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**Synthesis Report on Ex-Post Evaluations of
Reduced-Impact Logging Projects**

PD 74/90 Rev.1 (F,I)

**Better Utilization of Tropical Timber Resources in Order to
Improve Sustainability and Reduce Negative Ecological Impacts
(Global - Germany)**

PD 104/90 Rev.2 (F) and PD 26/96 Rev.4 (F)

**Studies of the Management Standards of Hill Dipterocarp Forests
in Sarawak from a Watershed Point of View, Phases I and II
(Malaysia)**

PD 45/97 Rev.1 (F)

**On-Site Training for Tropical Foresters and Forestry Trainers
(Brazil)**

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LIST OF ABBREVIATIONS AND ACRONYMS

ITTA	:	International Tropical Timber Agreement
ITTC	:	International Tropical Timber Council
ITTO	:	International Tropical Timber Organization

Definitions

CL	:	Conventional Logging
LAC	:	Latin America and the Caribbean
NGO	:	Non-Governmental Organization
PD	:	Project Document
RIL	:	Reduced-Impact Logging
Sdn. Bhd.	:	Sendirian Berhad – term for a limited liability company in the Malaysian language
SFM	:	Sustainable Forest Management
US\$:	United States Dollar

Organizations—PD 74/90 Rev. 1 (F, I): Germany + Cameroon, Ghana, Indonesia, and Malaysia

BFH	:	Federal Research Center for Forestry and Wood Products (Bundesforschungsanstalt fuer Forst- und Holzwirtschaft), Hamburg, Germany
FDS	:	Forest Department of Sarawak, Kuching, Sarawak, Malaysia
FORIG	:	Forest Research Institute of Ghana, Kumasi, Ghana
ONADEF	:	Office National de Développement des Forêts, Yaoundé, Cameroon
UHH	:	University of Hamburg, Germany
UNMUL	:	Mulawarman University, Samarinda, East Kalimantan, Indonesia

Organizations—PD 104/90 Rev. 2 (F) and PD 26/96 Rev. 4 (F): Sarawak, Malaysia

FDS	:	Forest Department of Sarawak, Kuching
HJSB	:	Hirosar Jaya Sdn. Bhd., Kuching

Organizations—PD 45/97 Rev. 1 (F): Brazil

ABC	:	Brazilian Government: Brazilian Agency for International Cooperation, Ministry of the Exterior, Brasília
FFT	:	Fundação Floresta Tropical, Belém, Pará (see also TFF)
IBAMA	:	Brazilian Institute of Environment and Renewable Natural Resources, Ministry of Environment, Brasília
TFF	:	Tropical Forest Foundation, Alexandria, Virginia, USA (the parent organization of FFT)

1. INTRODUCTION

This report provides a comparative ex-post evaluation of four projects supported by ITTO during the 1990s with the objective of advancing the application of **reduced-impact logging** in tropical forests. The projects were developed in response to somewhat different stimuli and were fundamentally different in many ways, yet altogether can be considered complementary.

Reduced-impact logging, or **RIL**, is a term used to describe logging technologies that have been introduced into tropical forests explicitly for the purpose of reducing the environmental and social impacts associated with industrial timber harvesting. Although the specific details vary somewhat with the local situation, RIL in tropical forests generally requires the following, shown approximately in chronological order:

- Pre-harvest inventory and mapping, usually to a level of detail that shows individual crop trees
- Pre-harvest planning of roads, skidtrails, and landings to provide access to the harvest area and to the individual trees scheduled for harvest, while minimizing soil disturbance and protecting streams and waterways with appropriate crossings
- Pre-harvest cutting of vines in areas where heavy vines tend to bridge across tree crowns
- Construction of roads, landings, and skidtrails so that they adhere to engineering and environmental design guidelines
- The use of appropriate felling and bucking techniques including directional felling, cutting stumps low to the ground to avoid waste, and optimal crosscutting of tree stems into logs in a way that maximizes the recovery of useful wood
- Winching of logs to planned skidtrails and ensuring that skidding machines remain on the skidtrails at all times
- Where feasible, using yarding systems that protect soils and residual vegetation by suspending logs above the ground or by otherwise minimizing soil disturbance
- Conducting a post-harvest assessment in order to provide feedback to the concession holder and logging crews and to evaluate the degree to which RIL guidelines were successfully applied

By the mid-1990s it had become widely accepted that the adoption of RIL technologies must be an essential part of the campaign to improve the management of tropical forests. Most authorities agree that RIL by itself cannot guarantee the sustainability of tropical forests, but that it is critically important as a component of sustainable forest management. Thus, ITTO Objective 2000 specifically includes the following two priority actions:

- Apply reduced-impact logging
- Train the work force, including supervisors, in reduced-impact logging

The projects included in this evaluation were undertaken with ITTO support for the purpose of advancing one or both of these priority actions in a range of target countries. Following is a brief summary of each of these projects:

- (a) **PD 74/90** – Better Utilization of Tropical Timber Resources in Order to Improve Sustainability and Reduce Negative Ecological Impacts (referred to here as the “**utilization project**”)

This project involved parallel forest and mill studies carried out in four countries (Cameroon, Ghana, Indonesia, and Malaysia) to quantify wood utilization and production of residues during harvesting and processing operations. The project was implemented by the Federal Research Center for Forestry and Wood Products (BFH) in Hamburg, Germany together with partner organizations and enterprises in each of the four countries.

- (b) **PD 104/90 & PD 26/96** – Studies of the Management Standards of Hill Dipterocarp Forests in Sarawak from a Watershed Point of View (referred to here as the “**roads project**”)

These two coordinated projects are evaluated here as phases of a single project. **Phase I** was intended to quantify impacts on stream sediment loads and water quality resulting from logging operations in steep watersheds, identify the main factors responsible for these impacts, and investigate the effectiveness of buffer zones for ameliorating soil erosion. **Phase II** focused on planning and construction of a “model forest road” utilizing technical guidelines on road construction in steep watersheds that were developed as a result of the studies carried out in the first phase. The project was implemented by Hirosar Jaya Sdn. Bhd. (HJSB) of Kuching, Sarawak, Malaysia on behalf of the Forest Department of Sarawak (FDS).

(c) **PD 45/97 – On-Site Training for Tropical Foresters and Forestry Trainers** (referred to here as the “**training project**”)

This project, undertaken in Brazil, was designed to utilize the capabilities of the Fundação Floresta Tropical (FFT), an NGO based in Belém, Brazil¹, to carry out training on the principles and practices of reduced-impact logging in forests typical of the Amazon Basin. FFT’s previous activities had primarily targeted logging crews and their direct supervisors, whereas the ITTO-FFT project was designed to train professional foresters and trainers. The training was to involve participants from Brazil and also from other countries in Latin America and the Caribbean. The project was implemented by FFT on behalf of the Government of Brazil.

2. PURPOSE OF THE EVALUATION

The purpose of this ex-post evaluation is to provide a concise diagnosis of several projects focusing on the application of reduced-impact logging as a contribution to sustainable forest management. As specified by the ITTO Secretariat, the diagnosis was to summarize the successful and unsuccessful outcomes of these projects and identify the reasons for successes and failures. It should also evaluate the degree to which the projects have contributed towards the achievement of ITTO’s Objective 2000 and draw lessons that can be used to improve similar projects in the future.

3. SCOPE AND METHOD OF EVALUATION

As noted above, in preparing this evaluation we examined four projects² that were supported by ITTO during the 1990s. Each project had a major focus on reduced-impact logging. Altogether the projects covered the three major regions of the tropics.

A two-person team carried out the evaluation on behalf of ITTO according to the Terms of Reference provided in the annex. The evaluation was done between June and September 2003 and involved a desk review of project documents and related materials provided by ITTO and by the project implementation teams; visits to Malaysia, Germany, and Brazil; and preparation of an ex-post evaluation report for each project independently and of this synthesis report for all projects together. The field visits included interviews of personnel on the project implementation teams and in a variety of other organizations. The trips to Malaysia and Brazil also involved visits to the field sites where the projects were carried out. We did not visit the sites in Cameroon, Ghana, Indonesia, and Malaysia where the field studies were conducted for the project coordinated by BFH in Germany. Instead we relied on published information, our own knowledge of those sites from past visits, and personal contact with some of the project team members from national institutions in the countries involved in the study.

4. EFFECTIVENESS IN ACHIEVING OBJECTIVES

Table 1 provides an overall summary of the objectives related to each project and indicates our assessment of the degree to which each objective was achieved. For the most part the projects were successful in achieving their objectives and producing the outputs that were expected.

¹ FFT is the Brazilian subsidiary of the Tropical Forest Foundation (TFF), an NGO based in Alexandria, Virginia, USA.

² Two of the projects, PD 104/90 Rev. 2 (F) and PD 26/96 Rev. 4 (F) (Sarawak, Malaysia), were closely linked administratively and chronologically and are treated throughout this report as two phases of a single project.

Table 1. Achievement of objectives by the RIL projects.

Project	Objectives	Assessment
PD 74/90 (utilization project)	<ul style="list-style-type: none"> Determine the extent of forest disturbance by felling and logging operations and quantify the amount of logging residues and wood left unutilized in the forest. Determine the amount and nature of industrial wood residues that occur during the transport, storage, and processing of timber in order to find reasons for the low degree of utilization. Develop recommendations that might enable more efficient use of the extracted wood resource from tropical forests, both as an industrial material and as a source of energy, in order to increase the local raw material supply. 	<p>Achieved through field studies at multiple sites within Cameroon, Ghana, Indonesia, and Malaysia.</p> <p>Achieved through mill studies at multiple sites within each of the four countries.</p> <p>Achieved—detailed recommendations were developed by each national team and refined during a workshop held in Hamburg.</p>
PD 104/90 (roads project)	<ul style="list-style-type: none"> Quantify sediment loads and water quality associated with an unlogged watershed, a watershed that had been logged with conventional techniques several years previously, and a watershed that was currently being logged with conventional techniques. Identify the main factors responsible for soil erosion in watersheds in which the forest roads were built using conventional approaches. Investigate the effectiveness of buffer zones and other mitigation measures for reducing negative environmental impacts associated with logging operations. Apply and test the efficacy of technical guidelines designed to reduce impacts from forest road construction in steep watersheds. Assess and evaluate watershed impacts associated with improved road construction (<i>i.e.</i>, the model road) by comparing them with impacts associated with conventional road construction. Disseminate project findings through a training seminar on improved road design and construction for timber companies and personnel of the Forest Department of Sarawak. 	<p>Achieved through comprehensive studies of climate, hydrology, and soils at the Phase I site.</p> <p>Partially achieved through observations of logging operations at the Phase I site.</p> <p>Partially achieved—most mitigation measures were tested only at the Phase II site, not at the steeper Phase I site.</p> <p>Technical guidelines were developed but not tested in steep topography.</p> <p>Comparisons were not possible due to fundamental differences in the Phase I location used for the conventional road construction and the Phase II site used for reduced-impact road construction. Also, the model road itself was not satisfactorily completed due to problems with the contractor.</p> <p>Not undertaken.</p>
PD 45/97 (training project)	<ul style="list-style-type: none"> Carry out RIL training for 96 professional foresters and forestry trainers through eight courses. Upgrade or reconstruct the FFT training camp. Develop training materials in Portuguese and Spanish. Treat 800 ha with RIL techniques (100 ha/course). Use experience gained during the courses to refine the RIL techniques and update the RIL manuals. Publish recommendations on adapting FFT's RIL techniques to other localities and conditions encountered in Latin America and the Caribbean. 	<p>More than fully achieved—138 persons were trained: 119 from Brazil, 18 from other LAC countries, and 1 from Africa; nine courses were held.</p> <p>Achieved.</p> <p>Achieved.</p> <p>More than fully achieved—1250 ha were treated during the nine courses due to increased efficiencies in application of the RIL technologies.</p> <p>Achieved, although some field testing and updating of the manuals was only completed after the project had ended.</p> <p>Achieved, but after the project had ended.</p>

Both the **utilization project** (PD 74/90) and the **training project** (PD 45/97) achieved all of their objectives, although not within the timeframes originally planned. The **utilization project** required a 22-month extension without additional funding due to the complexity of a project involving partner teams working simultaneously in four countries. The **training project** did not seek a formal extension but completed some activities related to field testing and publication of revised manuals after the planned completion date for the project. This was mainly due to an accelerated training schedule during the project period and delays in field testing caused by onset of the rainy season. The project's main objectives related to the actual training, however, were more than fully achieved before the completion date of the project.

The **roads project** (PD 104/90 & 26/96) was less successful than the other two in achieving its objectives, largely because the project team realized only at a relatively late stage that the site planned for construction of a "model road" was too steep to permit the road to be constructed in a way that would minimize environmental impacts, conform to regulations in Sarawak, and also be economically feasible. The model road was thus moved to a second site where the topography was much less steep than at the Phase I site. This prevented meaningful comparisons between environmental impacts associated with a road constructed using conventional technology at the Phase I site and the impacts associated with the model road constructed at the Phase II site. It also meant that the baseline information collected in the steep watersheds of Phase I was not relevant to the more gentle topography of the Phase II site.

5. USE OF RESOURCES

Both the **utilization project** (ITTO contribution US\$600,000 over 46 months) and the **training project** (ITTO contribution US\$875,281 over 24 months) were completed without additional funding from ITTO beyond the original allocation. The **roads project** required additional funding beyond the amounts originally committed, both during Phase I and Phase II. The original budget was \$419,900, scheduled over 24 months, and the total amount of ITTO funds eventually expended in both phases was \$1,344,705 over 70 months. The additional costs were due largely to difficulties posed by the remote site of Phase I and expansion of the original objectives to encompass the construction of a "model road" that could serve educational and demonstration purposes.

All three projects attracted additional funding from local governments and industry sources (and in the case of the **training project** from other international sources as well), indicating that the ITTO funding was well-leveraged.

Overall the costs, cost structure, and use of resources within the projects seem reasonable. The **roads project** in particular was costly, but projects that involve logging and road construction are inevitably expensive because of equipment and personnel costs. The non-ITTO contribution to the roads project was also considerable and was estimated as \$1,129,400.

6. RELEVANCE AND IMPACT

All of the projects included in this evaluation are highly relevant to the work of ITTO and in particular to the campaign to achieve Objective 2000. Similarly, all three projects are relevant to the countries where the work was undertaken and to other ITTO producer countries as well. Upgrading of wood utilization standards, improvement of road construction and other logging practices in forested watersheds, and successful training of personnel at all levels in the principles and practices of reduced-impact logging are goals to which every ITTO producer country should aspire.

Assessing project impacts is often difficult because there are seldom any reliable indicators of impact that can be observed directly. Also, impacts may accrue incrementally over a long period of time rather than becoming evident immediately after a project has been completed. For this part of the evaluation we therefore relied on opinions expressed by people we interviewed during visits to the countries where the project coordinating units are located. Although our assessments are based largely on these interviews, the interpretations and conclusions drawn are our own and do not necessarily represent the views of the persons interviewed or their institutions.

By focusing on wood utilization both in the forest and in processing facilities, the **utilization project** was able to provide baseline data and develop a large number of recommendations that could potentially increase

utilization levels significantly, both through improved practices and through increased utilization of lesser-used species. The increased utilization would in turn permit the annual timber supply to be recovered from a smaller area of forest, thus reducing ecological impacts. At the international level, we feel that the project has had an impact through (a) involvement of a significant number of people who worked on the project in the national partner organizations; (b) involvement, even if indirectly, of personnel associated with the forestry enterprises whose timber concessions and processing facilities were studied; and (c) dissemination of a substantial number of publications produced by the project. It is unfortunately not possible to quantify this impact or to estimate the degree to which it has resulted in improved utilization of wood, either in the countries involved in the study or in other ITTO producer countries.

For the **roads project**, the most significant contribution has been the transfer of technology related to measurement of meteorological and hydrological data. In addition it could be argued that the project has compellingly raised the issue of excessive sidestepping of excavated materials during construction of roads in steep watersheds. However, the project has not adequately demonstrated practical and affordable alternatives to this practice. On the whole, it is difficult to assert that the project has had any meaningful or lasting influence on the management of forests in Sarawak or other parts of Malaysia. Project personnel have consistently promoted the adoption of improved practices for constructing roads in steep terrain, but were not successful in providing a convincing demonstration of how to accomplish this in a practical and affordable way. The many reports and studies published by the project over its 70-month duration provide a considerable amount of potentially useful information, especially on the analysis of hydrological data related to soil erosion. The technical guidelines for road construction are potentially useful as well but have not yet been fully completed or adequately field-tested in steep terrain. Finally, we feel it is unlikely that the project has had any impact beyond Sarawak. Potentially there could be some international impact if the technical guidelines for road construction were completed, field-tested in steep terrain, and then published.

An important independent measure of the impact of the ITTO-FFT **training project** is the contribution the training courses have made toward forest certification in the Amazon region of Brazil. According to representatives of both NGOs and the forest industry, FFT's RIL training is regarded as the *de facto* standard for meeting RIL requirements related to certification. Nearly all forestry enterprises in the Brazilian Amazon whose forests have been certified under the principles and criteria of the Forest Stewardship Council have sent their logging crews and supervisors through the FFT training program (*Figure 1*), either as part of the ITTO-FFT training project or through training provided on a direct contract basis by FFT. Furthermore, in discussions with forest industry representatives we were told that in nearly all forestry enterprises in the Brazilian Amazon, priority in hiring is being given to persons who have completed the FFT training. There is strong recognition by the industry that people who have had this training are far advanced compared to those who have not. Similarly, several forestry technician schools and one university have recently begun using the FFT training program as a formal adjunct to their curricula. A representative of the university told us that he hopes the FFT training will become a permanent part of the university's curriculum. Finally, one industry representative told us that FFT's training has created an important "multiplier effect" that has not yet been widely recognized or appreciated. Many former FFT trainees have set up their own businesses to develop forest management plans and to do RIL training. This includes both forestry graduates and also technical personnel such as top-quality sawyers and equipment operators.

Overall, we conclude that the three projects have all had some impact on their respective target audiences, but that only the **training project** can be said to have achieved a significant and lasting impact as of the present time. Even so, that project's impact to date has been primarily restricted to the Brazilian Amazon. During the ITTO-FFT project only 19 of the 138 participants in the training courses were from countries other than Brazil as compared to the target of 30% foreign participants. In addition, it is not possible to say at present whether the FFT training has contributed to certification of forests in countries other than Brazil. In spite of these limitations, it is our conclusion that the training project represents a rather remarkable achievement and a significant return on the investment by ITTO.

7. CONTRIBUTION TO ACHIEVEMENT OF SFM AND OBJECTIVE 2000

Achievement of sustainable forest management (SFM) and of ITTO's Objective 2000 are broad-scale goals that cannot be attained quickly or through the implementation of a small number of projects. Nevertheless, each project should be designed so that it will assist ITTO members in progressing toward the attainment of these essential goals.

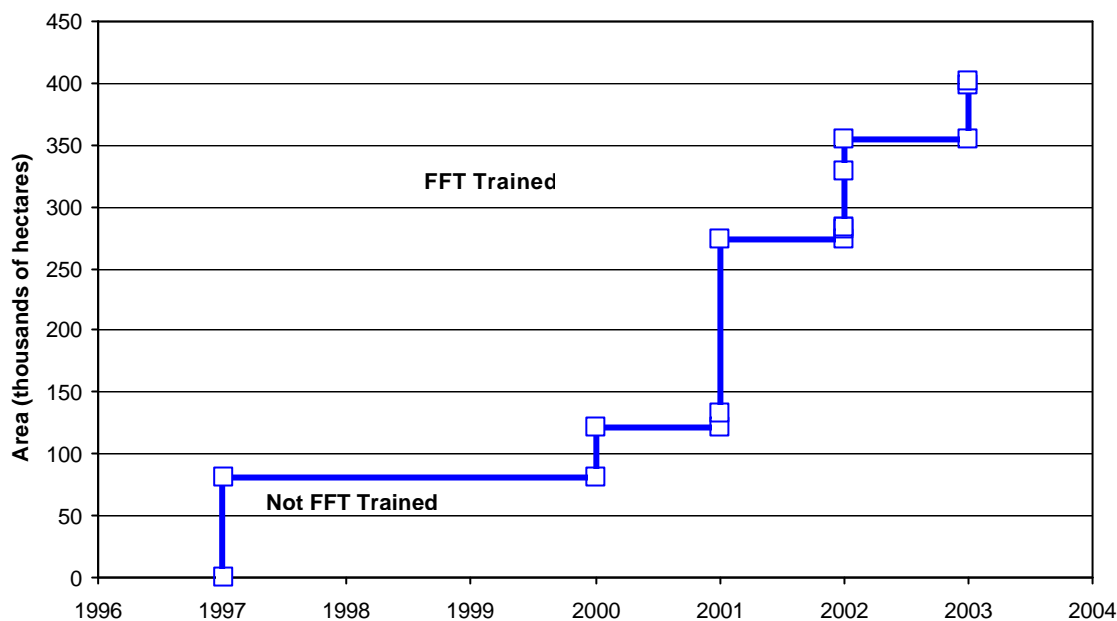


Figure 1. Cumulative area of forest certified in the Brazilian Amazon as of July 2003 under the principles and criteria of the Forest Stewardship Council. Each vertical bar between the squares represents a single enterprise and the height of the bar corresponds to the area of forest certified as sustainably managed for that enterprise. The first forest was certified in 1997, prior to the ITTO-FFT RIL training project. All forests certified since then have utilized FFT's RIL training.

We believe that all three of the projects evaluated in this report have contributed in some way to progress toward achievement of SFM and of Objective 2000. The projects' individual contributions are quite different but together they represent both useful advances in knowledge and significant progress in technology transfer.

The major contributions of both the **utilization project** and the **roads project** are related to the development of baseline information on impacts of logging operations and in pointing the way toward technologies and methodological improvements that could significantly reduce these impacts. The **utilization project** focused primarily on obtaining data essential for understanding the current level of wood utilization in harvesting and processing of tropical timber. Knowledge of these utilization rates is essential for calculating the sustained yield capacity of forests (a priority action under Objective 2000) and for developing methodologies that can improve utilization rates without significantly increasing costs. Research by itself, however, is seldom enough to induce change. Had the project team been able to find support for a followup project on capacity building and field-level implementation, it may have been possible to achieve a tangible and lasting effect on the ground. Even so, a significant contribution to knowledge was provided by the utilization studies and a substantial transfer of technology resulted as the national study teams were trained, carried out the research, prepared their reports, and then met together to discuss and compare the results.

The major contribution of the **roads project** was on the development of baseline information on hydrological impacts associated with the construction of forest roads and other logging operations in steep forested watersheds. The project was also able to identify sidestepping of excavated material as the principle contributor to excessive turbidity in streams below conventional logging operations. An important potential contribution of the project was the development of technical guidelines for road construction in steep terrain, but these guidelines exist only in draft form and have not been adequately field-tested. Therefore the proposed methodologies have not yet been shown to be practical and economically feasible.

Unlike the other two projects, the **training project** was concerned primarily with technology transfer, although it also had a secondary (but still important) focus on development, testing, and documentation of new procedures. FFT's general approach is to use very practical, hands-on training in which every participant operates every type of machine, participates in every planning and evaluation exercise, and at some point during the training period is personally and directly involved in all of the activities that together

comprise a RIL operation. In our opinion the overall result of the project has been to greatly accelerate the adoption of RIL techniques within Brazil and to a lesser extent within other countries in the LAC region. Part of the project's success is due to the fact that it was initiated at a time when conditions within Brazil particularly had developed to a point that the demand for RIL training was increasing rapidly. As a result, the FFT training has had an important positive effect on the adoption of SFM and on progress toward achievement of Objective 2000.

8. RECOMMENDATIONS

8.1 Project Planning

Effective planning is a critical aspect of any project. Research and demonstration projects that offer possibilities to change the way forestry is practiced are often complex and, because they may attempt to introduce new ideas or methodologies, can face resistance from the enterprises that would apply the new practices. Thus the degree of complexity and uncertainty must be weighed carefully when estimating the time required to complete a project.

Two of the three projects included in this evaluation required substantial extensions of time. The **utilization project** was administratively quite complex, involving national partner organizations from four countries whose staff members had to be trained and then carry out a series of multifaceted studies, analyze the data, and prepare reports describing the results. In retrospect the expectation that this could be done within the originally estimated 24 months was far too optimistic for such a complex project.

The **roads project** suffered from the fact that the site originally selected for the project was quite remote and eventually proved to be inappropriate for the construction of a model road. Relocating the project to a new site at a relatively late stage caused a significant delay but more importantly prevented meaningful comparisons from being drawn between the environmental impacts associated with the model road and those associated with conventionally constructed roads. Perhaps the most important observation here is that site selection is a critical aspect of such demonstration projects. This means that the criteria for site selection should be laid out carefully during the project planning phase, and one of the first activities during the implementation phase should be a thorough reconnaissance to ensure that the site fulfills all of the selection criteria. For any demonstration project the site must be accessible so that target audiences can easily be brought to the location, and the site must also fully represent the conditions under which the improved practices are to be implemented. The site eventually chosen for construction of the model road met the first of these criteria but not the second, and as a result its effectiveness for demonstration purposes was significantly compromised.

8.2 Need for Similar Projects

Our strongest recommendation is that projects similar to the ITTO-FFT **training project** should be promoted and encouraged by any means possible. We believe that such training offers the best opportunity for most countries to progress rapidly toward Objective 2000 and full sustainable forest management. Over time the training might be broadened to include forest management principles and activities in much the same way that the FFT training has been evolving. Initially, however, a concentrated focus on reduced-impact logging seems likely to achieve the most progress. A key component of the FFT training is the use of state-of-the-art equipment, much of which has been donated by equipment manufacturers and dealers. It is unlikely that this generosity can be replicated on a large scale, so it has to be assumed that the cost of training will increase as additional training institutions are established. The small amount of funding that ITTO can bring to such activities must therefore be leveraged carefully with funding from other donors and from the countries or regional groupings themselves.

We also feel that a strong need exists for projects on **improved road construction** particularly but also other logging activities that are appropriate for use in steep terrain. Loggers are moving into steep upland forests not only in Malaysia and Indonesia but also in the LAC region and in parts of Africa. Often the same technologies and methods are used in these hill forests as in the lowland forests, causing significant increases in soil erosion and other major impacts. Sidecasting of excavated materials is the major cause of soil-related impacts, and balanced road design, together with construction methods utilizing hydraulic excavators rather than bulldozers, can reduce the impacts significantly. These methods, which are well understood and widely used in the industrialized countries, must be adapted to conditions in tropical forests and their economic feasibility must be proven.

While road construction is usually the most serious contributor to environmental problems in hill forests, skidding operations also cause significant impacts, particularly when bulldozers are used for skidding. Reduced-impact alternatives to ground skidding such as **cable yarding systems** should be considered on terrain with average slopes greater than about 40% (~20°). Properly deployed, long-distance cable yarding systems that suspend logs during transit can greatly reduce road density and eliminate entirely the need for skidtrails. Because of the special skills needed to efficiently utilize such systems, demonstration projects will be needed in order to obtain information on the costs and benefits associated with these reduced-impact systems and to foster their widespread adoption. These demonstration projects should build on experience available from existing cable yarding operations such as at the FSC-certified Deramakot Forest Reserve in Sabah, Malaysia (<http://www.deramakot.com>).

We would assign a relatively low priority to additional projects designed to measure utilization rates, although this might be useful in countries or regions where little information on utilization currently exists. By the end of 2003 FAO plans to publish a comprehensive report on a series of utilization studies in forest operations (although not including mill studies) from around the tropics. Coupled with information from the **utilization project** evaluated here, this will provide a relatively good assessment of forest utilization rates throughout the tropics.

8.3 Innovative Approaches or Designs

Perhaps the greatest success of the **utilization project** was its organizational approach. Although coordinated by BFH in Germany, the project was implemented through national partner institutions working simultaneously in four different countries. With oversight and technical assistance from BFH, the national institutions assumed primary responsibility for carrying out the forest and mill studies, preparing reports, and developing recommendations on practices and new technologies that could potentially improve utilization. In addition to the national partner organizations, forest enterprises were also involved in the study because it was their forest and milling operations that were studied. This approach provides an excellent model for conducting international collaborative research. It promotes buy-in by the national institutions and ensures that their staff members will be trained in the procedures and become experienced in data collection, analysis, and report writing. It also helps motivate the industry collaborators, who can potentially benefit directly from involvement in the study.

We also believe that the methods used by FFT in the **training project** warrant additional emphasis. Nearly all of FFT's training is conducted in the forest, with participants lodged at a campsite located near the training area. This ensures a captive audience throughout the training period. The overall philosophy is that each participant must learn **how** to do each activity and also **why** that activity is important. Thus, each participant plans a logging block, measures trees for inventory, fells trees, sets chokers on logs to be skidded, operates the skidder, and at some point during the training period does all of the other activities that comprise the RIL operation. Each day's schedule is intensive, involving lectures, field activities, and evening discussion periods. The discussions provide an opportunity for participants to give feedback to the instructors and to offer suggestions that can be taken up by the FFT staff and incorporated into subsequent courses. According to FFT many improvements in techniques have come from such suggestions. FFT has also learned that courses involving heterogeneous groups—loggers, foresters, technicians, government regulators, forest owners—tend to be more effective than courses offered only to a single group. When participants are drawn from diverse backgrounds the discussions, interactions, and different viewpoints provide a stimulating learning environment for everyone.

8.4 Appropriate Target Groups

We have little doubt that the most rapid advance in the promotion of reduced-impact logging will be achieved through intensive, on-site training in RIL techniques and procedures. Highest priority should go to training of the loggers who actually do the work. Many experienced loggers have developed poor habits over long years of working with improper equipment or without understanding why it is important to protect future crop trees or to limit soil disturbance. Experience by FFT shows that experienced loggers respond very quickly to training and are able to adapt readily to new methods of working. Young people interested in logging as a career also learn quickly and are highly sought by industry when they have successfully completed the training.

Other target groups for which RIL training is appropriate include essentially everyone associated, directly or indirectly, with logging operations. Professional groups for which such training is appropriate include logging supervisors, foresters, forestry technicians, government regulators or forestry agency representatives, forest owners, and even representatives of environmental NGOs.

Potential target groups for demonstration and development projects related to improved road construction and reduced-impact logging in steep terrain are somewhat different than for training because these projects would attempt to influence decision makers in government and in the private sector, rather than focusing primarily on people working at the technical level. Therefore, such projects should provide information on costs, methods of application, and changes in impact levels that these decision makers can evaluate. When possible, demonstration areas should be accessible so that decision makers can be brought to them, but it is even more important that the selected areas represent topographic and other conditions typical of steep upland forests.

8.5 Organizational Arrangements

A recurring question related to RIL training institutions is whether they should be country-specific or regional in scope. Regional institutions help spread costs more efficiently and can promote adoption over a wider geographical area. However, organizing a regional training institution may require extensive negotiations that can be suddenly derailed by governmental changes in one or more of the countries involved. Ensuring sustainable funding for a regional training institution may prove even more difficult, since the institution will inevitably be located in one country and governments from other countries in the region may feel they do not get a fair return on the investment. Nevertheless, these problems can be overcome if the institution is set up properly and is assured of sufficient funding over a reasonable start-up period, which is probably five years as a minimum. Regional institutions can be especially attractive among a group of relatively small countries for which individual training institutions would be impractical.

In general, however, we believe that country-specific training institutions are more likely to succeed over the longer term than are regional institutions. A country-specific institution can respond directly to the needs of the country it serves, changing over time according to the dictates of society in that country. It can also provide more site-specific training, an important consideration for reduced-impact logging because the techniques and procedures must be adapted to local conditions.

An alternative organizational arrangement currently being tested by FFT in its RIL training program involves training conducted on-site in another country. This allows government agencies or forest enterprises in the other country to recruit participants from that country only, and to hold the training at a site that represents local conditions. Travel costs are reduced with this approach because only the trainers are required to travel. On the other hand, access to the full range of equipment and other gear may be more difficult to arrange. Nevertheless this might be a practical way to organize a regional training institution.

As a final comment on organizational arrangements, we believe that RIL projects are unlikely to be successful if they are built entirely around short-term visits by overseas consultants. In our view this general approach was the major underlying reason for the significant problems that occurred in the **roads project** and prevented the project from fulfilling all of its objectives. Nearly all successful projects have a resident staff of experts working directly with local counterparts on a day-to-day basis. Short-term experts can be valuable for solving specific problems, but a longer period of continuous residency is required in order to fully appreciate the local situation and to be able to offer solutions that are workable and affordable in the local context.

8.6 Supplemental Activities Required

In spite of having produced a wealth of valuable information on utilization of wood during harvesting and processing operations, it is difficult to imagine that the results of the **utilization project** will ever be applied unless a program of extension and training is undertaken specifically for that purpose. The first stage in such a program might be to start with one or more of the countries that were involved in the project, using the recommendations developed by the study partners as the basis for such an extension and training program. In our view the highest priority for such a program would be two-fold: (a) to train loggers and their supervisors in improved felling and bucking techniques to increase wood utilization in the forest; and (b) to train personnel in sawmills, and their managers, in improved recovery techniques. The program might focus

initially on training alone, to be supplemented later by modest improvements in equipment (for instance, to reduce saw kerf, which the project found was excessive in nearly all of the enterprises studied). Such a program would also benefit significantly from the development of demonstration areas and model enterprises in which the improved practices are used on a daily basis.

8.7 Follow-up and Sustainability Issues

To have a lasting impact on the target country or region, a RIL development project must ensure that logging practices actually change as a result of the project. Our examination of the projects included in this evaluation suggests to us that such change is unlikely to result from research or demonstration activities alone; instead, an active and continuous program of training is essential. We recommend that ITTO funding be concentrated on RIL projects that incorporate training as an integral part of the project. This training should not be limited to workshops or other activities planned for the end of the project, but rather should be integrated throughout the project period.

We believe that projects whose primary focus is on research and development can be very useful for identifying potential improvements in forest practices. However, such projects should not be limited to data acquisition and development of recommendations. Proposals for such projects should always include an extension and implementation phase in which the information developed through the research and development phase can be applied on the ground. This would permit an evaluation of the technical and economic feasibility of the new practices and would also permit people in the target countries to be trained in the improved practices. Otherwise it seems to us there is little chance such projects will ever have a significant impact on the practice of forestry.

As a general conclusion, we believe strongly that comprehensive, hands-on training is the fastest and most effective way to promote the widespread adoption of reduced-impact logging. There is little doubt that the most efficient way to provide such training is through institutions like FFT. However, this introduces the potential problem of sustainability for the institution, a critical consideration if the institution is to contribute its expertise over the long term. It is unlikely that ITTO itself could provide sufficient long-term funding to support such institutions, especially if it were to attempt to do this in each of the three major tropical regions. ITTO could, however, serve as a catalyst, working with governments in each of the regions to promote development of training institutions. It would be important for individual governments or regional organizations to contribute substantially to funding for the institutions. Optimally, RIL training institutions might eventually become self-sufficient as forestry enterprises realize the full value of the training and become willing (and able) to pay for it. In the short term, however, a major share of the cost of this training will have to be borne by government agencies or by intergovernmental institutions like ITTO.

ANNEX. Terms of Reference for the RIL Project Evaluations

Ex-Post Evaluation of ITTO Projects in the Field of Reduced Impact Logging for Sustainable Forest Management

I. Background

ITTO is an intergovernmental commodity organization established in 1986 to administer the provisions and operation of the International Tropical Timber Agreement (ITTA), particularly in the promotion of international trade in tropical timber, the sustainable management of tropical forests and the development of tropical forest industries through international cooperation, policy work and project activities.

The four projects that will be the subject of the Ex-post Evaluation are as follows:

1. PD 74/90 Rev.1 (F) Better Utilization of Tropical Timber Resources in Order to Improve Sustainability and Reduce Negative Ecological Impacts (Global-Germany)
2. PD 104/90 Rev.2 (F) Studies of the Management Standards of Hill Dipterocarp Forests in Sarawak from a Watershed Management Point-of-View - Phase I (Malaysia)
3. PD 26/96 Rev.4 (F) Studies on the Management Standards of Hill Dipterocarp Forests in Sarawak from a Watershed Management Point of View - Phase II (Malaysia)
4. PD 45/97 Rev.1 (F) On-site Training for Tropical Foresters and Forestry Trainers (Brazil)

II. Purpose and Scope of Evaluation

A) Purpose

The Primary purpose of the evaluation is to provide a concise diagnosis of four projects related to reduced impact logging for sustainable forest management so as to point out the successful and unsuccessful outcomes, the reasons for successes and failures, and the contribution of the projects towards the achievement of ITTO's Objective 2000, and to draw lessons that can be used to improve similar projects in the future.

B) Scope of Work

a) Analyze and assess for each project:

1. The overall role and contribution of the project in light of sectoral policies, development programmes, priorities and requirements to achieve sustainable forest management in the country(s) concerned.
2. The current management status of the forests within the project's area of influence, the effectiveness of the project's implementation and its effectiveness in promoting sustainable forest management as defined in the ITTO Criteria and Indicators for Sustainable Forest Management.
3. The contributions of the specific studies in various disciplines (inventory, ecology, socio-economy, forest engineering, forest industry, silviculture, etc.) prepared by the project to the development of forestry in the project's area of influence.
4. The results and potential impact of the applied research conducted by the project on the application of forest management practices and its contribution to the overall forestry-related knowledge in the region.
5. The impact of forestry activities on the livelihoods of target populations.
6. The effectiveness of dissemination of project results.
7. The overall post-project situation in the project's area of influence.
8. The unexpected effects and impacts, either harmful or beneficial, and the reasons for their occurrences.
9. The cost efficiency in the implementation of the project, including the technical, financial and managerial aspects.
10. Follow-up actions in order to enhance uptake of project results.

11. The project's relative success or failure, including a summary of the key lessons learnt; and the identification of any issues or problems that should be taken into account in designing and implementing similar projects in the future.

b) Provide a synthesis to:

1. assess the overall role and meaningful contribution of the four projects in achieving sustainable forest management in tropical timber producing countries taking into account ITTO's objectives, Yokohama Action Plan and Objective 2000, in particular as regards the implementation of priority actions identified by the ITTO as essential for progress towards the Objective 2000, as follows:
 - Adopt a forest policy and apply legislation;
 - Secure the permanent forest estate;
 - Apply reduced impact logging;
 - Train the work force, including supervisors, in reduced impact logging;
 - Limit timber harvest to the sustained yield capacity;
 - Raise public awareness that timber harvesting can be consistent with the sustainability of tropical forests;
 - Focus forest research on the analysis and use of existing data and knowledge
2. assess the overall appropriateness of the designs and objectives, outputs and implementation approaches of the four projects in light of their efficiencies and effectiveness to assist promoting sustainable forest management and to contribute to achieve Objective 2000.
3. evaluate the overall impact on and relevance of the four projects for the Executing Agencies, the forest industry sector and local communities being served and the countries concerned.
4. evaluate the overall attainment of the objectives and to assess the overall effectiveness of the four projects.
5. evaluate the overall appropriateness of the costs and cost structure and use of resources within the four projects.

And make recommendations on:

1. the needs for similar projects in the future.
2. the objectives of such future projects.
3. innovative approaches/designs for projects aiming at promoting reduced impact logging and sustainable forest management in the tropics.
4. appropriate target groups: countries, government, organizations, forestry sector and local communities.
5. the organizational arrangements of the projects.
6. follow-up and evaluation practices.
7. supplemental, alternative activities, processes, procedures, and/or follow-up programmes in the field of Sustainable Forest Management, if appropriate.
8. further actions needed to sustain or increase the intended effects on sustainable forest management and Objective 2000 and to draw conclusions which may be of relevance to other ITTO projects in the field of sustainable forest management.

III. Approach

A) Composition of the evaluation team

The team will be composed of two consultants who will work together. The assignment of specific tasks within the TOR will be left to the consultants based on their individual expertise. One of the consultants will be in charge of the final report and the presentation of the results at the Thirty-fifth Council Session in Yokohama in November 2003.

B) Consultation during evaluation exercise

The team will maintain close liaison with ITTO and will carry out its work in close cooperation with the concerned Executing Agencies and Governments. Although the team should feel free to discuss with the authorities concerned all matters relevant to its assignment, it is not authorized to make any commitments on behalf of ITTO.

C) Activities and report of the team

The work required in this evaluation will consist of:

1. Desk review of project-related documents and materials provided by ITTO.
2. Missions in Malaysia, Brazil and Germany. The evaluating team will visit each project's Executing Agency headquarters for further desk review of project materials and to carry out evaluation work in connection with the Executing Agencies. The missions shall also include a field visit to each of the projects' area of influence to review field implementation and to evaluate the project results and impact, and should include discussions with project stakeholders and target beneficiaries. A minimum of five working days is required for each project
3. Preparation of an Ex-post Evaluation Report for each project in English in accordance with the Scope of Work and the checklist contained in the ITTO Manual for Project Monitoring, Review and Evaluation. For projects PD 104/90 Rev.2 (F) and PD 26/96 Rev.4 (F) only one report is required.
4. Preparation of an Overall Executive Summary [synthesis; see b) Scope of Work] of the three ex-post evaluation reports focusing on the overall assessment of the projects' relative success in contributing to ITTO's Objective 2000, summarizing the key lessons learnt; and identifying any issues or problems which constrained their contribution to the achievement of Objective 2000.
5. Presentation of the Overall Executive Summary at the Thirty-fifth Session of the International Tropical Timber Council (November 2003, Yokohama).
6. Preparation of an article for possible publication in the ITTO Tropical Forest Update (TFU), in consultation with the editor, containing an overview of the projects and summarizing the lessons learned from the evaluation work. Appropriate high-resolution photographs should be provided.

In writing the Ex-post Evaluation reports, the team will have the opportunity to discuss its preliminary findings, conclusions and recommendations with the representatives of each of the Executing Agencies, Governments and ITTO before the final version of the report is made. Responsibility for the final content of the reports, however, remains with the evaluation team.

D) Duration of the assignment

The duration of the assignment will be one month and a half (two months for the team coordinator). Approximately fifty percent of the time will be spent travelling in the countries concerned and the rest for preparation of the evaluation and report writing.

E) Proposed Work Schedule

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| • 01 June – 15 July 2003 | Desk studies and field visits |
| • 20 August 2003 | Submission of draft reports to ITTO and to each of the Project Executing Agencies for comments and suggestions. |
| • 20 September 2003 | Submission of the final ex-post evaluation reports and the overall executive summary to ITTO. |
| • 4-5 November 2003 | Submission and presentation of the Final Report at the XXXV Session of the CRF in Yokohama, Japan (one consultant). |