

Memo: Report on BUS ticket no. B8

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Possibilities of social forestry and agro-forestry for the production of biomass in the tropics

Definition of the problem

Large scale (energy)plantations are relatively labour extensive, because of this social problems can arise in densely populated areas in developing countries. Plantations can also be established at the expense of agricultural lands. For this reason social- and agro-forestry have been promoted as a social friendly alternative. In these systems each individual farmer can grow a limited number of trees and supply these together to a timber processing industry. So far there are no examples known for the production of biomass, but there are examples in the pulp- and paper sector. Is it possible to predict whether this could also work for producing biomass and if so: in which way?

Questions

1. What are the experiences with such a sound social production method?
2. Could similar systems work for the production of biomass?
3. If so, under which conditions?

Summary

Plantations can effectively meet the ever-increasing demand for many different wood products, including biomass. Although this has been recognized for over a century, progress in getting large areas into production has been much slower than projected. There are many reasons for the shortfall in tree plantation production (see e.g. Report on BUS ticket no. 23), including a general lack of effort in actively engaging communities in plantation schemes in a way that benefits both the small-scale producers and the wood products industry.

An important means of expanding plantation establishment, thereby benefiting small-scale producers, is through corporate-smallholder partnerships which include agreements with industries to purchase wood produced by (but not limited to) smallholders. While there are some examples of successful corporate-smallholder partnerships in the tropics, many attempts have been only partially successful or have failed entirely in producing significant quantities of wood in ways that benefit both producers and users.¹

If partnerships between growers and forest companies adhere to and learn from the principles mentioned in the various studies on this subject (see Annex 1), it should be possible to establish a similar system for the sustainable production of biomass for bioenergy. It is interesting to see that various production scales are possible through corporate-smallholder partnerships: from producing biomass on a very small-scale for a local combustion plant or biodiesel engine, to PICOP size of over 20.000 ha and perhaps even larger.

¹ http://www.fao.org/documents/show_cdr.asp?url_file=/DOCREP/005/Y4803E/y4803e01.htm

1. Case study: The agro-forestry development plan and practices of the Paper Industries Corporation of the Philippines (PICOP)²

A short version of the PICOP-case presented here was also included in the study by Shell and WWF published in 1993: Shell/WWF Tree Plantation Review³. Study nr. 7 describes 'The social and cultural issues of tree plantations in local economies, and their implications for management'.

In Annex 1 an overview is given of other relevant projects on forest company-community partnerships e.g. in KwaZulu-Natal (South-Africa), Tasmania, Western Australia, Brazil, India, Thailand and Indonesia.

Origin of the PICOP-project

The Paper Industries Corporation of the Philippines (PICOP) is an integrated wood-based industry which obtains most of its supplies of raw material from its own concessions. To obtain further sources of supply for growth and expansion it has embarked on an agro-forestry programme involving landowners whose land is outside PICOP's own concessions.

Planned agro-forestry began in the Philippines in 1967 through the initiative of forester Nicholas Lansigan, then PICOP Assistant Vice-President for Forestry, in setting up the PICOP programmer. This is essentially a self-help programme for the improvement of the socio-economic welfare of the people living near PICOP's concessions, and is especially designed to develop supplementary sources of pulpwood for the pulp and paper mill at the town of Bislig.

Planting began in a very modest way in 1968 with a few sceptical landowners who were reluctant to undertake tree farming. Progress accelerated considerably in 1972, when the farmers obtained their first earnings from early thinnings, and realized the great potential of agro-forestry for improving their living standards.

In 1972 also, the Development Bank of the Philippines (DBP) became interested in the project, after a study had been submitted to it by PICOP and bank officials had visited the twenty-two demonstration tree farms in the Bislig area. In view of the praiseworthy objectives of the project they agreed to provide funding for the participating farmers. Later the World Bank, recognizing that the project was a viable and profitable one, took part in the financing through the DBP. It was considered that the PICOP plan would be a good model suitable for duplication not only in the Philippines but in other developing countries as well. A condition of the loan to farmers was the inclusion of a pulpwood marketing agreement between the farmers and PICOP.

Progress

By December 1980, 3,800 farmers were participating in the PICOP project, as compared with 22 in 1969. By that date 11.3 million trees of *Albizia falcataria* had been planted at a normal spacing of 4 metres by 4 metres on 22,600 hectares. Of the participating farmers, 44 per cent had availed themselves of the finance provided by DBP and the World Bank, and 56 per cent used their own resources.

With an average yield on an eight-year rotation of 250 cubic metres of pulpwood per hectare, the potential pulpwood supply was about 760,000 cubic metres per annum. At 72.75 pesos per cubic metre, this will provide the farmers with a total of about 51.4 million pesos year (in 1980, 1 U.S.\$ = 14 pesos).

Actually, between 1975 and 1979, before the plantations were fully mature, PICOP had already bought 660,579 cubic metres of pulpwood from farmers, valued at 37,963,500 pesos. (2.7 million US\$). During the first half of 1980, 119,932 cubic metres were sold to PICOP for 13,248,600 pesos (almost 1 million US \$).

² <http://www.unu.edu/unupress/unupbooks/80502e/80502E0d.htm>

³ Shell/WWF, 1993, Guidelines: Shell/WWF Tree Plantation Review, Shell International Petroleum Company Limited and World Wide Fund for Nature, London

PICOP Incentives for Agro-forestry Farming

1. Assistance in locating and acquiring vacant public agricultural lands.
2. Technical advice in determining which portions of the land are good for food cropping and livestock farming and which for tree growing.
3. Technical advice on the preparation of land for planting, methods of planting, maintenance and management of tree farms and marketing of pulpwood trees.
4. Technical advice on the methods of planting, cultivating, processing and marketing of food crops, as well as on the raising and marketing of livestock.
5. Assistance in obtaining loans from government financing institution for tree farming and for food production.
6. Providing *Albizia falcataria* seedlings the cost of which is payable after the pulpwood is harvested, without interest.

Details of the Agro-forestry Development Plan

Under the "Agro-forestry Development Plan for Farmers" PICOP staff not only guide the farmers in growing fastgrowing trees for pulpwood, but also give advice on growing food-crops and on raising pigs, poultry, cattle and fish. The general objective of the plan is to assist in the socio-economic uplift of the people, particularly the small landowner-farmers, as well as the members of their families. through a self-help agro-forestry project. The specific objectives are (a) to assist the farmers to increase their production of cereals, vegetables, fruits, meat and fish, and (b) to assist the farmers to grow fast-growing pulpwood on their privately owned land for sale to the PICOP pulp and paper mill. The concept of the project is to develop the land intensively, by devoting 20 per cent of the most suitable land to production of farm crops and livestock, and using the remaining 80 per cent of poorer land for tree farming. Intercropping of annual food crops, such as rice, maize, root crops, vine crops, and vegetables, between the young trees, possibly until they reach the age of three years, was advised. It provides the farmer and his family with additional food and cash income, and helps in weeding and maintenance of the tree plantations.

Under the loan assistance programme of the DBP and the World Bank, landowner-farmers who own from five to fifty hectares of land, outside the PICOP concession, but within 100 km distance by road from the PICOP mill, can obtain loans for the development of their land, both for food and pulpwood production.

Three methods of agro-forestry farm management are recognized. The first is used where there is existing good second-growth forest. Here on ten hectares, two hectares will be used for food-crops and livestock, while the remaining eight hectares will be managed for pulpwood by harvesting the trees which reach pulpwood size each year, and allowing the smaller ones to continue to grow.

In the second case, second-growth forest is converted into cropland and tree plantation. As before, on a ten-hectare plot, two hectares are used for foodcrop and livestock production, and of the remaining eight hectares, one hectare is cleared of secondary forest and artificially planted with fast-growing trees each year. In the third case when the land is bare of trees, two hectares are planted with foodcrops, etc., and one hectare is planted with fastgrowing species each year.

Economics of Agro-forestry PICOP Tree Farming Project

I. Gross income from the average harvest of 250 m³ of *Albizia falcataria* per hectare in the ninth year, and selling at the rate of 72.75 pesos/ m³, totals 18,187 pesos (1300 US\$)

II. Costs⁴ Establishment costs

1. Land clearing and preparation 300 pesos

⁴ Costs in (1980) pesos. Not included is the labour-income of the working Agro-forestry farmer and/or the members of his family, in such activities as land clearing and preparation, lining, staking, holing, planting and replanting, weeding, cultivation, fertilization, harvesting, hauling to roadside, debarking, and cutting of pulpwood to convenient length of 2,5 m.

<p>2. Purchase and handling of seedlings, lining, staking, holing, planting and replanting 755 pes.</p> <p>3. Weeding, cultivation and fertilization 645 pesos</p> <p>Sub-total 1,700 pesos (i.e 121 US\$)</p> <p style="text-align: center;"><u>Harvesting and transport</u></p> <p>1. Harvesting and transporting to roadside, debarking and cutting to convenient length of 2.5 metres at the rate of 32.50 pesos per m³ based on 250 m³ harvest per hectare totals 8,125 pesos</p> <p>2. Hauling from roadside to mill site (subsidized by PICOP as far as 100 km road distance from mill site)</p> <p>Sub-total 8,125 pesos (i.e 580 US\$)</p> <p style="text-align: center;"><u>Interest and taxes</u></p> <p>1. Interest on investment of 1,700 pesos upon harvest on the ninth year at the rate of 12 per cent (simple) per annum costs 1,632 pesos</p> <p>2. Land tax and special educational fund for eight years at the rate of 2 per cent yearly of the assessed value of the land, is 560 pesos per hectare</p> <p>3. Contingencies including other government levies 2,000 pesos</p> <p>Sub-total 4,201 pesos (i.e 300 US\$)</p> <p>Total cost per hectare 14,000 pesos (i.e 1000 US\$)</p> <p>Net income per hectare at the ninth year 4,160 pesos (i.e. 297 US\$)</p>

Conclusions

- The PICOP agro-forestry programme has shown that the private sector can be an effective partner of the government in making the hills and mountains "greener" by planting economic trees. Agro-forestry not only contributes to raising the socio-economic standards of the people, but is also an effective means of forest conservation, forest protection, maximum utilization of land, avoiding erosion, improving public relations, community development, and creation of employment.
- Employment is created in preparation of land for food and wood-pulp production; in planting, maintaining, harvesting and marketing trees; and in producing, harvesting and marketing farm crops and livestock. The results are: increased family income, better education, improved health, and more active family participation in the affairs of the community and the government.
- At present, in addition to the 3,800 participant farmers, 11,400 labourers, 65 truck drivers and 65 truck helpers are employed as a result of the project, under the management of the farmers themselves, and on their payroll. Thus a relatively small-scale project has benefited 15,330 people plus their dependents. This is a great step forward in the fight against poverty.
- Agro-forestry as practiced in PICOP is simple, practical, economical, profitable and duplicable. It is hoped that such schemes will, in fact, be duplicated on a wide scale.

2. When do such social forestry and agro-forestry schemes work?

Small scale social- and agro-forestry systems are appropriate for timber processing companies:

- when wood is supplied at a lower cost than alternatives would provide, and when continuous supply can be secured

Small scale social- and agro-forestry systems are appropriate for growers:

- when the land used is not required for food production
- when they have security of land tenure (land title may not be essential)
- when the earning from trees compares favourably to alternative land uses
- when they are involved in the negotiations for defining terms and conditions and designing the scheme, including the right to determine when the trees are harvested
- when they receive advance payments from the company to assist them in meeting initial costs
- when tree growing provides a stable and fair source of income in terms of the price of products, an assured market, and access to technical advice and inputs exists
- when regional competitive markets are developed

- when reliable information about the industry is made available
- when they experience labour shortage (e.g. for labour intensive agriculture)

Small scale social- and agro-forestry systems are **not** appropriate for growers:

- who have very little or no land; and may not reach the very poor unless different arrangements are reached, providing them with land for tree growing without restricting food production
- when risk sharing between partners is not appropriate in the local context

Problems between growers and companies may arise from:

- the terms of agreements in relation to the freedom to sell to other buyers, the price for the product and the availability of credit, extension and support. Flexible contractual arrangements are needed
- a lack of financial assistance with the cost of inputs (fertilizer in particular)
- discouragement from the company of diversification of farm production
- lack of incentive for farmer initiatives to manage trees appropriately
- the role of the government, which needs to be clarified and developed

3. Recommendations

1. Empower and train growers associations to negotiate on behalf of the growers and to provide many of the services required, so that they are not entirely dependent on the goodwill of the forest company.
2. Inform growers about the economic viability of small scale social forestry and agro-forestry schemes, long-term market prospects and reliable market information, their capacity to negotiate with the industry, fair returns from joint ventures, market structures, the benefits of small scale forestry for land and water degradation, and tax arrangements.
3. Learn from the agricultural industry, which has a long history of working within these producers/buyers relationships. Future agro-forestry projects may benefit from this extensive working experience.

4. Follow up?

1. Prepare a specific case for which this social forestry scenario can be worked out for the dedicated production of biomass. Search for local partners, sites, species, etc.
2. Put the benefits and costs in a realistic perspective from a 'bioenergy' point of view.
3. Convert the results of this quick-scan into a project proposal, for external funding and with co-funding from the BUS, focussing on poverty reduction and generating bioenergy for the local market.

Annex 1.

Overview of relevant literature on forest company - community partnerships

Results of a workshop held in May 2002 in Bogor, Indonesia, put together with country reports, case studies etc, and published under the title: 'Towards equitable partnerships between corporate and smallholder partners, relating partnerships to social, economic and environmental indicators' (FAO and CIFOR, 2002⁵) is a very interesting document on this matter. It compiled, for instance, an overview of relevant literature⁶, which is presented here.

Arnold, M. 1997. Trees as outgrower crops for forest industries; experiences from the Philippines and South Africa. Rural Development Forestry Network Paper 22a. London, UK, Overseas Development Institute.

Drawing on a number of studies, Arnold presents two long running outgrower schemes in the Philippines and South Africa, operating since 1968, and the mid-1980s, respectively. In the Agroforestry Tree Farming program of the Paper Industries Corporation of the Philippines (PICOP), and three outgrower programmes in KwaZulu-Natal where landholders are growing wood for forestry processing companies, with the companies providing an assured market, and a variety of support services to growers. He outlines how the schemes originated and have developed, and analyses the schemes' impacts on outgrowers and their livelihoods.

He finds outgrower schemes to be appropriate for forest processing companies when wood is supplied at a lower cost than alternatives would provide, and with a measure of security. The appropriateness of the schemes for growers may be when growers obtain reliable income from other sources, when the land used is not required for food production, when tree growing provides a stable source of income in terms of the price of products, an assured market, and access to technical advice and inputs exists. Land security is important also, although land title may not be essential for this. Finally, outgrower schemes may not be appropriate for people with very little or no land, and hence may not reach the very poor unless different arrangements are made, e.g. by providing them with land for tree growing without detriment to food production.

Problems arise from the terms of agreements between growers and companies in relation to the freedom to sell to other buyers, price for product, the availability of credit, and extension and support. Arnold perceives these problems to arise from a broader institutional issue, that is needed to achieve balanced and equitable relationships between growers and companies. He believes growers associations, empowered and trained to negotiate for growers and to provide many of the services required but which are currently only available from the company, need to be formed. He suggests the forestry outgrower schemes may learn much from the agricultural industry, which has a long history of working within these relationships.

Curtis, A. & Race, D. 1998. Links between farm forestry growers and the wood processing industry: lessons from the Green Triangle, Tasmania and Western Australia. RIRDC Publication No. 98/41.

This report outlines the nature of the links between small-scale tree growers and the forest industry in these three important farm forestry regions in Australia, namely joint ventures, cooperatives and on-farm processing. The study found that from the growers' viewpoint, current linking arrangements can be improved. Of primary concern to farmers was the uncertainty about the economic viability of farm forestry, long-term market prospects and reliable market information, their capacity to negotiate with the industry, fair returns from joint ventures, market structures, the benefits of farm forestry for land and water degradation, and concern about tax arrangements. The findings pointed to a need to develop competitive regional markets, to make available reliable information about the industry, for industry to demonstrate its willingness to offer fair prices and hence a reasonable share in profits for growers. In addition, the industry also needed to demonstrate a long-term commitment to farm forestry in regions, either through the development of processing infrastructure or funding of field staff. Finally

⁵ http://www.fao.org/documents/show_cdr.asp?url_file=/DOCREP/005/Y4803E/y4803e09.htm

⁶ http://www.fao.org/documents/show_cdr.asp?url_file=/DOCREP/005/Y4803E/y4803e12.htm

growers needed to develop the capacity to negotiate appropriately, or choose from a range of grower industry arrangements.

Higman, S., Bass, S., Judd, N., Mayers, J. & Nussbaum, R. 1999. The sustainable forestry handbook. London, UK, Earthscan.

In this book issues concerning the sustainable forestry development are raised. Outgrower schemes are perceived to have potential to contribute to sustainable forest development. Based on the review of outgrower schemes in Brazil, India and the Philippines a range of benefits to growers and companies are identified. Outgrower schemes are seen to make good business sense, and increase the potential social benefit from forest management, and hence enhance support for forest managers, including companies, and the support from others, including communities. A case study of the Swiss Lumber Company scheme is presented.

Makarabhirom, P. & Mochida, H. 1999. A study on contract tree farming in Thailand. Reprinted from Bulletin of Tsukuba University Forests No. 15.

This document outlines the historical development of contract tree farming. It provides a general description of contract elements. The incentive for processing companies to enter contract arrangements with tree growers is the assurance of a continuous supply of wood from small-scale tree planting. Case studies of contract tree farming are described in relation to the contractual arrangements, the company objectives, farmers' perspectives, and problems and prospects. The study found that farmers would enter contract tree farming agreements where they experienced poor production or labour shortages. Issues raised by growers were the lack of financial assistance with cost of inputs (fertilizer particularly), poor extension, the discouragement from the company of the diversification of farm production, and the high production risk carried. The author perceived the lack of incentive for farmer initiatives in managing trees appropriately to be of particular concern.

Mayers, J. 2000. Company-community forestry partnerships: a growing phenomenon. Unasylva, 200: 33-41. Rome, FAO.

A range of formal and informal partnerships between private sector companies and communities are emerging as the importance of forest farms for the production of forest goods and services increases. In this discussion, communities may encompass farmers and individuals as well as community groups and cooperatives. To gain an understanding of the arrangements needed to establish equitable partnerships, James Mayers examines a range of existing company - community relationships, including outgrower schemes, and discusses the advantages and disadvantages of these for growing trees outside forests. He outlines some considerations for the development of good partnerships for the secure delivery of forest goods and services. Outgrower schemes, one of the main formal partnership arrangements, vary. While, in some schemes, growers control production with the company paying the market price on delivery, in other schemes companies may have considerable control over production, or may incorporate fixed prices for products.

Sappi, an international pulp and paper company in South Africa, has run outgrower schemes with farmers since the 1980s. The company obtains trees from over 8,000 farmers covering about 88,000 ha in KwaZulu-Natal. Under this scheme, the company provides farmers with marketing and production services, including free expertise, silvicultural training and seedlings. The purchasing agreement is also laid out in the contract. The farmers grow trees on their own, receiving advance payments from the company to assist them in meeting costs which are then deducted from market price paid at harvest. The earning from trees compares favourably to alternative land uses.

A review of the literature available on company-community partnership arrangements in Brazil, India, Philippines, South Africa, and Australia (Arnold, 1997; Clarke, Magagula & von Maltitz, 1997; Curtis & Race, 1998; Roberts & Dubois, 1996) enabled the following lessons for good partnerships to be learned: risk sharing between partners needs to be appropriate to the local context; arrangements need to cover potential fluctuations in market and hence price; growers need to improve their bargaining power to create strong, equitable partnerships; partnerships may have a negative impact on some community members; secure partnerships may require broader cooperation; extension and technical support is crucial; dealing with communities present greater challenges for companies; and the roles of government needs to be clarified and developed.

Race, D. 1999. Forest company - community partnerships: ingredients for success. Discussion Paper based on a meeting held at the International Institute for Environment and Development (IIED), London, UK on 9 April 1999.

In this paper the context in which forest company-community partnerships have developed is outlined after a review of the literature. The paper focuses on outgrower schemes and joint venture, while acknowledging self-processing, market intermediaries and grower cooperatives as additional strategies that have developed in the forest industry if contractual partnerships are not preferred. The benefits of partnerships as well as some disadvantages for growers and the industry have also been highlighted. It identifies the following key issues for the formation of effective partnerships; the need for competitive markets, for flexible contractual arrangements, for reliable assessment of long term market stability, and clarity of roles of third parties involved in, or supporting, such partnerships. In summary, four key elements were identified for effective partnerships.

Roberts, S. & Dubois, O. 1996. The role of social/farm forestry schemes in supplying fibre to the pulp and paper industry. Towards a sustainable paper cycle. Substudy Series 6. London, UK, International Institute for Environment and Development.

In this report social forestry schemes supplying wood fibre to the pulp and paper industry are reviewed in Brazil, India and the Philippines to identify why the schemes were initiated, how they are implemented and the perceived success of the schemes for different stakeholders.

The terms and conditions of the social forestry schemes vary considerably. The findings indicate that social forestry schemes do have a role in providing wood fibre to the industry. However, industry and growers have not always found the schemes to be successful. In addition to the need for stakeholders to be involved in the negotiations for defining terms and conditions and designing the scheme, the success of such schemes is also dependent the following features for growers to become involved: security of land tenure, access to credit prior to harvest, higher returns than alternative land uses, and secure markets for wood. The main issues of concern for growers identified were the choice they have of the species they plant, their rights to determine when the trees are harvested and to whom they are sold, and the price paid for the wood.

Shingi, P. 1997. Production and marketing of poplars in India: a case study. Ahmedabad, India, Centre for Management in Agriculture, Indian Institute of Management.

The case study of WIMCO (Western India Match Company), a processing company manufacturing matches in India, was undertaken to understand the factors leading to the development of farmer-industry linkages for the commercial production of wood. To access additional wood resources for production, his company promoted poplar plantations on farmland. The study covers the poplar production from agro-forestry systems in three northern Indian states.

The study finds that after motivating a large number of farmers to plant poplar a joint scheme involving WIMCO farmers and the National Bank for Agriculture and Rural development was initiated in 1983. Farmers were offered loans, and also saplings, technical support and guaranteed market by the company. Difficulties with the schemes varied between the regions. However, growers were not bound to sell trees to the company. Insecurity of supply became a major issue for the company as growers sold to other buyers, defaulting on loans. Consequently, the company altered their strategy, focussing instead on the production of saplings for sale to growers.

Vuokko R. & Otsamo, A. 1998. Social and technical considerations in establishing large-scale *Acacia* plantations on grassland and bushland in West Kalimantan, Indonesia. In Turnbull *et al.* Recent developments in *acacia* planting. ACIAR Proceedings No. 82. Canberra, Australia.

In this technical paper plantation establishment of *Acacia mangium*, *A. crassicaarpa* and *Eucalyptus pellita* in West Kalimantan, Indonesia under a joint venture between a Finnish and two Indonesian companies is presented. The venture is working closely with communities to secure their participation in the venture as holders of traditional user rights. The arrangements under the joint venture are described, and include employment, a range of community and agricultural development benefits, in addition to ownership of a percentage of the plantation area, with the company guaranteeing to purchase wood at current stumpage rates. The effectiveness of the joint venture is demonstrated

through the take up by villages, which is proceeding without difficulty. At this time the joint venture was operating in 50 villages and plantations covered 15,000 ha.