ON-SITE PROCESSING OF TIMBER AS A KEY TECHNOLOGY
FOR COMMUNITY FORESTRY

Based on Experience Gained by the Social Forestry Development Project
West-Kalimantan, Indonesia
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Article by Martin Lux and Werner Schindele, February 2002

THE CONCEPT: Community Forestry as a Multi-Sector Approach for Integrated Land Management

Community Forestry (CF) is widely understood to be an approach whereby local communities become the main actors in managing adjacent forests. Nevertheless, there is still a broad range of perceptions how and where CF can be implemented. It has been the task of the Social Forestry Development Project (SFDP) in West-Kalimantan to develop a model for the sustainable management of natural forests by local communities. The working definition of community forestry used in the project is as follows:

Community Forestry is a management system whereby the local communities that have traditional rights over the forests, become main actors in, and the main beneficiaries from, the management of the forest resources in an area with sufficient natural forests still remaining so that their management can contribute significantly to an integrated, regional development.

This means the approach, as developed and proposed by Social Forestry Development Project, includes all forest related activities inside and outside existing natural forest areas. It refers to reforestation and land rehabilitation as well as natural forest management with the assumption that the sustainable management of the natural forest resources can be used as a lasting source of capital for rural, regional development. Participatory land use planning, which leads to secure, long-term land use rights and clarification of rights and responsibilities, is a fundamental prerequisite for the implementation of community forestry.

Bearing in mind that community forestry is a cross-sector approach, this article will focus on natural forest management and show how the technical solution developed in the SFDP, can contribute to a sustainable and integrated land management with local communities as main actors and beneficiaries.

BASIC CONSIDERATIONS: Requirements for a Community Forest Management System

Aside from the requirements for sustainability and simplicity, the forest management system is based on two fundamental conditions that allow for a drastically simplified forest management planning, monitoring and control system:

Condition 1  The timber is processed on site and thus no skidding with heavy machines is required.
Condition 2  There are very low capital and fixed costs.

If the first condition is not met, the system cannot be applied at all. The second is rather a matter of degree. Due to the simplicity of the technology to be used, the system can work with very low input and thus, needs only generalized financial planning. The higher the capital input and the higher the fixed costs, the more detailed the financial planning should become.

Most of the people in a typical local community, have no experience in commercial forest harvesting, therefore, their technical skills need to be developed first. This calls for a technology that is robust and simple. Also, the managerial and organizational skills of the local communities are limited and their educational level is usually low. This calls for simple planning and administration systems that concentrate on the basics and deal with the most relevant issues only.

1 The present article is based on various documents prepared by SFDP which will not be mentioned explicitly in the text, but are indicated as reference literature. For further details please refer to these publications.
2 The Social Forestry Development Project (SFDP) is a joint project of technical cooperation between the Governments of Germany and Indonesia. It is implemented on behalf of GTZ by GFA-TerraSystems.
The Forest Department is responsible for providing technical assistance to the communities and for monitoring and controlling the forest management. Taking into account the limited capacities and resources of the Forest Department, community forestry can only be successfully introduced on a larger scale, if the system does not require a high level of input in terms of technical assistance and, if it can be easily controlled and monitored.

The forest management system has to ensure sustainability in economic and ecological terms and must be designed in such a way that over-utilization and degradation of the forest resource is almost impossible in order that regulatory problems can be minimized.

Finally, the system needs to be open to further development, depending on the increasing capacities and skills of the communities.

THE TECHNICAL SYSTEM: On-site processing of timber

The basic steps of the technical system are presented in Figure 1. In the first step, the timber is felled and cross-cut into logs between 3 to 5 meters in length depending on market demand.

In the second step, short-distance skidding of the logs can be implemented according to the requirements of processing technology and local site conditions. The objective of this step is to pull some 5 to 10 logs together in order to organize the timber processing more efficiently. The lighter the processing equipment and the easier the site conditions, the less need there will be for skidding and the shorter the skidding distance will become. The maximum skidding distance should be about 50m. Skidding will be done by using a portable chainsaw winch.

After this, the timber is processed on-site into marketable sizes of sawn timber. Processing equipment can be mobile circular sawmills (such as the Lucas Mill), Alaskan mills or other appropriate sawmilling equipment that can produce high quality sawn timber.

The transport of the sawn lumber to the storehouse consists of two steps. First, it will be transported by manpower to the logging road or track. This will involve labor intensive, value added activities, while having a minimum impact on soils and on the residual stand. The sawn lumber is then transported by tractor and trailer to the community storehouse. The average road density to develop the community forest area will be about 1.2 km per 100ha.

This proposed system is technically both simple and implementable by the local communities. It maximizes labor inputs and utilizes appropriate and easy-to-learn technology. The overall management system can be kept equally simple by focusing on low-intensity harvesting and well understood silvicultural principles as we shall see later in this article.

ECONOMIC AND ECOLOGICAL CONSIDERATIONS

<table>
<thead>
<tr>
<th>Yearly harvesting area</th>
<th>Reforestation Tax payment option</th>
<th>Return on investment (ROI)</th>
<th>Minimum harvesting volume per ha (Break-even point)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 ha</td>
<td>full</td>
<td>60.9%</td>
<td>7.7 m³</td>
</tr>
<tr>
<td></td>
<td>none</td>
<td>84.3%</td>
<td>9.4 m³</td>
</tr>
<tr>
<td>200 ha</td>
<td>full</td>
<td>124.9%</td>
<td>9.4 m³</td>
</tr>
<tr>
<td></td>
<td>none</td>
<td>163.3%</td>
<td>9.4 m³</td>
</tr>
</tbody>
</table>

Table 1: Return on investment and break-even point for different options applying on-site processing of sawn timber (Selling price 150 US$/m³ sawn timber; Exchange rate US$/IDR ca. 1/10,000)
estimated selling price of 150 US-$/m³ for saw lumber is a reasonable figure that has already been achieved by the community forestry enterprises in Sanggau.

The payment of reforestation tax, which amounts to approximately US$32 per m³, will have a major impact on the economic viability of the community forest enterprises and significant implications for the felling intensity as well as the silvicultural viability. For this reason the two alternatives are presented in Table 1.

Finally, the example presents two options for a yearly working area. Only in the 200 ha option would the technical equipment provided under the project scheme, be fully utilized. This means that fixed costs per hectare would be minimized at an annual cutting area of 200 ha.

In the above example, the return on investment would vary between 60% to 160%, while the break-even point would be between 6 and 12m³ of harvestable timber per hectare. The return on investment shows that this harvesting system can be highly profitable and that it is resilient against changes in external conditions. The break-even point shows that already quite small volumes of commercial timber per hectare make community forest operations economically feasible. Thus, the above figures indicate that forest operations under the proposed scheme have a low economical risk of failure.

Because there is only skidding of short logs with light mobile winches over a limited distance, the impact on soil and residual stand will be very low. Figure 2 shows a skidding track that has been used to pull five logs. It is not difficult to visualize that after a few months, any evidence of this skid trail will disappear. The same can be said about the damage around the milling site. If the place is selected and cleaned carefully only a few smaller trees will have to be cut to prepare the milling site. The damage caused by the tree-felling, can be minimized through proper preparation and felling techniques.

FROM ON-SITE PROCESSING TO INTEGRATED LAND MANAGEMENT

Based on the technical system described above, a very simple and sustainable silvicultural system can be developed which can easily be implemented by a community and monitored by both community members and an appropriate government institution such as the Forest Department. The system is based on considerations as shown in Figure 3. Since there is a need for low investment and low fixed costs, there is also a low economic threshold. For this reason there is no need for detailed financial planning. Instead, decisions can be made empirically and thus forest management activities can start without carrying out a complex forest inventory.

Since there is no skidding with heavy equipment and consequently, no defined skid trails, there is also virtually no soil compacting or disturbance and, only minimal damage to the residual stand. For this reason there will be no need for tree mapping since this planning activity is usually considered necessary only in order to effectively minimize damage to soil and the residual stand through improved planning of skid trails. Since the technical system is safe, both from the economic the ecological point of view, a much simpler approach to planning and monitoring can be adopted. Long and medium term planning will focus on the core issues only.

Yield regulation can also be based on some simple assumptions that are in line with investigations and experience in the management of dipterocarp forests in general. The harvesting cycle will be set at

Figure 2: Impact on soil and residual stand by short distance hauling with mobile winches

Figure 3: Implications of on-site processing for planning
20 years. During this period, a maximum number of 10 trees/hectare can be extracted in order to maintain canopy structure, micro-climate, and regeneration capacity.

Additional selection criteria will further ensure economic, ecological and social sustainability (Table 2). These criteria, together with the silvicultural considerations, provide a silvicultural system that can easily be implemented by community members and be monitored continuously by the responsible institutions.

<table>
<thead>
<tr>
<th>No.</th>
<th>Criteria</th>
<th>Justification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dbh above cutting limit (e.g. 60cm)</td>
<td>Harvesting of mature trees only; silviculture</td>
</tr>
<tr>
<td>2</td>
<td>Exclude steep slopes</td>
<td>Ecological, environmental, and safety reasons.</td>
</tr>
<tr>
<td>3</td>
<td>Outside river buffers</td>
<td>Protection of riparian zones</td>
</tr>
<tr>
<td>4</td>
<td>Distance from seed tree of commercial species</td>
<td>Natural regeneration of gaps; silviculture</td>
</tr>
<tr>
<td>5</td>
<td>Distance from next harvested tree (e.g. &gt; 20 m)</td>
<td>Even distribution of gaps; silvicultural reasons</td>
</tr>
<tr>
<td>6</td>
<td>Change species and take big trees first</td>
<td>Maintenance of bio-diversity; silviculture</td>
</tr>
<tr>
<td>7</td>
<td>Consensus with adat land tenure holder</td>
<td>NTFP, sacred places, etc.</td>
</tr>
</tbody>
</table>

Table 2: Tree selection criteria for the proposed silvicultural system

The simplicity of the technology, together with the silvicultural considerations and criteria make this management system sustainable within small units. Low investment requirements and fixed costs further enhance the attractiveness of the system (Figure 4). This makes it possible for natural forest management to be implemented on village or even settlement level. The income for the local communities from sustainable forest harvesting and management activities can be increased directly without involving complex levels of administration or bureaucracy. This will help to increase the commitment of the local communities to the concept of sustainable forest management.

The organization of forest management on a village or settlement level, also provides an opportunity for a simple implementation of integrated land management and, of integrated management of timber and non-timber products.

In the past, only non-timber forest products and areas outside the forests, could be managed at the village level. Timber harvesting was largely the domain of large companies and required the adoption of more sophisticated technologies, complex planning, and cumbersome monitoring systems. All of this discouraged the integrated utilization of timber and non-timber forest values. With the technical system developed by SFDP this gap can be closed.

CONCLUSIONS: "Reduced Input Logging" as an Alternative Approach to Sustainable, Natural Forest Management

The proposed management system represents an economic approach that is different from the conventional concession system. A limit is placed on the intensity of harvesting based solely on silvicultural considerations. The application of a low-level technological approach minimizes the damage to the forest.

According to the economic principle, traditional harvesting enterprises which are based on a high level of investment, will have to maximize their production in order to reach optimum economic performance through economies of scale. On the other hand, the community based approach which is proposed here, will fix the output based on silvicultural considerations. The economic optimum will be found by minimizing the costs (reducing the inputs), thus reducing the risk of resource over-exploitation. This proposed community-based management system will, for the first time, combine an appropriate technical solution with a planning and monitoring system that truly considers economic, ecological and social sustainability in forest management.
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