
Land in converted to a higher-valued use.

Negative features

Harvesting costs are not included in the financing;
Harvesting bottle-necks are not foreseen;
Government price controls limit the mill-gate price of pulpwood;
The species that was selected is prone to typhoon damage;
Due to inflation, the size of the loans granted cannot cover the full costs of tree-farming activities as they were prescribed in the conditions for the loans.

Hardly any of the tree farmers applied extra fertilizer to their sites and few weeded as often as recommended, stating that it was not necessary. Not unexpectedly, a number of the inspected tree farms did not appear well-maintained in terms of weeding and brushing.

The most serious deviation from the project design is the cutting cycle, and this has caused serious bottlenecks in harvesting. Since tree farmers plant their entire area at one time, they harvest the entire area at age eight in order to recoup their investments as soon and as simply as possible. Also, the tree farmers have no incentive to let their trees grow longer because PICOP does not provide any premium for older logs, even though fourteen-year-old logs are more valuable since they are suitable for export.

Aggregate production. The financed tree farms would have produced 3137700 solid cubic

metres of pulpwood at a per hectare yield of 250 cubic metres or 2510200 cubic metres at a yield of 200 cubic metres per hectare if all targets had been achieved. Although the appraisal report for the project (World Bank, 1974) assumes the lower of the two yields, PICOP states that the higher yield is likely for undamaged tree farms. These financed tree farms were expected to yield 58 percent of the wood produced by smallholders for PICOP. Due to a freak typhoon in 1982, the actual production will be lower than predicted.

It is difficult to estimate how much of this land would have been developed for tree farming in the absence of the loans. Since a sizeable portion of the tree farmers did not borrow funds from DBP, credit could not have been the sole factor in recruitment. Yet, average income tree farmers would find it difficult to afford tree-farm development costs exceeding 10000 Philippine pesos for five hectares.

The net economic benefits of the project to the tree farmers depend on (i) whether tree farmers follow prescribed tree-farming practices or do the more typical amount of fertilizing and weeding; (ii) the assumed yield; (iii) mortality rates. Following the typical tree-farming practices, the internal rate of return would be 31 per cent at high yields (250 solid cubic metres per hectare) or 22 percent at low yields (200 solid cubic metres per hectare). These figures drop to 18 percent and 10 percent respectively if the recommended tree-farming practices are followed. Even when yields are lower at a reduced intensity of maintenance activities, the labour savings outweigh the losses if household labour is valued at the market wage. When labour is shadow-priced to reflect the social costs of tapping under-employed workers, the recommended practices appear more cost effective. All those estimates assume a 21) percent mortality rate of seedlings in the first year which are replanted in the second year, and no significant subsequent mortality of trees. Since the estimates also are based on the intended submarginality of the sites for agriculture, any returns from previous land uses should be deducted from them.

Of course, the economic benefits of tree farming are very sensitive to the mill-gate price which was 77.25 Philippine pesos per solid metre including the loading subsidy, as of August 1981. Many tree farmers claimed that this was too low in relation to harvesting costs. However, PICOP stated that it is unable to raise the price because of government price controls on the newsprint produced from the pulpwood. Tree farmers are not bound to sell to PICOP if they are offered a higher price and notify PICOP in advance. Dugan (1982) notes potential alternative markets for *falcataria* in Taiwan (China), Japan, the Republic of Korea or the Democratic People's Republic of Korea for non-paper products at roughly triple the price offered by PICOP. At present, the farmers do not have access to an organized alternative market in the area. Since tree farmers who decide to sell to PICOP must first obtain harvesting permits from the company, they are anxious to maintain good relations with the company.

[LOADING 8-YEAR-OLD LOGS FOR NEWSPRINT PRODUCTION PICOP'S - assured market guarantees success with the company.](#)

One of the most serious problems encountered in the project has been harvesting bottlenecks and cost. There is a shortage of harvesting contractors because lucrative gold panning in the Agusan River has drawn away potential labourers and the cost of harvesting equipment is high. Moreover since financing does not cover harvesting costs, tree farmers with cash-flow problems are at the mercy of contractors who will accept deferred payments in return for a large share of the surplus value. It is common for harvesting contracts to appropriate 45 percent of the mill-gate price of the pulpwood. This problem was not foreseen in the original design of the project because it was expected that household labour could handle the harvesting of one-eighth of the sites each year over eight years. Many tree farmers also complained about hauling delays. Better arrangements with the private sector for harvesting and hauling are needed.

Another problem is that many tree farmers realize that other crops (in particular, coffee, oil palm, rubber, or another tree-*Leucaena leucocephala*) would be more profitable. Mostly for that reason, only 38 percent of the tree farmers interviewed in 1981 stated that they would continue raising *falcataria* after their harvests. Another 12 percent said that it would depend on the specifics of the agreement or on their own personal circumstances. Those who were willing to participate again cited low labour requirements of *falcataria* (the "lazy man's crop"). Many of these participants lived some distance from their tree farms.

Another critical factor, although unrelated to the design of the project was the occurrence of a freak typhoon in the Bislig area in 1982. Although *falcataria* is a brittle tree that cannot withstand strong winds, the project area is considered outside the typhoon belt and is typified by even rainfall throughout the year, unlike most of the Philippines. This storm caused damage worth 200 million Philippine pesos to the tree crops of both the smallholders and the PICOP concession. A total of 1.6 million cubic metres of wood was damaged with 1.2 million cubic metres recoverable. However, PICOP plans to accept only 342000 cubic metres from the smallholders, recoverage in order to recoup 679500 cubic metres from the company's own concession. As a result, many tree farmers may find it difficult to repay their loans and a local political controversy is brewing (Perez. 1982, p. 10). Since the farmers know that typhoons are rare in the project area, the weather itself should not present a barrier to their future participation in tree farming. However, potential participants may perceive that the company does not act in their interests when a risky situation occurs and current participants may be discouraged by the size of their losses.

Regarding other natural risk factors, only 8 percent of the tree farmers noted problems with pests or diseases, but 64 percent found it hard to protect trees from grazing animals.

One major reason for the successful growing of trees (before the typhoon calamity) was the good job PICOP had done in providing technical assistance and supervision to the tree farmers. This included the hiring of one sector officer per 173 tree farmers to visit the sites, monthly meetings with tree-farmer associations, and a daily radio programme.

Secondly, the existence of an assured market encouraged tree farming. The minimum price guarantee was not sufficient by itself, due to inflation. More important is a willingness to adjust the price as well as the loan size regularly to compensate for inflation. Thirdly, the World Bank project built on the previous experience of DBP and PICOP in the area contributed to the success of tree farming. The basic infrastructure for seedling supply and tree farming already existed in the project area and reliable data were available on the costs and yields of *falcataria* tree farms.

The project was a success from the viewpoint of the company. It reduced the uncertainty in the supply of inputs essential to continued mill operation and was an inexpensive way for PICOP to gain access to pulpwood with low overhead and labour costs. Prior to the controversy following the typhoon, the project also served to improve the company's public relations, especially important because of the prevalence of "New People's Army" agitators in the project area.

From the viewpoint of the participants, the project has been a mixed success, mainly due to the typhoon, the low purchase price, and the harvesting costs. If these issues were to be resolved to the satisfaction of the tree farmers, the project could continue in the future, benefiting both the smallholders and the company.

The Ilocos project is one component of a US\$4.4 million loan from the World Bank to the DBP in 1978. Following a variation of the PICOP model, the loan provides for 8000 ha of fuelwood tree farms in the Ilocos region of northern Luzon (as well as an additional 20600 ha for other purposes elsewhere in the country which are not discussed in this paper).

II. The Ilocos project

The Ilocos project

Positive features

A fuelwood need exists both for households and cottage industries;
The landless poor are eligible for the project;
Leaf-meal fodder is seen as a secondary product;
A nitrogen-fixing species is selected.

Negative features

Local cultural attitudes against incurring debt are not foreseen;
Because of inadequate publicity the people who needed this project most are unaware that they are eligible for it;
Hired labour is inadequately supervised;
The participants are unfamiliar with tree farming and technical assistance or extension services are not provided;
Soil conditions are unfavourable and soil tests are not carried out;
Grazing animals are difficult to control;
Jealousy and political rivalry result in arson;
The dispersed characteristics of the fuelwood market result in high transactions costs.

The Ilocos region is the production centre for Philippine Virginia Tobacco, which consumes large quantities of wood in flue curing. The average tobacco farmer has less than 0.75 ha and cures all his own tobacco before selling it to private or government trades. Households are also facing increasing scarcities of domestic fuelwood. Ilocos is one of the most deforested regions in the country (Philippine Natural Resources Management Center, 1977).

The basic goal of the Ilocos project is the annual supply of 360000 solid cubic metres of fuelwood on a sustained yield basis. A second goal is to provide additional net income and employment for the rural poor. The project also has an environmental quality goal of restoring the productivity of denuded or idle cogon-grass lands. Lastly, an equity objective limits sites to a maximum of 50 ha with no more than 25 percent of the financed area in sites larger than 25 hectares. In contrast to the PICOP project, landless kaingineros are eligible for this loan programme if they have obtained public land occupancy permits from the Bureau of Forest Development. In 1975, Presidential Decree 705 removed the threat of prosecution of kaingineros who were already in place if they obtained permits for remaining on the land and complied with the forest occupancy management code. In 1982 under the Government's new "Livelihood Programme" the emphasis was changed to 'assistance in place' rather than resettlement of kaingineros.

The project provides financing for 90 percent of the costs of tree-farm development (but not land acquisition or harvesting) of a fast-growing leguminous tree, the giant ipil-ipil (*Leucaena leucocephala*). There is a four-year grace period on loan repayments. Loans carried the same interest rates as in the PICOP project until late 1981 when the rate on secured loans was raised to 15 percent. Starting in 1979, chattels on the future production of fuelwood were accepted as collateral instead of land and thus kaingineros became eligible for the lower interest rate on secured loans.

The tree-farming plan is based on "coppice rotations". In other words, the trees would be cut back at age four to a height of 30 cm and allowed to resprout for three- or four-year cutting cycles. The seedlings supplied by the Bureau of Forest Development are planted at a close spacing. 1 x 2 metres. The sites are supposed to be submarginal for agriculture; consequently, tree farmers are expected to apply fertilizer in the first and second years. Weeding and singling are required in the first three years. Fertilizer and extension services are supposed to be supplied to tree farmers by the Bureau of Plant Industry (BPI) in exchange for

coupons provided by DBP (World Bank, 1977, Annex 1, p. 4). Unlike the PICOP case, the Ilocos tree farmers do not have a tie-in with a corporate buyer, nor do they receive any marketing assistance from DBP.

[GIANT IPIL-IPIL SEEDLINGS AT ILOCOS PROJECT NURSERY - a fast-growing fuelwood species](#)

All of the participants in the Ilocos region are landowners. Although kaingineros are eligible to take out loans, none have done so. Four-fifths of the participants admit annual household incomes exceeding 6000 Philippine pesos, while two-thirds are above 10000 Philippine pesos. Although these people are not rich, they have more than the average income for the region and the nation. The mean size of financed tree farms is 12.5 ha while the median is 8.0 hectares.

The tree-farm sites tend to be in the uplands away from the tobacco-growing centres along the coastal plain and often are distant from the residences of the participants. Before planting ipil-ipil, only 5 percent of the sites had been idle. In order of prevalence, the sites had been used for grazing livestock, wild trees kept for fuelwood or polewood, rice growing, and fruit trees.

Changes in project design during implementation. The main change in project design has been the need to open up the geographic eligibility for the project to the entire country due to the low recruitment rate in the project area.

Within the region, some tree farmers have taken short cuts by relying on direct seeding rather than the transplanting of seedlings and those tree farmers generally failed to produce viable plantations. Few of the tree farmers have done the recommended amount of fertilizing and weeding. In actuality, the coupon system for fertilizer and extension services that was part of the design of the project has never been implemented despite a memorandum of agreement between DBP and BPI.

As of April 1981, only thirty-six participants had signed up for the project, comprising a total of 442 hectares. Slightly more than 30 percent of this area is in sites larger than 25 hectares. From an economic point of view, government plantations would have been a more effective way to meet the wood demands of the tobacco industry and households, but this would not have achieved the social goals of the project.

The reasons for the low participation rate in this project include regional cultural attitudes toward debts, insufficient publicity, competition from other government tree-farming programmes, perceptions regarding land collateral requirements, and tree-farm size restrictions.

Landed Ilokano farmers dislike borrowing money from banks for any purpose. Instead, they rely on their own relatively high rates of savings and the equity of relatives. In some cases when the younger generation is willing to take out a loan, older members of the household who control the land titles are not.

Furthermore, kaingineros are subsistence farmers unaccustomed to a cash economy. Thus, it is not surprising that they are wary of loans that may tie them to the Government and could land them in jail if they fail to repay them. In addition to covering the labour and material costs of tree-farm development, these people still have to meet their daily needs for food and do not have any savings that allow them to take risks.

One of the applicants, a journalist, blamed inadequate publicity as a cause of the low project recruitment rate. Most of the applicants first learned about the project by word-of-mouth through other participants or friends and relatives rather than radio announcements, newspaper articles, advertisements, or public meetings. A broader-based campaign might

have sparked the interest of more than a few elite. Nor was there any special outreach programme for kaingineros who live in remote areas and have little contact with the media. Kaingineros need to be reached through face-to-face communication with people they have learned to trust over a period of time.

Some of the demand for tree farming in the region has been deflected by other government programmes. For example, the Bureau of Forest Development leases a small number of one hectare plots of public land for agroforestry, but does not offer loans.

The public's perception of land collateral requirements may also have been a barrier despite a much more liberal collateral policy for this project than for the PICOP project. In fact, DBP tried to help arrange public land leases for potential participants, but the Bureau of Forest Development did not want to deal with small individual leases which it defined as those below 1000 ha and it wanted tree farmers to deposit 20 percent of the leased area as collateral.

Restrictions on maximum tree-farm size slowed the achievement of tree planting goals. Malliari (1981) notes that many Filipinos imitated successful examples of large landholders. This view is borne out by the number of participants who cited one large tree farmer as their source of information on the project. Because smallholders are risk-averse and short of capital they want to see that an undertaking is economically worthwhile.

The economic analysis of this project is very sensitive to the yield assumption (Hymen, in press (b)). The base yield of 123 solid cubic metres per hectare is taken from standard tables for giant ipil-ipil on site class 13 in the Philippines (Bonita, 1981). The "medium yield" estimate further assumes 100 percent replacement of dead seedlings. The "low yield" estimate accounts for a net seedling mortality of 30 percent. Economic analysis is also sensitive to the wage rate since most of the costs are for labour. There are some variations in wages paid for casual, daily labour. Including an allowance for food, common wage rates ranged from 13 to 18 Philippine pesos per person per day. At the "medium yield", the internal rate of return to the tree farmers exceeds 18 percent at both wage rates. Yet, at the "low yield" which better approximates reality, the rate of return exceeds 14 percent. However, the opportunity costs of converting the land to tree farming should be deducted from these figures.

The tree mortality rates of the flocks participants have been quite high - about half the tree farmers estimated mortality at more than 40 percent. This poor performance has resulted from locos natural conditions, lack of tree-farming knowledge, bad labour relations between tree-farm workers and absentee owners, grazing animals, the dispersed nature of the fuelwood market, fires, and infrastructure under development.

In general, the soils in the Ilocos region are poor; they are rocky and acidic. Although it is well established that low soil locos greatly retards the growth of ipil-ipil, there has been an over-reliance on this species in all forestry programmes in the Philippines (Hymen, in press (a)). The soils are not tested on the sites before the loans are granted and repeated applications of lime to increase pH would be expensive due to the lack of commercial sources in the region and extra labour involved.

Climate has also been a problem. The Ilocos region experiences a long dry season of seven to eight months followed by a period of intense monsoons and destructive typhoons.

Most of the participants had no previous experience with forestry and two-thirds of them have never been visited by a forester or extension agent offering tree-farming advice. The responsible government agencies were lax in this regard.

Many of the participants live in urban areas distant from their tree farms and entrust management to a caretaker. In some cases, that worked out well, but often it led to inadequate supervision of badly motivated and poorly paid hired labourers.

Nearly 44 percent of the participants have found it hard to protect trees from grazing animals (carabaos, goats and cows) or rodents.

The demand certainly exists for the output relative to the existing market in the region, but the location of some of the tree farms is remote and the transaction costs of sales to small tobacco farmers and individual households would be high. Tree farmers might find it inconvenient to locate small buyers. In addition, wood is bulky and hence expensive to transport.

Five of the tree farms have been totally destroyed by fires. Arson was suspected in those cases for motives of economic jealousy or local social or political conflicts.

About 17 percent of the tree farmers criticized DBP branch officials as "uncooperative" or "unhelpful", citing rigidity in collateral requirements, tight availability schedules or too many demands before loan releases, and too rapid a willingness to cancel subsequent loan releases or declare borrowers in default and subject to immediate repayment. Most of the low evaluations of DBP were made by unsuccessful tree farmers.

III. Financing smallholder tree farming

Some general principles for the financing of smallholder tree farming can be drawn from these two projects.

Under the right conditions, credit can be a useful lever for encouraging effective tree farming by small landowners. However, this requires paying close attention to local cultural factors and the complementary inputs and services provided to borrowers. Otherwise, such a project will be doomed to low participation rates or high failure and default rates. It is also questionable whether loans at subsidized, but nevertheless, high interest rates can provide sufficient incentives for impoverished, landless farmers who are unable to bear risks.

One of the important conditions for success in smallholder tree farming is to have a cooperating institution that is active in supporting the project and marketing the output. In certain countries, a responsible corporation with a direct economic stake in the success of the tree farmers may be necessary. However, an active government agency with sufficient resources and a decentralized organization can be very successful as the experience in the Republic of Korea (Gregersen, 1982) and Gujarat in India (Khanchandani, 1981) demonstrates. In Scandinavia, some paper companies work through tree-farmer cooperatives as a way of organizing the farmers for their economic protection and as a means of turning them into better tree farmers. The success of cooperatives depends on cultural values and their political acceptability. Due to the orientation toward the family, cooperatives have generally been unsuccessful in the Philippines. The availability of technical assistance is critical where most participants are new to tree farming.

In addition, wood-pricing policies should be fair to provide incentives for participation. Arrangements should also be made for harvesting and transportation of wood if the existing infrastructure is underdeveloped or if the private sector is exploitative. Extensive publicity campaigns will be necessary to ensure participation and should include direct contact with the rural poor in remote areas. Project designs may also have to be more flexible if landless people are to be reached rather than the more well-to-do educated residents of villages or provincial towns.

Natural factors may pose constraints to tree farming although their effects can be minimized by matching the proper tree to the requirements of the site. There is no single 'miracle tree' for all purposes. Lastly, cost effective protection against grazing and fires can be critical in

ensuring the success of this type of programme.

References

BONITA, M. 1981 Timber management and harvesting criteria for mass selection of fuel wood species. In *Proceedings of a conference on firing criteria for mass selection of fuel wood species*. Honolulu, East West Center Resource Systems Inst.

CRUCILLO, D. 1981 (Central Office, DBP). Pers. comm.

DUGAN, P. 1982 (Forester, US Agency for 1982 International Development, Manila). Pers. comm.

GREGERSEN, H. 1982 *Village forestry development in the Republic of Korea: a case study*. Rome, FAO. Report GCP/INT/347/SWE

HYMAN, E. Forestry administration and policies in the Philippines. *Environmental Management*. [In press (a)]

HYMAN, E. Loan financing of smallholder treefarming for fuel wood production in the Province of Ilocos Norte, Philippines. *Agroforestry Systems*. [In press (b)]

KHANCHANDANI, M. 1981 Establishment of forest energy resource base in Gujarat. *The Indian Forester* 107: 777-784.

MALLIARI, A. 1981 (Laoag Branch. DBP). Pers. comm.

PEREZ, R. 1982 Falcata growers urge PICOP to buy damaged trees. *Philippine Daily Express* (11 May 1982): 10.

PHILIPPINE NATURAL RESOURCES MANAGEMENT CENTER. 1977 *Forest inventory of the Philippines using landsat multispectral scanner digital data*. Quezon City, Govt of the Philippines.

WORLD BANK. 1974 *Philippines: appraisal of a smallholder treefarming project loan 998-PH*. Washington, D.C., World Bank.

WORLD BANK. 1977 *Philippines: appraisal of a smallholder tree farming project loan 1506-PH*. Washington, D.C., World Bank.

