

ITTO PROJECT PD12/97 REV.1 (F)

Forest, Science and Sustainability:
The Bulungan Model Forest



Completion Report

Phase I 1997–2001



ITTO

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PD12/97 REV.1 (F)**

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The Bulungan Model Forest**

COMPLETION REPORT

PHASE I

1997–2001

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Preface

This Completion Report of ITTO Project PD 12/97 Rev.1 (F), Forest, Science and Sustainability: Bulungan Model Forest was prepared with reference to the format provided in Annex D of the ITTO Manual for Project Monitoring, Review and Evaluation, ITTO, May 1999.

The headings in the Contents, as well as the content of the Completion Report, follow the headings and subject matter as stated in the aforementioned Annex D.

CIFOR and FORDA, as the Project Executing Agencies, wish to thank ITTO, the Ministry of Forestry of the Republic of Indonesia, CIRAD Forêt, IRD, PT Inhutani II, PT Trakindo Utama, Caterpillar Co., the MacArthur Foundation, the Ford Foundation, IFAD, ACIAR, LIPI, local governments and all partners and collaborators for their full support in the execution of the project.

Sincere thanks and appreciation go to the members of the Project Steering Committee for their support and invaluable advice and criticism.

Colleagues at CIFOR and FORDA are gratefully acknowledged for reviewing and providing help and inputs in the preparation of this Completion Report.

Bogor, 20 January 2002

Project Identification

1. Title	:	Forest, Science and Sustainability: The Bulungan Model Forest
2. Serial Number	:	PD 12/97 Rev.1 (F)
3. Implementing Agency	:	Center for International Forestry Research (CIFOR) and Forestry Research and Development Agency (FORDA)
4. Host Government	:	Republic of Indonesia
5. Starting Date	:	2 September 1997
6. Actual Duration (months)	:	52 months
7. Actual Project Costs	:	ITTO US\$1,096,391 CIFOR US\$144,000

Part 1: Executive Summary

1.1. BACKGROUND INFORMATION

1.1.1. Pre-Project Situation

In January 1996, the Indonesian Ministry of Forestry (MOF) designated 321 000 ha of forest for CIFOR in East Kalimantan to be developed as a long-term model of exemplary research-based management. The creation of this research forest, known as the Bulungan Research Forest (BRF), grew out of a provision in the host-country agreement granting access to a long-term research site, where CIFOR would carry out multidisciplinary research activities able to cover the complexity of forest management for multiple uses. CIFOR and MOF expect to maintain research and development activities at BRF for a period of 10–20 years.

CIFOR's strategic research is focused on policy issues to enable more informed, productive, sustainable and equitable decisions about the management and use of forests. Cooperation between CIFOR, FORDA (Forestry Research and Development Agency of the Ministry of Forestry) and ITTO through this research will contribute to the achievement of the ITTO Year 2000 Objective and also enhance the relationship between these institutions.

The general objective of the present research is to carry out systematic investigation of how to achieve long-term forest sustainability for a 'large forest landscape' by integrating social, ecological and silvicultural aspects.

The initial project constituted a developmental phase within this long-term research strategy. The first phase focussed mainly on gathering baseline information on the physical and human environment. Reduced-Impact Logging (RIL)

experiments applied on a concession scale and the assessment of their impacts on both the environment and economic costs would lead to promoting and integrating these techniques into the current Indonesian forest management system.

1.1.2. Specific Objectives and Outputs

1.1.2.1. Specific Objective 1

Assessment of the effect of Reduced-Impact Logging (RIL) on biodiversity, conservation, ecology and socio-economics. Detailed Outputs: see Section 2.1.3.1.

Output 1.1. Formulation of RIL guidelines

Output 1.2. and 1.3. Comparison of the impacts and cost analysis of RIL and conventional logging (CNV).

Output 1.4. Improvement of the current Indonesian forest management system.

Output 1.5. and 1.6. Biodiversity and multidisciplinary landscape assessment.

Output 1.7. Publications and workshops on the main results.

1.1.2.2. Specific Objective 2

Assessment of rural development trends and future policy options including the effects of macro-level development activities on people dependent on the forest. Detailed Outputs: see section 2.1.3.2.

Output 2.1. and 2.2. Susceptibility and resilience of forest products and responses of forest product uses to economic changes and ecological disturbances.

Output 2.3. Models of trends in forest dependence, livelihood strategies, institutions for forest management and rural development, into which were merged Outputs 2.4 and 2.5.

1.1.3. Project Strategy

The planning and implementation of the project adopted the following strategies:

1.1.3.1. Site selection

The Malinau area of BRF was selected as the project site. It has been used for harvesting timber and collection of other forest products by local people living within and outside the area. Proposed new development activities combined with previous traditional uses make it an excellent location for studying response to disturbance.

A partnership with PT Inhutani II allowed a study on changes in forest policy and concession behaviour regarding logging practices, and translating these changes into field operational levels. It allowed PT Inhutani II to test the feasibility of, and implement Reduced-Impact Logging (RIL) techniques, to achieve sustainable forest management practices as required by MOF in line with ITTO's Year 2000 Objective.

1.1.3.2. Lessons drawn from past experience

The project benefited from previous experiences in forest management planning projects in Sarawak, Malaysia and East Kalimantan, as well as WWF Indonesia projects carried out in the adjacent Kayan Mentarang National Park (KMNP) and extensive data collected from KMNP by CIFOR social science staff since 1994.

1.1.3.3. Technical and scientific aspects

1.1.3.3.1 Assessment of the effect of RIL on biodiversity, conservation and socio-economics

Previous RIL studies clearly indicated that applying simple techniques within a forest management plan, including the provision of training and RIL guidelines, could significantly reduce damage. The Indonesian Selective Cutting and Planting System (*Tebang Pilih dan Tanam Indonesia*, TPTI) has not been widely applied on a concession scale. Under a RIL regime various costly regeneration treatments may be unnecessary. Policy may be developed to induce the MOF to change TPTI requirements regarding treatments after logging.

Due to various constraints, the ecological assessment of the biophysical impacts of RIL and conventional logging (CNV) concentrated on damages to residual stands and soils through a better harvesting plan, directional felling, planning of skidtrails and landings and use of less destructive skidders. A system of permanent sample plots (1 ha each) in both CNV and RIL coupes were maintained for long-term monitoring and will be used for various forestry research activities, including studies on forest regeneration, productivity and forest dynamics modelling.

The socio-economic assessment of RIL focused on an analysis of the costs and benefits of RIL in comparison with conventional logging operations.

1.1.3.3.2 Biodiversity assessment

The initial design was revised and a more integrated multidisciplinary approach to landscape assessment, termed a 'Multidisciplinary Landscape Assessment' (MLA), was adopted. This provides a framework for much of the biodiversity, socio-economic, and land/resource surveys. The ultimate goal is to develop a baseline of environmental information that explicitly includes factors that should determine good land use planning with special reference to biodiversity and the needs and preferences of local people. This innovative approach can potentially be developed and adapted to other areas.

A pre-logging wildlife inventory in the CNV and RIL blocks was undertaken. Due to budgetary, technical and biological constraints a comprehensive review was

developed of the literature and expertise pertinent to the species known to occur in Malinau, in order to identify factors that make species vulnerable to forestry activities and other landscape interventions, and relate findings to the design of ‘biodiversity-friendly’ reduced-impact forestry guidelines. This study should help to develop specific recommendations and guidance on management interventions and identify the most important unknowns and controversies for additional research. The process will also be replicated in other tropical regions.

1.1.3.3.3. Assessment of rural development trends and future policy options including the effects of macro-level development activities on people dependent on the forest

It is generally accepted that forest people strictly depend on forest resources for their livelihood and that forests must be preserved to ensure their survival, and that indigenous communities may act as conservationists. In Malinau, however, dependency on forest products varies greatly among villages and among households.

The research questions were: (1) Who depends on forest products for their livelihoods and to what extent? (2) Is it a deliberate choice or a forced one? (3) Would people seize other opportunities if offered? The answers will help to understand what is happening in Malinau and how such dynamic situations evolve in order to determine the best way to favour positive initiatives and avoid unwanted extremities.

1.1.3.3.4. Future scenarios for rural development

This activity addressed the problem of how to improve local people’s livelihoods and forest management practices by anticipating economic development trends and policy needs.

The scenario research was linked to research on adaptive co-management (ACM) of local forests and the creation of resource management agreements.

The research topics were: (1) What information can be gained about trends in livelihoods, forest management and rural development? (2) The testing of the scenario method as a tool; and (3) What sort of attention to

governance issues associated with use of this tool is necessary, especially the representation of different stakeholders? Due to the prevailing policy environment, the field research strategy was shifted to better reflect local priorities related to land tenure and claims on local resources, using action research based on participatory mapping.

1.1.4. Project Planned Duration and Planned Overall Cost

Phase I was planned to last three years with the following budget allocation:

ITTO funding	US\$ 965,650
Government of Indonesia funding	US\$ 362,500
CIFOR funding	US\$ 144,000
TOTAL	US\$1,472,150

However, various constraints, such as dependence on partners for heavy equipment and field operations, unstable political situations, availability of skilled human resources, unpredictable weather resulting in floods, late arrival of equipment, scattered distribution of and large distances between villages, different ethnic groups dealt with, high travel costs between villages, and other factors, not only led to a delay in the initiation and slowed down progress, but also resulted in unpredictable and high operational costs. The ITTC XXIX Session approved an extension until December 31, 2001, with an additional budget of US\$130,741. The new budget allocation was:

ITTO funding	US\$ 965,650
ITTO additional funding	US\$ 130,741
Government of Indonesia funding	US\$ 362,500
CIFOR funding	US\$ 144,000
TOTAL	US\$1,602,891

Due to the economic crisis, the GOI was unable to fulfil its commitment, thus leaving a total operating budget of US\$1,240,391.

Complementary financial contributions were provided by CIFOR (on top of the amount indicated above), CIRAD Forêt, IRD, the MacArthur Foundation, USAID, PT Inhutani II, PT Trakindo Utama, IFAD, ACIAR, and the Ford Foundation.

1.1.5. Intersectoral Linkages

The Government of Indonesia has given top priority to the attainment of ITTO's Year 2000 Objective. This project, by integrating silvicultural (Reduced-Impact Logging assessment), ecological (biodiversity assessment) and social aspects of natural forest management for multiple use, is a major contribution to sustainable forest management. The project will provide some guidelines for long-term natural forest management and therefore makes an important contribution to the improvement of the current Indonesian Selective Cutting and Planting Systems (TPTI).

1.2. PROJECT ACHIEVEMENT

1.2.1 Outputs Achieved

The following major outputs were achieved in Phase I:

- Output 1.1. Publication on RIL guidelines according to the biophysical features of the area (topography, stand volume, tree distribution).
- Output 1.2. Report on the comparison of the impact of RIL and CNV on the forest ecosystem.
- Output 1.3. Report on the comparison of the economic and financial cost of RIL and CNV techniques.
- Output 1.4. Improvement of the current Indonesian forest management system. This was not implemented by the project, but it is expected that the project results on comparative analyses of cost benefits in RIL and CNV, the RIL guidelines (Output 1.1.), and data and information from other projects will be applied by MOF and forest concessionaires to improve the TPTI.

Output 1.5. and Output 1.6. were merged. Reports on multidisciplinary landscape assessments and a review of the literature and expertise pertinent to the species known to occur in Malinau.

Output 1.7. A workshop presenting the main results was organized during the 4th PSC Meeting on 15 August 2000 and the final seminar was held on 27 November 2001.

Outputs 2.1 and Output 2.2. were merged. Reports on the resilience, susceptibility and response of local forest use following economic and ecological disturbances.

Output 2.3, Output 2.4 and Output 2.5 were merged. Reports on models of trends and future scenarios in forest dependence, livelihood strategies, institutions for forest management and rural development.

Publications and reports are presented in the attached CD ROM.

1.2.2. Specific Objectives Achieved

More detailed achievements of the objectives are given in the Technical Report presented separately to ITTO.

1.2.2.1. Specific Objective 1: Assessment of the effect of Reduced-Impact Logging on biodiversity, conservation, ecology and socio-economics

Outputs 1.1–1.4. The *Reduced-Impact Logging Guidelines for Lowland and Hill Dipterocarp Forests in Indonesia* provided the minimum standards for the RIL vs. CNV experiments. The *Reduced-Impact Logging Guidelines for Indonesia* were prepared on the basis of research results from

the RIL experiments and other published guidelines and codes. The results showed that RIL reduced damage by 50% and that a felling intensity of 7–9 trees per ha caused acceptable levels of damage to the residual stand and soil and water resources. Analysis of the costs of RIL and CNV showed that productivity increases in felling and skidding of 28% and 25%, respectively, were possible. RIL was less expensive than CNV under these conditions and benefits from waste reduction were estimated at Rp 20,000/m³. Improvements to timber harvesting in the concession were undertaken through training to increase the accuracy of contour maps (a basic requirement for harvest planning), directional felling training, planning of skidtrail layout, landings and an understanding of environmental issues relating to buffer zones and other timber harvesting exclusion areas.

To date, the activities have produced ten publications three articles in preparation for publication and 16 unpublished reports (see Annex 3 in the attached CD ROM) and more publications are forthcoming.

Outputs 1.5–1.6. These were merged. The overall technical report is summarized below. The ultimate goal is to develop a baseline of environmental information that explicitly includes factors that should determine good land use planning. A multidisciplinary process was developed to collect the most useful or decisive information with regard to environmental impacts and the values or preferences of local people. Special emphasis was placed on environmental costs that are not well-recognized by other stakeholders, and upon the uncertainties related to weighing up the real importance or relevance of a given facet of the landscape (decisive uncertainty). A database describing how local people perceive and value natural resources in the forest landscape, based on surveys conducted in seven villages, has been developed. The data show, among other things, > 20 000 references of specific uses and or values attributed to natural forest products (see technical report). To date, five publications, three articles in preparation for publication and eight unpublished reports (see Annex 3 in the attached CD ROM), and more publications are forthcoming.

1.2.2.2 Specific Objective 2: Assessment of rural development trends and future policy options, including the effects of macro-level development activities on people dependent on the forest.

Outputs 2.1. and 2.2. The main research objective was to assess the actual dependency of local people on forest products and how they react or would react if major disturbances affected the availability of the resource. A comprehensive survey of villages showed the dependency of different communities on forest products. Special attention was given to Punan hunter-gatherer groups for which little information has been available. To date, the activities have produced three publications, two articles in preparation for publication and eight unpublished reports in English and Indonesian (see Annex 3 in the attached CD ROM), and more publications are forthcoming.

Output 2.3. Outputs 2.3–2.5 were merged into Output 2.3. The results of surveys of stakeholders, land tenure and forest-related conflict in 27 villages at the district level showed significant increases in conflicts, which can be grouped by type and source. Draft participatory maps of land claims were produced for 22 villages. Initial training in policy reform and conflict management was conducted for communities. A multistakeholder workshop in May 2001 indicated the high level of interest in working with FORDA/CIFOR on an integrated land use plan and resolving conflict related to forest management. To date, the activities have produced 15 published articles, four in preparation for publication and 25 unpublished reports (see Annex 3 in the attached CD ROM), and more publications are forthcoming.

1.2.3. Contribution to the Achievement of the Development Objectives

The present project collected baseline information on the biophysical and human environment in support of achieving the development objective of long-term forest management for multiple uses, integrating social, environmental, biodiversity and silvicultural aspects.

RIL techniques, together with guidelines, were developed and applied on a concession scale by PT

Inhutani II. The assessment of RIL impacts on the environment and the cost/benefit analysis provided data leading to the promotion and integration of these techniques into the current Indonesian forest management system and subsequent policy changes in this system.

The MLA studies have developed a framework to integrate social, environmental, biodiversity and silvicultural aspects by making local choices and needs more explicit and available to guide any interventions that may be led by outsiders. This information provides a baseline from which future choices and developments can be better judged.

The ACM research has indicated the nature of conflicts among stakeholders related to forests, and principles for managing conflict and reaching agreements to better coordinate their interests.

The Forest Products and People (FPP) research focused more on cultural, social and economic aspects of human activities. It provided information on the past, present and future roles and importance of forest products in local peoples' livelihoods. It analysed development opportunities for forest products and compared them to other opportunities presently available to local people.

1.2.4. Situations at the End of the Project

Upon completion of Phase I, the achievements include aspects of capacity building and provision of a database, guidelines, methods, publications, reports and maps (see Section 2.5.1. for details).

1.3. TARGET BENEFICIARIES' INVOLVEMENT

The main beneficiaries were involved in the projects in the following ways (see also Section 2.3.5.):

1. The people living in the area actively took part in the project, through participatory mapping, provision of local data and information and other active collaboration.

2. The Ministry of Forestry and policy makers, through provision of full support for the project towards improvement of the TPTI. FORDA actively collaborated with CIFOR in the project execution. Other agencies within MOF gained benefits through training and use of the project facilities for training purposes.
3. PT Inhutani II managed its concession and provided facilities at Malinau for the project, and in addition, acquired technical knowledge for RIL implementation.
4. Other concessionaires in the vicinity of the project sites took part in the training activities organized by the project.
5. ITTO member countries participated in the project through the provision of consultancies and undertaking of research on subjects complementing the project as well as using the project sites at Malinau district as a site for testing a model on Integrated Natural Resources Management (INRM).
6. CIFOR and FORDA have assumed primary responsibility for the design and execution of research activities within the project.
7. Young scientists, students, technicians participated in various aspects of the research.

1.4. LESSONS LEARNED

1.4.1 Development Lessons

a. Project design

1. The well-structured and workable design, approaches and strategies of the project, complemented by the availability of qualified scientists and technical personnel and institutional, scientific and technical support provided by collaborators and partners, were important for the smooth execution of the project. They were likely to contribute a great deal to the attainment of the development objective.

2. The budget formulation and inaccurate design of the project, which were not based on accurate estimates or a detailed workplan and methodologies of the project's implementation, led to the budget shortfall and the need to reorient and modify the component research outputs.

b. Changes in intersectoral links that affect the project's success

The Government of Indonesia has given top priority to the attainment of ITTO's Year 2000 Objective. This project is a major contribution to sustainable forest management and, by providing guidelines for long-term natural forest management, makes an important contribution to the improvement of the TPTI.

The financial and political crisis in Indonesia since 1997, however, led to a rapid change in the situation of the forests of Kalimantan. The depreciation of the Indonesian currency against other major currencies and the increase in the export market value of palm oil and coal led to a rapid expansion of land clearing for oil palm plantations and construction of roads to give access to coal deposits. The situation has been aggravated by the large-scale forest fires in some areas.

c. Additional arrangements that could improve cooperation between relevant parties interested in the project

Although there was no serious problem with cooperation between all the parties involved in the project, cooperation could be improved by:

1. Holding the PSC meetings more frequently.
2. Organizing formal and informal meetings between scientists and stakeholders who are not PSC members.
3. Stakeholders, such as PT Inhutani II, local governments and local NGOs, should be more involved in the execution of the project.

d. Factors that will most likely affect project sustainability after completion

The activities which will likely affect project sustainability after completion:

1. The implementation of the Project Phase II, which is an expansion of Phase I, has a wider relevance to the development of Malinau and will involve more stakeholders, including local government and local people.
2. Follow-up activities to the RIL project, including PT Inhutani II's plan to implement RIL on a commercial scale, along with an associated training agenda and possibly a research programme.
3. Maintenance of the Seturan Field Station at the Malinau concession for:
 - (1) monitoring of permanent plots on growth and regeneration studies,
 - (2) use of the research sites, facilities and information for training on RIL and research by local, national and international institutions and universities, and
 - (3) development of a model on the scheduling of logging using data obtained during the project.
4. Extension of MLA activities to other parts of BRF, in view of the fact that the expected research results will likely improve practices and lead to better 'sustainability' in management (e.g. by means of improved RIL) and that there is some interest in using the MLA approach as part of a wider planning process.
5. The proposed designation by UNESCO of BRF and the neighbouring Kayan Mentarang National Park as a World Heritage Forest Site.
6. The use of the Malinau area as one of the test sites in the tropics for developing an Integrated Natural Resource Management model.

7. The possible participation of the BRF programme in the ITTO-supported development of the Kayan Mentarang National Park as an Indonesia-Malaysia transborder conservation area.
8. The interest of PT Inhutani II and the local government in the development of the research sites in Malinau and beyond for scientific tourism and ecotourism.
9. The devolution of power from the central government to the district level, including the authority to allocate logging permits.
6. Review of Outputs 2.1 and 2.2 led to combining them into a research agenda on the assessment of the actual dependency on forest products of local people in the Bulungan Research Forest.
7. The reorganization of CIFOR's work on community-based management has shifted the scenario research that was linked to research on adaptive co-management (ACM) of forests. It led to the merging of Outputs 2.3–2.5 into a single output, 2.3.

1.4.2. Operational Lessons

a. Project organization and management

1. The Project Steering Committee, representing ITTO, MOF, CIFOR, CIRAD-Forêt, PT Inhutani I, PT Inhutani II, NGOs, local governments, local communities, universities, and representatives of donors, supervised the implementation of the project. Fewer members would have made the committee more efficient and effective.
2. The project would run better if a project research assistant was seconded to the Project Coordinator.
3. The failure of MOF to provide a budgetary (cash) contribution to the project led to the modification of the outputs and their activities, reduction of participation of FORDA scientists, and inability to purchase and provide vehicles.
4. RIL underwent implementation changes due to the dependence on PT Inhutani II and other partners' schedules and availability of heavy equipment and personnel.
5. Outputs 1.5 and 1.6 were revised and merged into a 'Multidisciplinary Landscape Assessment' (MLA), an integrating framework for much of the biodiversity, socio-economic, and land/resource surveys to assess what actually 'matters' in the local landscape.

b. Project documentation

1. A skilled staff member, preferably full time, was required to undertake project documentation, to compile all data and information from the research and complementary data from other sources and make them meaningful and easily available, not only to the project but also to other users.
2. Baseline biophysical and social data and information compiled were not only from the project but also other data relevant to the project and development of the Malinau area. These will provide good bases for developing and implementing the next phase of the project as well as for the development of Malinau in general.
3. The results of the project were disseminated through the provision of guidelines, methods, scientific publications and reports.

c. Monitoring and evaluation; quality of project planning

1. Monitoring by the PSC should be systematic and continuous and the quality of project planning and results reviewed accordingly.
2. PSC meetings organized in the field, providing opportunities for members to visit field sites, would increase the quality of planning and the results of the project.

4. An annual mid-term evaluation would have been beneficial to the project.
5. Funding for the above activities should have been incorporated into the overall budget.

d. Definitions of roles and responsibilities of the institutions involved in project implementation

1. While each institution involved understood its roles and responsibilities, these were sometimes complicated by unforeseen circumstances. Additionally, their capacities, functions and operational objectives were not always in line with the needs of the project. This led to delays in project implementation.
1. CIFOR and FORDA assumed primary responsibility for the design and execution of research activities within the project.
2. The people living in the area actively took part in the project through participatory mapping, provision of local data and information and other active collaboration in the project's implementation.
3. MOF and policy makers took part through their support for the project, anticipating the project outcome of the improvement of the TPTI. Where required, MOF retained overall responsibility for the policies and activities carried out in BRF.
4. PT Inhutani II was responsible for the management of its concession area, and provided facilities and its concession for the project, especially for the RIL experiment and subsequent implementation on a commercial scale.
5. ITTO member countries and the global community participated in the project through the provision of consultancies and research activities on subjects complementing the project. The project sites in Malinau district were also used for testing a model of Integrated Natural Resources Management.

e. Actions to be taken to avoid variations between planned and actual implementation (schedule, costs, etc.)

1. The following measures and actions taken could have avoided the above variations: (1) better project formulation and planning during the proposal preparation stage, and (2) better planning during implementation, including regular revisions of existing plans adjusted to prevailing situations and budgetary conditions.
2. The actions taken to overcome the problems include (1) use of national scientists instead of expatriates; (2) use of funds from other sources for research station facilities, personnel, equipment, and vehicles, and (3) modification of outputs and reduction of activities.

f. External factors that influenced the project implementation and that could have been foreseen

1. Several field activities were still active until early August 2001, large amounts of biodiversity data needed additional verification and processing, the critical process of reaching agreement with the government and P.T. Inhutani II on participatory mapping and other ACM aspects required completion, and opportunities for developing agreements among communities needed documentation. Employing young national scientists, while enhancing their capability, has also required the additional support of more senior and experienced scientists.
2. Insufficient skilled human resources and experts in East Kalimantan forced the project to hire them from Java, resulting in higher travel expenditure and other costs.
3. External monitoring and evaluation should have been undertaken continuously in order to avoid variations between planned and actual implementation and to take necessary actions should such variations exist.

g. External factors that influenced the project implementation and that could not have been foreseen

1. The inability of the GOI to provide the counterpart budget resulted in a budget shortfall (which was compensated by funds from other sources) that led to a reduction of the number of outputs and activities, modification of the methods employed, and limited the number of FORDA staff participating in the project.
2. The financial constraints and unpredictable political situation led to the delay of several activities and hampered the progress of the project. More specialized consultants were required to implement the field activities than planned, leading to higher-than-anticipated expenses for this budget line.
3. Dependence on the tight logging schedules of PT Inhutani II, availability of consultants and workers, unpredictable weather resulting in floods, late arrival of tractors and other factors led to the delay in the initiation and slowed down the progress of the project.
4. Relationships with stakeholders have to be taken into account in the socio-economic and landscape studies. These have not only slowed down the activities but also resulted in unpredictable and high costs of operation, particularly in the later stage of the project implementation.
5. Complementary financial contributions from CIFOR, the MacArthur Foundation, USAID, PT Inhutani II, PT Trakindo Utama/Caterpillar, IRD and IFAD helped a great deal in overcoming the budgetary shortfall, without which the project would have achieved less.

1.5. RECOMMENDATIONS

1.5.1. Identification

1. The project should support national and international commitments.
2. The specific objectives to be tackled should be relevant and in accordance with criteria of sustainable forest management as defined by ITTO.
3. The selection of problems to be addressed should reflect the critical needs of the country but their solutions should have national and international applications and implications.

1.5.2. Design

1. It is important to develop a common vision among stakeholders of what sustainable forest management on a landscape scale for BRF should be and provide them opportunities for more participation in the planning and implementation of a project. Project formulation and planning should be prepared by CIFOR and FORDA in collaboration with other stakeholders.
2. The momentum of research generated in Phase 1 should continue and expand to achieve a more intensive understanding of the biophysical and socio-economic environments in the forest area.
3. Phase 2 should be built upon Phase 1, which has satisfactorily laid the foundations for these long-term sustainable forest management objectives through baseline data gathering and synthesis and the piloting of RIL as a better option to conventional logging.
4. Many of the needed inputs for a sustainable forest management plan for the BRF as a model forest, including all required base maps on current land use and forest cover as well as more precise topographic maps, can be completed in Phase 2, hence this plan should be the principal output projected.

5. A project plan should (i) design activities in detail during the formulation and prior to the implementation of a project and use them as a basis for budget allocation and monitoring of the progress of the project, and (ii) include a scheme for the dissemination of results of the project through the provision of guidelines, methods, scientific publications and reports in both English and Indonesian, as well as translation of scientific results into policy, management and practical application.

1.5.3. Implementation

1. Involvement of stakeholders and confirmed institutional commitments in project implementation will likely ensure the success of sustainable forest management and development of a model forest.
2. It is important to demonstrate how to incorporate sustainable forest management principles into the district spatial land use plan.
3. Implementation should be based on a workplan and carried out jointly by CIFOR and FORDA in collaboration with partners, under the supervision of the PSC.
4. Stakeholders, such as PT Inhutani II and local governments, should be more involved in the execution of the project.

1.5.4. Organization

5. The project should have a competent coordinator who has a solid background in forest ecology and silviculture but has a multidisciplinary vision so that he or she is able to integrate social and biophysical aspects of the project.
6. Effective coordination and organization among partners, stakeholders and other relevant institutions should be ensured.

7. The PSC should monitor the project continuously. It should be small yet effective and efficient and consist of professionals who will be able to be actively involved in steering and supervising the project execution.
8. The PSC, scientists and policy makers should meet regularly to ensure the smooth execution of the project.
9. Throughout the implementation of the project, constant cooperation among ITTO, CIFOR, FORDA, MOF, PSC, scientists, local government, local people, partners and collaborators should be ensured.

1.5.5. Management

1. The Project Coordinator should manage and coordinate all activities, including financial management and periodic reporting. He or she should be a competent manager and scientist who has an interdisciplinary vision of the project and has an ability to deal with people from the lower level in villages to high officials elsewhere, as well as good contact with national and international scientists and scientific institutions.
2. The Project Coordinator should ensure a strong link between the different parties involved in the project and overview the gathering of baseline information.
3. The project would benefit from a project research assistant and a field project supervisor being seconded to the Project Coordinator and included in the overall budget of the project.
4. CIFOR senior scientists, together with FORDA scientists, should direct the research activities in the site in consultation with the Project Coordinator.

Part 2: Main Text

2.1. PROJECT CONTENT

2.1.1. Development Objectives

The final objective is to achieve long-term forest management for multiple uses, integrating social, environmental, biodiversity and silvicultural aspects. The initial project was to constitute a developmental phase within a longer-term research strategy and was concerned mainly with gathering baseline information on the physical and human environment. Reduced-Impact Logging (RIL) experiments applied on a concession scale, and the assessment of their impacts on both the environment and economic cost were expected to lead to promoting and integrating these techniques in the current Indonesian selective cutting and planting system.

2.1.2. Specific Objectives

1. Assessment of the effect of Reduced-Impact Logging on biodiversity, conservation, ecology and socio-economics.
2. Assessment of rural development trends and future policy options, including the effects of macro-level development activities on people dependent on the forest.

2.1.3. Outputs

2.1.3.1 Specific Objective 1:

Assessment of the effects of Reduced-Impact Logging on biodiversity, conservation, ecology and socio-economics.

Output 1.1. Formulation of RIL guidelines in cooperation with PT Inhutani II according to the biophysical features of the area (topography, stand volume, tree distribution, etc.).

Output 1.2. Comparison of the impact of RIL and conventional logging on the forest ecosystem, including system modelling.

Output 1.3. Comparison of the economic and financial costs of RIL and conventional techniques.

Output 1.4. Improvement of the current Indonesian forest management system.

Output 1.5. Spatially-referenced database on target groups of plant and animal species of concern to management.

Output 1.6. Potential distribution maps of target species and related forest productivity; land allocation model and decision support system for reserve selection and for designing management options to minimize impact on biodiversity.

Output 1.7. Publications and workshops on the main results.

2.1.3.2. Specific Objective 2:

Assessment of rural development trends and future policy options, including the effects of macro-level development activities on people dependent on the forest.

- Output 2.1. An analysis of what makes a particular forest product susceptible or resilient to change following economic or environmental disturbance.
- Output 2.2. Improved ability to predict responses in forest product use following major economic or ecological disturbance.
- Output 2.3 Models of trends in forest dependence, livelihood strategies, institutions for forest management and rural development, into which were merged Output 2.4: Future scenarios demonstrating how hypothesized changes in economic growth, rural development and the forest condition will affect livelihood opportunities and forest sustainability, and Output 2.5: Policy briefs describing policy trends and projected impacts of different policy options based on scenarios.

2.1.4. The Strategy Adopted in Carrying Out the Project

2.1.4.1. Reasons for selection

The Bulungan Research Forest (BRF) has been used for harvesting timber and collection of other forest products by local people living within and outside the research area. There has been a considerable amount of dynamism in the situation with government-encouraged migration of villages to areas with better access to infrastructure, in particular schools and medical services. This has led many villages to move out of the area while still maintaining traditional links with it, especially for high-value forest products. Diverse new activities have been proposed for this area (including oil palm plantations, coal mining and logging), which have been rapidly opening the area, and when combined with previous traditional use, make it an excellent location for studying response to disturbance.

A partnership with PT Inhutani II provided an ideal opportunity to study the influence of changes in forest policy and the incentive structure on

concession behaviour regarding logging practices, and the translation of these changes to the field operational level. In the context of the approaching timber eco-certification deadline, and as a state-owned company, PT Inhutani II must achieve sustainable forest management practices by the year 2000 as required by MOF in line with ITTO's Year 2000 Objective. Since RIL is an essential component of those practices, PT Inhutani II was willing to cooperate with the project on this particular topic. This offered PT Inhutani II the opportunity to test the feasibility of those techniques and, more importantly, to acquire thorough technical knowledge for RIL implementation.

2.1.4.2. Lessons drawn from past experience

The project benefited from previous experience in forest management planning (ITTO project in Sarawak, Malaysia, ref: PD 104/90) and in RIL trials carried out in Sabah (Danum valley, Innoprise concession) and East Kalimantan (STREK project, PT Inhutani I concession, and projects of other timber companies). Those past experiences demonstrated that training in RIL techniques was essential for the success of the operation. WWF has been facilitating and carrying out research since 1990 in the adjacent Kayan Mentarang National Park on both ecological and social topics. CIFOR social scientists have been conducting a study on household livelihoods and forest use in the area since 1994 and have extensive data holdings on household incomes, demography and forest product collection.

2.1.4.3 Technical and scientific aspects

2.1.4.3.1 Assessment of the effect of Reduced-Impact Logging on biodiversity, conservation and socio-economics

Previous RIL studies in Southeast Asia have clearly demonstrated that damage can be significantly reduced by applying simple techniques within a forest management plan, including a pre-harvesting survey, pre-mapping of timber trees, vine cutting, design of skidtrail networks before logging and directional felling. Although the TPTI recommends the

achievement of almost all these RIL rules, they have not been widely applied on a concession scale for various reasons, including lack of technical knowledge, lack of control of harvesting practices and the high economic cost of RIL if combined with enrichment planting. One of the objectives of RIL implementation at BRF is to demonstrate the advantage of those techniques in post-harvesting forest management. Under a RIL regime that avoids damage to advanced and understorey regeneration, artificial regeneration, as required by TPTI, might be rendered wholly or at least partially unnecessary. A policy question might be put forward as to whether the economic and time savings made by reducing the TPTI regeneration requirements would provide sufficient incentives for a concessionaire to invest in the planning and training required for RIL. Another possible policy question that might be considered by MOF is to waive both liberation thinning and enrichment planting requirements after logging.

Before the implementation of RIL, technical guidelines were published by CIFOR and evaluated by PT Inhutani II in order to assess their feasibility in the field. These guidelines took into account the physical features of the area and particularly the topography. A first assessment of the topographic features of the PT Inhutani II concession and particularly of the 5000 ha scheduled for logging over the next five years was a first priority. Forest inventory and a tree location map provided important information on the forest resource of the concession. This assessment allows a logging plan to be developed according to the field characteristics and forest resources. Training on topographic and tree mapping, skidtrail planning and directional felling for staff of PT Inhutani II, MOF and other concessionaires, was carried out in collaboration with forestry consulting companies (Forestec and Nordfor), and the Tropical Forest Foundation (TFF).

The assessment of the biophysical impacts of RIL was initially planned to focus on biodiversity, changes in soil and water, non-timber forest products, forest regeneration and productivity, and fire risk. Due to various constraints, particularly financial limitations, the impact studies were concentrated mainly on damage to residual stands and soils through a better harvesting plan, directional felling, planning of skidtrails and landings and use of less destructive skidders. The assessment of the logging

impacts required the establishment of a system of permanent sample plots (1 ha each) in both conventional logging (CNV) and RIL (1997–1998 and 1998–1999 coupes, respectively) before logging operations. They offer possibilities for a wide range of long-term forestry monitoring, research and training on forest regeneration, productivity, growth and forest dynamics modelling.

The socio-economic assessment of RIL involving comparisons of financial analyses of the assessment of forest management planning and control costs, including RIL, have not yet been carried out on a concession scale. An assessment of the advantages and disadvantages of adopting RIL techniques requires an understanding of both the economic benefits and costs of RIL operations in comparison with CNV practices. By reducing damage to the remaining stand and limiting soil compaction, RIL has the potential to provide economic advantages in long-term management, thus benefiting society and the landowner (the Government of Indonesia). Forests harvested with RIL techniques are likely to regenerate better and faster than those harvested with CNV. It should be demonstrated that by adopting RIL techniques, concessionaires could avoid the necessity of enrichment planting and liberation thinning, which would serve as an important economic incentive to induce concessionaires to adopt RIL procedures on a wide scale.

2.1.4.3.2. Biodiversity assessment

The initial design was revised and a more integrated multidisciplinary approach to landscape assessment, termed a ‘Multidisciplinary Landscape Assessment’ (MLA), was adopted. The shift in approach of the planned biodiversity assessment provides an integrating framework for much of the biodiversity, socio-economic, and land/resource surveys. The ultimate goal is to develop a baseline of environmental information that explicitly includes factors that should determine good land use planning with special reference to biodiversity and the needs and preferences of local people. This innovative approach has stimulated much interest as a useful new assessment paradigm that can potentially be developed and adapted to other areas

On the study of logging impacts on wildlife, the WCS-IP undertook a pre-logging wildlife

inventory in the CNV and RIL blocks. However, the field reassessment of wildlife was not carried out as originally foreseen due to budgetary, technical and biological constraints. Owing to the very short-term nature of any post-harvest changes, and the many interventions in the surrounding landscape which would confound any careful re-survey assessment (e.g. roads, hunting), it would be impossible to understand the reasons for any changes in the fauna of the composition. It is also intended to take a different approach that involved aggregating on 'what is known already'.

Some background information on this idea is as follows. Current conceptions of 'good' practice in tropical high forest are almost exclusively preoccupied with silviculture (e.g. reduced-impact logging). Yet, researchers from many disciplines of tropical biology claim their work has potential relevance to improving forestry practices in tropical landscapes. Capturing this knowledge may help to improve current logging practices. It is believed that much more is known about vulnerable forest taxa than is currently recognised and applied. Many experts have quite clear views on what types of landscape properties or habitat elements are required to maintain, for example, woodpeckers, hornbills, tree frogs, *Rafflesia*, gibbons, ungulates, etc. This includes clearly documented natural history information and the more context-specific expertise that might have been built up without such documentation. A synthesis of both types of information would be useful to guide forestry activities, and is arguably of much greater use than any statement of how densities of taxa change in any one logging study.

Based on this reasoning we developed a comprehensive review of the literature and expertise pertinent to the species known to occur in Malinau. The aim was to identify the factors that make species vulnerable to forestry activities and other landscape interventions, and relate findings to the design of 'biodiversity-friendly' reduced-impact forestry guidelines and to invite a broad range of expert opinions including local experts in Indonesia. We believe this study will help develop specific recommendations and guidance on management interventions and also identify the most important unknowns and controversies for additional research.

Based on the Malinau experience, this process will also now be replicated in other tropical regions.

The WCS-IP undertook the review. The compiled database should be an invaluable tool with which to assess the potential impact of logging and to refine the existing RIL guidelines for hill dipterocarp forests. Previous documents (e.g. ITTO guidelines, FAO Code of Practice, Sist *et al.*'s RIL Guidelines for Lowland and Hill Dipterocarp Forests, Government of Indonesia Logging Laws, etc.) were used as a starting point.

Additional surveys produced a detailed summary of aquatic fauna including fish (some ITTO support) and invertebrates (without ITTO support), and an additional pilot summary looked at amphibians and reptiles. Apart from detailed information on species lists, these studies also included detailed attention to habitat, ecology, and how these species are used and viewed by local communities.

2.1.4.3.3. Assessment of rural development trends and future policy options including the effects of macro-level development activities on people dependent on the forest

It is generally accepted that forest people strictly depend on forest resources for their livelihood and that forests must be preserved to ensure their survival. The notion that indigenous communities may act as conservationists belongs to the same category of '*idEes reAues*'. In Malinau, as elsewhere, reality is very different. Dependency on forest products varies greatly among villages and among households and quite often, local people play an active role in forest conversion.

The research undertaken seeks to assess the actual dependency on forest products of local people in the BRF: (i) Who depends on forest products for their livelihoods and to what extent? (ii) Is it a deliberate choice or a forced one? and (iii) Would people seize other opportunities if offered? The answers to these questions are an absolute prerequisite to understand what is happening in Malinau, how such dynamic situations evolve, and thus to determine the best way to favour positive initiatives and avoid unwanted extremities.

2.1.4.3.4. Future scenarios for rural development

This activity addressed the problem of how to improve local people's livelihoods and forest management practices by anticipating economic development trends and policy needs. The research developed future scenarios that illustrate possibilities for reconciling forest management objectives with local people's needs.

The reorganization of CIFOR's work on community-based management has shifted the emphasis for this activity. The scenario research was linked to research on Adaptive Co-Management (ACM) of local forests and the creation of resource management agreements. The scenario research was one of several tools that were tested as part of an ACM approach to landscape management. In developing the tool and applying it, questions related to stakeholder participation and governance in resource management agreements were also examined. In Malinau, these efforts focused on the representation of communities in multiple stakeholder processes. The current activity was thus focusing on the testing of scenario-based methods for collaborative, adaptive management in Malinau. The research topics associated with this work were: (1) What information can be gained about trends in livelihoods, forest management and rural development? (2) The testing of the scenario method as a tool; and (3) What sort of attention to governance issues associated with use of this tool is necessary, especially the representation of different stakeholders? Due to the policy environment at the time the research was implemented, we shifted the field research strategy to better reflect local priorities related to land tenure and claims on local resources. Examinations were carried out on the negotiation of boundaries among villages, using action research based on participatory mapping and the governance conditions affecting how local stakeholders were able to reach agreement and negotiate effectively.

2.1.5. Workplan

The Project Agreement between CIFOR and ITTO was signed on 8 September 2001 on the implementation of Project PD 12/97 Rev.1 (F), Forest, Science and Sustainability: The Bulungan

Model Forest. The Project Workplan was prepared and approved by the first Project Steering Committee (PSC) Meeting on 11 December 1997 in Jakarta. The first budget instalment was received on 30 December 1997; accordingly, the project execution was effective on 30 December 1997. The implementation of the project was delayed until 1 March 1998, when the Project Coordinator started his assignment, although initial activities were carried out by CIFOR scientists in January 1998. The Project Workplan was reviewed during the subsequent PSC Meetings and revised accordingly.

2.1.6. Required Inputs

The project required financial inputs provided by ITTO, the Government of Indonesia (GOI)/Ministry of Forestry (MOF) and CIFOR initially for the period of 30 December 1997–30 December 2000 as shown in Table 1.

However, various constraints, such as dependence on partners for heavy equipment and field operations, unstable political situations, availability of skilled human resources, unpredictable weather resulting in floods, late arrival of equipment, scattered distribution of and large distances between villages, different ethnic groups dealt with, high travel costs between villages, and other factors, not only led to a delay in the initiation and slowed down progress, but also resulted in unpredictable and high operational costs. The ITTC XXIX Session approved an extension until December 31, 2001, with an additional budget of US\$130,741. The new budget allocation was:

ITTO funding	US\$ 965,650
ITTO additional funding	US\$ 130,741
Government of Indonesia funding	US\$ 362,500
CIFOR funding	US\$ 144,000
TOTAL	US\$1,602,891

Due to the economic crisis, the GOI was unable to fulfil its commitment, thus leaving a total operating budget of US\$1,240,391. It provided in-kind contributions instead.

CIRAD-Forêt provided contributions to cover the salary of a RIL scientist and expenses for a French student intern. IRD paid the salary of a social

Table 1. Financial Inputs provided by ITTO, the Government of Indonesia/Ministry of Forestry and CIFOR initially for the period of 30 December 1997–30 December 2000

Budget component	TOTAL (USD)	ITTO	CIFOR	GOI/MOF
10 Project Personnel	783 600	531 600	0	252 000
20 Subcontracts	340 000	244 000	144 000	0
30 Duty Travel	84 800	84 800	0	0
40 Capital items	92 400	32 400	0	60 000
50 Consumable items	28 150	7 650	0	20 500
60 Miscellaneous	71 850	41 850	0	30 000
70 ITTO monitoring	21 000	21 000		
TOTAL	1 421 800	965 650	144 000	362 500
ITTO costs (5.5%)	50 350			
GRAND TOTAL	1 472 150			

scientist. CIFOR (on top of the aforementioned contribution), the MacArthur Foundation and USAID contributed complementary funds to cover expenses for constructing and managing field facilities, staff salaries, purchase of equipment and vehicles, PSC meetings, transportation, and travel. PT Inhutani II provided support to cover the cost of transporting two new tractors from Singapore to the Malinau concession as well as logging and other expenses, P.T. Trakindo Utama and Caterpillar Co. allowed the project to use two brand-new tractors for free for three months, and IFAD, ACIAR, and the Ford Foundation gave complementary funds to pay for various activities.

2.1.7. Project Rationale, Relevant Background Information and Location

In January 1996, the Indonesian Ministry of Forestry designated 302 900 ha of forest for CIFOR in Malinau District, East Kalimantan, to be developed as a long-term model of exemplary research-based management. The creation of this research forest—the first ever in Indonesia—grew out of a provision in the host-country agreement granting access to a long-term research site. The interest of CIFOR in this area is to carry out multidisciplinary research activities able to cover the complexity of forest management for multiple uses. For this reason,

among CIFOR's six research programme areas, four (Sustainable Forest Management, Biodiversity Conservation, Adaptive Co-Management of Forests, and Forest Products and People) have been involved in the area for this initial three-year period. CIFOR and MOF expect to maintain research and development activities at BRF for a period of 10–20 years.

CIFOR's strategic research has focused on policy issues to enable more informed, productive, sustainable and equitable decisions about the management and use of forests. CIFOR and ITTO both have an international dimension and constitute fora for cooperation and consultation between Member Governments and Non-Governmental Organizations. As stipulated in the ITTO Action Plan, ITTO aims to encourage and promote sustainable and economically viable management systems. Cooperation between CIFOR, FORDA and ITTO through this research and development project will not only contribute to the achievement of the ITTO Year 2000 Objective but also enhance the relationship between these three institutions.

One of the greatest challenges for achieving sustainable forest management in the next century will be to address the increasing complexity of demands on tropical forest resources within a constrained land area. Demands for tropical forest extraction, conversion or protection are transforming

the way forests look and the way they are managed, with the result that tropical forested landscapes are perhaps the single most rapidly changing land type around the globe. These demands are complicated by coinciding claims over the use or control of the same area, the increasing number of social and private interests pursuing their diverse agendas and the multiple contexts of forest management, from the local to the regional, national and international scales.

Although sustainability and how to maintain it at the forest management level is beginning to be understood, approaches for maintaining sustainability at the larger landscape scale remain poorly developed. The general objective of the present research is to carry out a systematic investigation of how to achieve forest sustainability for a 'large forest landscape' in the humid tropics, where diverse, rapidly changing and often conflicting land use demands exist.

This investigation requires an understanding of the technologies, policies and information needed for meeting multiple objectives, both within and across forest types, in a given area. The focus of such a landscape approach is on the links between different activities. The research will therefore aim to understand how to strengthen the synergies and compatibilities among demands, while minimizing the conflicts and negative impacts on sustainability.

2.1.8. Previous Preparatory Activities

There were no previous preparatory activities before the project was launched except the formulation of the Project Document and a related research project (coordinated by Eva Wollenberg) on local livelihoods and the relationship between income incentives and conservation behaviour. This work provided baseline information about the dependence of local people on the forest for five selected sites in BRF.

2.1.9. ITTO Context of the Project

2.1.9.1. Compliance with ITTO objectives

This project is consistent with the following ITTO objectives as stipulated in Article 1 of the ITTA (1994):

- a) To contribute to the process of sustainable development.
- b) To enhance the capacity of members to implement a strategy for achieving exports of tropical timber and timber products from sustainably managed sources by the year 2000.
- c) To promote and support research and development with a view to improving forest management and efficiency of wood utilization as well as increasing the capacity to conserve and enhance other forest values in timber-producing tropical forests.
- d) To encourage members to develop national policies aimed at sustainable utilization and conservation of timber-producing forests and their genetic resources and at maintaining the ecological balance in the regions concerned, in the context of the tropical timber trade.

2.1.9.2 Compliance with ITTO criteria

This project lies within the framework of the Committee on Reforestation and Forest Management, and is mainly related to the forest management area. It is also in line with all the objectives defined by this committee (ITTA, 1994, Article 27).

2.1.9.3. Relationship to ITTO Action Plan and Priorities

The project is consistent with the ITTO Action Plan and is related to the major objectives of the Committee on Reforestation and Forest Management, which are to promote the development of national policies and to support the development and implementation of sustainable forest management systems. The project is related to all the following priorities defined in the ITTO action plan:

- Forestry sector policy review.
- Studies on the economic and financial costs and benefits of forest management.

- Identification of field demonstration projects where sustainable production of timber and non-timber products may be combined.
- Comparative assessment of silvicultural treatments on permanent sample plots.
- Study of the effect of different levels of timber harvesting on forest sustainability.
- Promoting and financing demonstration projects for different models, and regional/subregional networks of such projects.
- Specification of training requirements for forest management and administration.
- Help to create networks on tropical forest management, and between tropical forestry research institutes.
- Help to finance exchange visits and workshop participation by technical personnel.

The project complies with the ITTO Libreville Action Plan 1998 to 2001: (1.4) ITTO Year 2000 Objective, which is the goal of having all tropical timber entering international trade come from sustainably managed sources by 2000.

The major actions cover forest policy, security of forest resources, prevention of unplanned deforestation, improvement of utilization, improvement of social and political environment on forest management, application of and training on reduced-impact logging, monitoring and research, and relationship with local people.

2.2. PROJECT CONTEXT

2.2.1. Relationship to Sectoral Policies Affecting Tropical Timber

The Indonesian Constitution stipulates that the State controls forests and utilization of resources therein. In this context the Government of Indonesia (GOI) controls, manages and administers the nation's forests under the provisions of the 1967 and 1999 Basic Forestry Laws. The Laws determine the status,

function and utilization of forests. Since the 1970s, the government has granted concessions to logging companies, which have to comply with the regulation that the management of forest should be in accordance with the principle of multiple use and sustainable yield. In 1998 the government authorized communities to undertake timber harvesting through cooperatives and a programme on management of forest production by traditional societies, which involves non-government organizations (NGOs) working in partnership with local communities. Meanwhile the Government of Indonesia has given top priority to the attainment of ITTO's Year 2000 Objective. This project, by integrating silvicultural (Reduced-Impact Logging assessment), ecological (biodiversity assessment) and social aspects of natural forest management for multiple use, is a major contribution towards sustainable forest management. This project will provide some guidelines for long-term natural forest management and therefore makes an important contribution to the improvement of TPTI.

2.2.2. Relationship to Subsectoral Aims and Programmes

The project provided training activities, particularly on logging techniques and planning. Training sessions in the forest were organized by CIFOR in collaboration with PT Inhutani II and the Tropical Forest Foundation. The project provided facilities and allowed the use of experimental RIL sites for training by other organizations, such as various universities, the Berau Forest Management Project (a joint project of PT Inhutani II and the European Union) for training some of their staff, and the Center for Forestry Training of the Ministry of Forestry and the Indonesia Australia Specialized Training Project for training participants from various logging companies and Indonesian forestry agencies. The Ministry of Forestry will also use the sites for Asia-Pacific RIL training.

The ACM activity provided training on participatory mapping, conflict management and policy awareness for local people. Three multistakeholder dialogues were also sponsored, the last of which (supported primarily by funds from ACIAR) was a full two-day workshop.

2.3. PROJECT DESIGN AND ORGANIZATION

2.3.1. Adequacy of the Results of the 'Identification Phase'

The project correctly defined the choice of BRF as a location for research and for identifying the issues of sustainable forest management to tackle by integrating social, biological, environmental and silvicultural approaches, although as the project progressed, various rapid changes took place and required adjustment.

2.3.2. Sound Conceptual Foundation of the Project

The project concept and rationale were sufficiently defined in the Project Document, but the impacts of external influences were not predictable. The financial crisis, leading to the failure of the GOI to provide its financial contribution, and rapid changes in the political situation, for instance, were not anticipated and have had profound effects on the project, including the modification and delay of various activities. The dependency of project activities on third parties' commitment often slowed down the progress of the project.

2.3.3. Adequacy of Time and Other Resources for Project Formulation

The Project Document was produced in time for submission by the GOI to ITTC in May 1997 and the agreement was signed by ITTO, MOF and CIFOR on 8 September 1997. There was, however, a delay in the implementation of the project, due to the fact that the workplan was presented at the first Project Steering Committee meeting held on 11 December 1997 in Jakarta, as well as to the availability of the Project Coordinator, who commenced his service on 1 March 1998.

2.3.4. Understanding and Appropriateness of the Roles and Responsibilities of the Institutions Involved with Project Implementation.

As forestry research institutions, CIFOR and FORDA were appropriate as the executing agencies and had a good understanding of their responsibilities. Other institutions involved as partners included PT Inhutani II, the state-owned forest enterprise, and CIRAD-Forêt, LIPI, WCS-IP, Mulawarman University, Bandung Institute of Technology, BIOMA and SHK. While each institution involved understood its roles and responsibilities, these have been complicated by unforeseen circumstances. In addition, their capacities, functions and operational objectives were sometimes not in line with the needs of the project. This led to delays in project implementation.

2.3.5. Beneficiary Involvement with the Project's Efforts and Actions

The involvement of the main beneficiaries in the projects:

1. The people living in the area actively took part in the project through participatory mapping, the provision of local data and information and other active collaboration. Through participation and discussions, the project and the people gained a better understanding of enhancing conservation and sustainable utilization of the forest resources on which they depend, protection against inappropriate development, and better coordination with adjacent land users.
2. The Ministry of Forestry and policy makers provided full support for the project, anticipating the project outcome: the improvement of the Indonesian Selective Cutting and Planting System (TPTI) through providing rules and guidelines for RIL application on a concession scale, and better development of community-based forest management. FORDA, being the implementing agency, actively collaborated with CIFOR in the project execution. Other agencies within MOF gained benefits through training and use of the project facilities for training purposes.

3. PT Inhutani II provided facilities and its concession at Malinau for the project, especially for the RIL experiment and subsequent implementation on commercial scales. At the same time, PT Inhutani II acquired technical knowledge for RIL implementation as part of forest management planning and control.
4. Other concessionaires in the vicinity of the project sites took part in the training activities organized by the project.
5. ITTO member countries and the global community participated in the project through the provision of consultancies and research activities on subjects complementing the projects. The project sites and Malinau district were also used as one of the sites for testing a model of Integrated Natural Resources Management that is being developed for tropical regions and will be applied by various international institutions.
6. Other partners of the project providing support included LIPI (*Lembaga Ilmu Pengetahuan Indonesia*, the Indonesian Institute of Sciences) in the inventory and identification of plant and fish species, the WCS-IP and Bandung Institute of Technology in wildlife surveys, and BIOMA and SHK in various field studies.
7. Young scientists, graduate and undergraduate students, technicians participated in various aspects of the projects.

2.4. PROJECT IMPLEMENTATION

2.4.1. The Most Critical Differences Between Planned and Actual Project Implementation

These include the following:

- Underestimated costs of the project during the project formulation and the failure of GOI/MOF to provide a budgetary (cash) contribution to the project due to the economic crisis led to the

modification of the outputs and their activities, a reduction in the participation of the FORDA scientists, and inability to purchase and provide vehicles.

- RIL underwent implementation changes due to the dependence on PT Inhutani II and other partners' schedules and availability of heavy equipment and personnel as well as inadequacy of the budget.
- The reorganization of CIFOR's work on community-based management has shifted the scenario research that was linked to research on adaptive co-management (ACM) of forests. It led to the merging of Outputs 2.3–2.5 into a single output, 2.3.
- Initially, Outputs 1.5 and 1.6 comprised the gradient-based survey, which was designed to provide the basis for stratified sampling of the Bulungan area. However, following a change in project staff, a new approach—the Multidisciplinary Landscape Assessment (MLA)—was developed as it was recognised that this would be of greater value to achieving project goals. The ultimate goal of MLA is to develop a baseline of environmental information that explicitly includes factors that should determine good land use planning when seen from the perspective of local communities.

2.4.2. Measures and Actions that Could Have Avoided These Variations

The following measures and actions could have avoided the above variations: (1) better project formulation and planning during the proposal preparation stage, which should have been based on the details in outputs, activities, personnel, travel, and budgets; and (2) better planning during implementation, including regular revisions of existing plans adjusted to prevailing situations and budgetary conditions.

The actions taken to overcome the problems include (1) use of national scientists instead of expatriates; (2) use of funds from other sources, i.e., the MacArthur grant and the CIFOR additional budget for training, meeting, consultants, publication, research station facilities, personnel, equipment, running facilities, and vehicles, and (3) modification of outputs and reduction of activities.

2.4.3. Appropriateness of the Assumptions Made and Correct Identification of the Issues Involved

Assumptions made regarding the project background, justification, objectives and expected outputs were appropriate. Assumptions regarding implementation were mostly correct, although there have been some miscalculations as a result of unforeseen changes and, in particular, financial deficiency.

2.4.4. Project Sustainability after Project Completion as a Result of Project Implementation Conditions

Upon completion, the sustainability of the project would be contingent upon the following:

- The implementation of the Project Phase II, which is an expansion of Phase I, has a wider relevance to development of Malinau and will involve more stakeholders, including local government and local people.
- RIL programme:
 - PT Inhutani II's plan to implement RIL on a commercial scale, and its associated training and possibly a research agenda.
 - Development of a model on the scheduling of logging using data obtained during the project.
 - Monitoring in permanent sample plots of long-term impacts of logging on forest structure and species composition, growth, regeneration and forest dynamics in Phase II.
- Maintenance of (i) the Seturan Field Station at the Malinau concession for (1) monitoring of permanent plots on studies of growth, regeneration and forest dynamics, and (2) use of the research sites, facilities and information for training on RIL and research by local, national and international institutions and universities, and (ii) the Loreh guest house and its facilities, mainly for social science research.
- Extension of MLA activities to other parts of BRF in view of the fact that the expected research results will likely improve practices and lead to better sustainability in management (e.g. by means of improved RIL) and that there is some interest in using the MLA approach as part of a wider planning process. The value of this activity will depend on appropriate packaging and promotion of the methods and results.
- The impacts of the participatory mapping and conflict management will be sustainable with the support of the local district government to (1) follow up on engaging in participatory mapping training to complete the process initiated under this project, (2) resolve remaining disputes, (3) finalize maps according to changes in boundaries negotiated by villages, and (4) enforce principles about what is considered a legitimate process for settling boundary differences, the definition of a village and enforcement of boundary agreements. Stronger support from civil society (nongovernmental actors) groups interested in facilitating local communities, providing them with legal literacy and assisting them to negotiate with other actors would be necessary to build villagers' capacities to act on a more equal basis with other local institutions.
- A proposal by UNESCO to designate BRF and the neighbouring Kayan Mentarang National Park as a World Heritage Forest Site.
- The use of the Malinau area as one of the test sites in the tropics for developing an Integrated Natural Resource Management model.

- The possible participation of the BRF programme in the ITTO-supported development of the Kayan Mentarang National Park as an Indonesia-Malaysia transborder conservation area.
- The interest of PT Inhutani II and the local government in the development of the research sites in Malinau and beyond for scientific tourism and ecotourism.

2.4.5. Appropriateness of the Project Inputs

As indicated above, the financial input was inadequate due to inaccurate budgetary estimates for activities and the failure of the GOI/MOF to provide its contribution to the project. This affected the entire operation of the project, including the quantity and quality of personnel, material and management inputs to the project, and has led to the extension of the project with an additional budget.

2.5. PROJECT RESULTS

2.5.1. The Situation Existing at Project Completion as Compared to Pre-project Situation

As a result of the project implementation the following have been achieved:

(1) Methodology

RIL:

- Planning and implementation of RIL on a commercial scale by PT Inhutani II.
- More understanding of the necessity of the application of RIL in sustainable forest management by forestry officials and local governments.

MLA:

- The manual should allow wider use and adaptation of the methods.
- Several related activities, directly stimulated by the Malinau work, are planned or already in progress in other parts of the world.
- The main results of the surveys will be used to feed into and enrich other project outputs, such as the RIL guidelines.

ACM:

- Participatory mapping, negotiations , etc.
- Participation in the formulation of the Malinau District Government regulations on management of natural resources, especially forest resources.
- Participation in development of the Malinau District spatial plan.

(2) Capacity building

RIL:

- Use of the research sites, facilities and information for training on RIL and research by other institutions and universities.
- Improved capabilities of young scientists, universities, national research institutions, government agencies and NGOs participating in the project.

MLA:

- Most of the survey work and analysis has been done by or in close collaboration with local institutions.
- Much emphasis has been given to developing a number of young Indonesian scientists.

FPP:

- Involvement of numerous Indonesian young graduates in the research.
- Involvement of many student interns at Masters level (Indonesian and international).
- Involvement of two PhD students in the research.
- Training of *Yayasan Adat Punan* members in assessment methods, population census and computerized data analysis.

ACM:

- Training and facilitation in negotiation and participatory mapping among 21 villages, which have produced draft maps.
- Training in legal awareness about decentralization, conflict management.
- Community and multistakeholder dialogues.
- Participation in the formulation of the Malinau District Government regulations on management of natural resources, especially forest resources.
- Discussion of the development of the Malinau District spatial plan.
- Scenario methods seminar at the Ministry of Forestry, Jakarta.
- Scenario methods guide translated into Indonesian and distributed in the local district and among national stakeholders.

(3) Database at CIFOR

RIL:

- A model of RIL operations (topographical maps, tree maps, skidtrail locations, etc.) and data on tree species identification, species diameters, non-timber use, damage to canopy, ground and trees, growth, regeneration and reports.
- Tree data in permanent sample plots.

MLA:

- Wildlife in Malinau concession prior to logging.
- Review of impacts of logging on biodiversity.
- The MLA database linked social and biophysical data in 200 sample points and structured data on local preferences and views regarding the environment for seven communities.
- Surveys of reptiles, amphibians and fish.

FPP:

- Anthropological data on the Punan of the Malinau watershed.
- Traditional and modern medicine in Malinau.
- Cultural diversity in five villages of the Malinau watershed.
- Commercialisation of forest products in the Malinau district.
- Exploitation of aquatic resources.
- Impact of concessionaires on local people.
- Potential use of wastewood by local people.
- Household survey in five villages of the Malinau watershed and in all villages of the Tubu watershed.
- Illegal logging survey in Malinau, Berau and Pasir.

ACM - Future trends and scenarios:

- Baseline data on 27 villages.
- Georeferenced points for constructing maps.
- Guide to scenario methods as a tool for ACM of forests.

(4) Understanding of SFM for land use and resource planning by local government, PT Inhutani II, and local communities.

(5) Provision of:

- Database and products to local government, communities, PT Inhutani II and other stakeholders.
- Publications and reports (see Annexes in CD ROM).
- RIL guidelines and methods of topographic and tree mapping.
- MLA's new methods of biodiversity assessment integrating local community perception, social and biological aspects.
- ACM's guidelines and methodology on trends and future scenarios.

2.5.2. Extent to which the Project's Specific Objectives were Achieved

The project's specific objectives were mostly achieved, but certain aspects were only partially accomplished, including:

- (1)Objective 1: The RIL implementation was partially achieved and due to various constraints its replication was not realized. The assessment of impacts on biodiversity was partially achieved (in some cases substantial alternative achievements—as agreed in steering committee meetings—were made) while those on soils and environment were not realized.
- (2)Objective 2: The assessment of the role and importance of forest products for local communities was achieved. The actual level of dependency on forest products of households and communities was determined. The realization of predictive models has not been achieved. The assessment of rural development trends and future policy options was partly achieved through workshops, interviews and participant observation rather than scenario methods. Given

the rapid changes associated with reforms in Indonesia at the time, the research was modified to conduct action research on using conflict management and boundary setting as mechanisms to adapt to changes, rather than to predict them.

2.5.3. Impact of the Project Results

2.5.3.1 Sectoral programmes

The following are the expected impact on sectoral programmes:

- One of the most important impacts of this first RIL experiment was certainly the progressive change in perception of these techniques on the part of PT Inhutani II Malinau Unit. The economic cost assessment study clearly showed that production and productivity were significantly increased with RIL and costs consequently reduced as well. RIL is therefore no longer regarded as an experimental tool for forest scientists but an efficient technique able to increase logging efficiency. The best demonstration of this is the decision of PT Inhutani II to harvest two blocks in the 2000 annual coupe with RIL techniques on their own initiative.
- The project will likely have positive impacts on forest research and management in Indonesia and beyond, and should make an important contribution to forest science worldwide.
- BRF and its existing research stations are providing a tropical rain forest venue for many aspects of forest research and training and a demonstration site for RIL at both the experimental stage and commercial-scale application.
- The project offers RIL methods and guidelines, integrated biodiversity methods, participatory mapping guidelines, and future scenario guidelines that can be applied by forestry agencies, concession holders, local government and universities in Indonesia and beyond.

- RIL studies will contribute guidelines, data and information to the improvement of the TPTI and RIL implementation on a commercial scale by various logging companies in Indonesia and elsewhere.
- The RIL research sites, data and information at Malinau have been used as demonstration sites and materials for reduced-impact logging operations by various organizations.
- Through ACM, forest management planning can be better coordinated among stakeholders from the district to village level. There is an indication that it also helps stimulate the use of accountability and transparency principles for decision making about how forests will be used and, together with the village administrative maps, provide a basis for local government to develop a more participatorily derived land use plan.
- Various forestry undergraduate students of Mulawarman University in Samarinda and Gadjah Mada University in Yogyakarta visited the sites as part of their field studies. Forestry student interns from Mulawarman University, Bogor Agricultural University, and the University of Aberdeen took part in the project. Several graduate students from Mulawarman University, Bogor Agricultural University, the University of London, the Swiss Federal Institute of Technology, Yale University, Oxford University, Wageningen University, the University of Montpellier, the University of Paris VII & XII, and Stirling University undertook their research in the project sites.

2.5.3.2. Physical environment

RIL implementation greatly reduced soil damage. Reduction was achieved through the increased accuracy of contour maps (a basic requirement for harvest planning), directional felling training, planning of skidtrail layout and landings, use of less destructive skidders and an understanding of environmental issues relating to buffer zones and other timber harvesting exclusion areas. Forest

modification and conversion increased soil erosion and soil compaction, which led to the decrease of water quality of the rivers as reflected by the increase of turbidity and siltation. This will likely affect population of fish and other organisms living in the aquatic ecosystems in the area. Better understanding on the part of local government of sustainable forest management, which has led to the decision to stop issuing permits for small scale logging, is expected to reduce further forest destruction and degradation of the physical environment.

2.5.3.3. Social environment

The impact on social environment is beginning to be felt through more active involvement of communities in negotiations about land use in their territories and in seeking material benefits, although it will be significantly appreciated when Phase II of the project is completed.

2.5.3.4. Target beneficiaries

The impacts on target beneficiaries are as follows:

- The people living in the area, who benefit from improved livelihood options, enhanced conservation of the forest resources on which they depend, protection against inappropriate development, and better coordination with adjacent land users.
- ITTO member countries in the region, by contributing to the achievement of ITTO's Year 2000 Objective, providing a model of sustainable forest management, and developing new technologies, including the plan to use methods to be developed in the project in a survey in Mozambique.
- MOF and policy makers with regard to improvement of the Indonesian Selective Cutting and Planting System (TPTI) by endorsing and providing rules and guidelines for RIL (including *RIL Guidelines for Indonesia* produced by the project) application on a concession scale.

- PT Inhutani II, which acquired technical knowledge for RIL implementation as part of forest management planning and control.
- The global community, through bringing of one of the world's most important forest wilderness areas under exemplary management, and the conservation of both its biodiversity and of its global environmental functions.

2.5.4. Project Sustainability after Project Completion

See Section 2.4.4., which also presents sustainability after completion of the project.

A proposal for Phase II of the Project was submitted in June 2000. The Twentieth Review Panel, however, recommended a project evaluation to assess the achievements and shortcomings of the project prior to the formulation of the second phase. The project evaluation was undertaken from 25 April to 9 May 2001, barely enough time to consolidate the outcome into the proposal of Project Phase II before the deadline for the proposal submission on 15 June 2001. The 22nd Review Panel recommended that the Phase II proposal be further revised and resubmitted to ITTO before 19 November for review by the 23rd Review Panel.

2.6 SYNTHESIS OF THE ANALYSIS

(a) Specific Objective(s) Achievement

Objective 1: Partly realized

Objective 2: Partly realized

(b) Outputs

Outputs 1.1.–1.4. : About 90 % realized

Outputs 1.5.–1.6. : After modifications, 100% realized

Output 1.7 : Fully realized

Outputs 2.1.–2.2. : 90% realized

Outputs 2.3.–2.5 : After modifications, 90 % realized

(c) Schedule

Certain activities were delayed, but not seriously, due to unfavourable field conditions. The extension of the project with an additional budget necessarily delayed the completion of the project.

(d) Actual expenditures

None of the activities had expenditure below the planned amount. The expenditure of some activities was > 10% above that planned and was covered by other funding sources. The overexpenditure was due to the inaccuracy of budgetary estimates during the proposal preparation stage and the failure of the Government of Indonesia to provide its contribution.

(e) Potential for replication

The RIL technique, Multiple Landscape Assessment, ACM-Future Scenario undertaking and Forest Product and People studies have significant potential for replication and application.

(f) Potential for scaling up

There is significant potential for scaling up and extension into Phase II.

Part 3: Conclusion and Recommendations

3.1. DEVELOPMENT LESSONS

A similar but shorter account appears in the Executive Summary in Section 1.4.1.

a. Project design

1. The well-structured and workable design, approaches and strategies of the Project, complemented with availability of qualified scientists and technical personnel and institutional, scientific and technical support provided by ITTO, CIFOR, MOF, PT Inhutani II, collaborators and partners were found important for the smooth execution of the project. They were likely to contribute a great deal to the attainment of the development objective.
2. The budget formulation and inaccurate design of the of the project, which were not based on accurate estimates or a detailed workplan and methodologies of the project's implementation, led to the budget shortfall and the necessity of making some reorientation and modification of component research outputs.

b. Changes in intersectoral links that affect the project's success

The Government of Indonesia has given top priority to the attainment of ITTO's Year 2000 Objective. This project, by integrating silvicultural (Reduced-Impact Logging assessment), ecological (biodiversity assessment) and social aspects of natural forest management for multiple use, is a major contribution to sustainable forest management. This project will provide some guidelines for long-term natural forest

management and therefore makes an important contribution to the improvement of the current Indonesian forest management system (TPTI).

The financial and political crisis in Indonesia since 1997, however, led to a rapid change in the situation of the forests of Kalimantan. The depreciation of the Indonesian currency against other major currencies and the increase in the export market value of palm oil and coal led to a rapid expansion of land clearing for oil palm plantations and construction of roads to give access to coal deposits. Another factor that has had a major impact on forest resources has been the devolution of power from the central government to the district level, including the authority to allocate logging permits. For instance, permits for oil palm estates are being given for areas that are still the subject of logging concession agreements. The situation has been aggravated by fires in some areas. A series of catastrophic fires occurred in fairly rapid succession between 1982 and 1998. The extent and damage caused by these fires of the past two decades has been the worst in history. Forest fires may have a regional and global consequence because the areas involved are so extensive and effects are so devastating.

c. Additional arrangements that could improve cooperation between relevant parties interested in the project

Although there was no serious problem with cooperation between all the parties involved in the project, the cooperation could be improved by:

1. Holding the PSC meetings more frequently.

2. Organizing formal and informal meetings between scientists and stakeholders who are not PSC members.
3. Stakeholders, such as PT Inhutani II and local governments, being more involved in the execution of the project.

d. Factors that will most likely affect project sustainability after completion

These activities will likely affect project sustainability after completion:

1. The implementation of the Project Phase II, which is an expansion of Phase I, has a wider relevance to development of Malinau and will involve more stakeholders, including local government and local people.
2. PT Inhutani II's plan to implement RIL on a commercial scale, along with its associated training agenda and possibly a research programme.
3. Maintenance of the Seturan Field Station at the Malinau concession for:
 - (1) monitoring of permanent plots on growth and regeneration studies,
 - (2) use of the research sites, facilities and information for training on RIL and research by local, national and international institutions and universities, and
 - (3) development of a model on the scheduling of logging using data obtained during the project.
4. Extension of MLA activities to other parts of BRF in view of the fact that the expected research results will likely improve practices and lead to better 'sustainability' in management (e.g. by means of improved RIL) and that there is some interest in using the MLA approach as part of a wider planning process.

5. The proposed designation by UNESCO of BRF and the neighbouring Kayan Mentarang National Park as a World Heritage Forest Site.
6. The use of the Malinau area as one of the test sites in the tropics for developing an Integrated Natural Resource Management model.
7. The possible participation of the BRF programme in the ITTO-supported development of the Kayan Mentarang National Park as an Indonesia-Malaysia transborder conservation area.
8. The interest of PT Inhutani II and the local government in the development of the research sites in Malinau and beyond for scientific tourism and ecotourism.
9. The devolution of power from the central government to the district level, including the authority to allocate logging permits.

3.2. OPERATIONAL LESSONS

A similar account appears in the Executive Summary in Section 1.4.2.

a. Project organization and management

1. The Project Steering Committee, representing ITTO, MOF, CIFOR, CIRAD -Forêt, PT Inhutani I, PT Inhutani II, NGOs, local governments, local communities, universities, and representatives of donors, supervised the implementation of the project. Fewer members would have made the committee more efficient and effective.
2. The project would run better if a project research assistant was seconded to the Project Coordinator.
3. The failure of MOF to provide a budgetary (cash) contribution to the project due to the economic crisis led to the modification of the outputs and their activities, reduction of participation of the FORDA scientists, and inability to purchase and provide vehicles.

4. RIL underwent implementation changes due to the dependence on PT Inhutani II and other partners' schedules and availability of heavy equipment and personnel.
5. Outputs 1.5 and 1.6 were revised and merged into a 'Multidisciplinary Landscape Assessment' (MLA), an integrating framework for much of the biodiversity, socio-economic, and land/resource surveys needed as a baseline to assess what actually 'matters' in the local landscape. The ultimate goal of MLA is to develop a baseline of environmental information that explicitly includes factors that should determine good land use planning with special reference to the needs and preferences of local people.
6. Review of Outputs 2.1 and 2.2 led to combining them into a research agenda on assessment of the actual dependency on forest products of local people in the Bulungan Research Forest.
7. The reorganization of CIFOR's work on community-based management has shifted the scenario research that was linked to research on adaptive co- management (ACM) of forests. It led to the merging of Outputs 2.3–2.5 into a single output, 2.3.

b. Project documentation

1. A skilled staff member, preferably full time, was required to undertake the project documentation, to compile all data and information from the research and complementary data from other sources and make them meaningful and easily available, not only to the project but also to other users.
2. Baseline biophysical and social data and information compiled were not only those from the project but also other data relevant to the project and development of the Malinau area on different aspects and from different sources. These will provide good bases for developing and implementing the next phase of the project as well as for the development of Malinau in general.

3. The results of the project were disseminated through the provision of guidelines, methods, and scientific publications and reports.

c. Monitoring and evaluation; quality of project planning

1. Monitoring by the PSC should be systematic and continuous and the quality of project planning and results reviewed accordingly.
2. PSC meetings organized in the field, providing opportunities for members to visit field sites, would increase the quality of planning and the results of the project.
3. An annual mid-term evaluation would have been beneficial to the project.
4. Funding for the above activities should have been incorporated into the overall budget.

d. Definitions of roles and responsibilities of the institutions involved in project implementation

1. While each institution involved understood its roles and responsibilities, these were sometimes complicated by unforeseen circumstances. Additionally, their capacities, functions and operational objectives were not always in line with the needs of the project. This led to delays in project implementation.
2. CIFOR, in consultation with FORDA, assumed primary responsibility for the design and execution of research activities within the project.
3. The people living in the area actively took part in the project through participatory mapping, provision of local data and information and other active collaboration in the project's implementation.
4. MOF and policy makers took part through their support for the project, anticipating the project outcome of the improvement of the TPTI. Where required, MOF retained overall responsibility for the policies and activities carried out in BRF.

5. PT Inhutani II was responsible for the management of its concession area, and provided facilities and its concession for the project, especially in the RIL experiment and subsequent implementation on a commercial scale.
6. ITTO member countries and the global community participated in the project through the provision of consultancies and research activities on subjects complementing the project. The project sites at Malinau district were also used as a site for testing a model of Integrated Natural Resources

e. Actions to be taken to avoid variations between planned and actual implementation (schedule, costs, etc.)

1. The following measures and actions taken could have avoided the above variations: (1) better project formulation and planning during the proposal preparation stage, which should have been based on the details in outputs, activities, personnel, travel, and budgets; and (2) better planning during implementation, including regular revisions of existing plans adjusted to prevailing situations and budgetary conditions.
2. The actions taken to overcome the problems include (1) use of national scientists instead of expatriates; (2) use of funds from other sources, i.e., the MacArthur grant and the CIFOR core budget, for research station facilities, personnel, equipment, and vehicles, and (3) modification of outputs and reduction of activities.

f. External factors that influenced the project implementation and that could have been foreseen

1. Insufficient skilled human resources and experts in East Kalimantan forced the project to hire them from Java, resulting in higher travel expenditure and other costs.
2. External monitoring and evaluation should have been undertaken continuously in order to avoid variations between planned and actual

implementation and to take necessary actions should such variations exist.

3. Several field activities were still active until early August 2001, large amounts of biodiversity data needed additional verification and processing, the critical process of reaching agreement with the government and PT Inhutani II on participatory mapping and other ACM aspects required completion, and opportunities for developing agreements among communities needed documentation. Employing young national scientists, while enhancing their capability, has also required the additional support of more senior and experienced scientists in finalizing the work accomplished and translating this into English for final reports.

g. External factors that influenced the project implementation and that could not have been foreseen

1. The inability of the GOI to provide the counterpart budget resulted in a budget shortfall (which was compensated by funds from other sources) that led to a reduction of the number of outputs and activities, modification of the methods employed, and limited the number of FORDA staff participating in the project.
2. The financial constraints and unpredictable political situation led to the delay of several activities and hampered the progress of the project. Furthermore, the number of specialized consultants required to implement the field activities was far greater than planned, leading to higher - than - anticipated expenses for this budget line.
3. Dependence on the tight logging schedules of PT Inhutani II, availability of consultants and workers, unpredictable weather resulting in floods, late arrival of tractors and other factors led to the delay in the initiation and slowed down the progress of the project.
4. Relationships with stakeholders (including local communities, PT Inhutani II, local governments, and the different ethnic groups dealt with) were

aspects that have to be taken into account in the socio-economic and landscape studies. These have not only slowed down the activities but also resulted in unpredictable and high costs of operation, which have been felt particularly in the later stage of the project implementation.

5. Complementary financial contributions from CIFOR, the MacArthur Foundation, USAID, PT Inhutani II, PT Trakindo Utama/Caterpillar, IRD and IFAD helped a great deal in overcoming the budgetary shortfall, without which the project would have achieved less.

3.3. RECOMMENDATIONS FOR FUTURE PROJECTS

Similar recommendations appear in the Executive Summary, Section 1.5.

3.3.1. Identification

1. The project should support national and international commitments.
2. The specific objectives to be tackled should be relevant and in accordance with the criteria of sustainable forest management as defined by ITTO.
3. The selection of problems to be addressed should reflect the critical needs of the country but their solutions should have national and international applications and implications.

3.3.2. Design

1. It is important to develop a common vision among stakeholders of what sustainable forest management on a landscape scale for BRF should be and provide them opportunities for more participation in the planning and implementation of a project. Project formulation and planning should be prepared by CIFOR and FORDA in collaboration with other stakeholders.

2. The momentum of research generated in Phase 1 should continue and expand to achieve a more intensive understanding of the biophysical and socio-economic environments in the forest area.
3. Phase 2 should be built upon Phase 1, which has satisfactorily laid the foundations for these long-term sustainable forest management objectives through baseline data gathering and synthesis and the piloting of RIL as a better option to conventional logging.
4. Many of the needed inputs for a sustainable forest management plan for the BRF as a model forest, including all required base maps on current land use and forest cover as well as more precise topographic maps, can be completed in Phase 2, hence this plan should be the principal output projected.
5. A project plan should (i) design activities in detail during the formulation and prior to the implementation of a project and use them as a basis for budget allocation and monitoring of the progress of the project, and (ii) include a scheme for the dissemination of results of the project through the provision of guidelines, methods, scientific publications and reports in both English and Indonesian, as well as translation of scientific results into policy, management and practical application.

3.3.3. Implementation

1. Involvement of stakeholders and confirmed institutional commitments in project implementation will likely ensure the success of sustainable forest management and development of a model forest.
2. It is important to demonstrate how to incorporate sustainable forest management principles into the district spatial land use plan.
3. Implementation should be based on a workplan and carried out jointly by CIFOR and FORDA in collaboration with partners, under the supervision of PSC.

4. Stakeholders, such as PT Inhutani II and local governments, should be more involved in the execution of the project.

3.3.4. Organization

1. The project should have a competent coordinator who has a solid background in forest ecology and silviculture but has a multidisciplinary vision so that he or she is able to integrate the social and biophysical aspects of the project.
2. Effective coordination and organization among partners, stakeholders and other relevant institutions should be ensured.
3. The PSC should monitor the project continuously. It should be small yet effective and efficient and consist of professionals who will be able to be actively involved in the supervision of the project execution.
4. The PSC, scientists and policy makers should meet regularly to ensure the smooth execution of the project.
5. Throughout the implementation of the project, constant cooperation among ITTO, CIFOR, FORDA, MOF, PSC, scientists, local government, local people, partners and collaborators should be ensured.

3.3.5. Management

1. The Project Coordinator should manage and coordinate all activities, including financial management and periodic reporting. He or she should be a competent manager and scientist who has an interdisciplinary vision of the project and has an ability to deal with people from the lower level in villages to high officials elsewhere, as well as good contact with national and international scientists and scientific institutions.
2. The Project Coordinator should ensure a strong link between the different parties involved in the project and overview the gathering of baseline information.
3. The project would benefit from a project research assistant and a field project supervisor being seconded to the Project Coordinator and included in the overall budget of the project.
4. CIFOR senior scientists, together with FORDA scientists, should direct the research activities in the site in consultation with the Project Coordinator.

Responsible for the Report

Name : Kuswata Kartawinata

Position held : Project Coordinator

Date : 20 January 2002

Signature : 

Acronyms

ACIAR	Australian Centre for International Agricultural Research	MLA	Multidisciplinary Landscape Assessment
ACM	Adaptive Co-Management	MOF	Ministry of Forestry
APHI	Asosiasi Pengusaha Hutan Indonesia (Indonesian Association of Forest Enterprises)	NGO	Non-Governmental Organization
BAPPEDA	Badan Perencanaan Pembangunan Daerah (the Regional Development Planning Board)	NTFP's	Non Timber Forest Product
BRF	Bulungan Research Forest	PD	Project Document
CD-ROM	Compact Disc Read Only Memory	PEMDA	Pemerintah Daerah (Local Government)
CIFOR	Center for International Forestry Research	PSC	Project Steering Committee
CIRAD	Centre de Coopèration Internationale en Recherche Agronomique pour le Dèveloppement	PSP	Permanent Sample Plot
CNV	Conventional Logging	RIL	Reduced-Impact Logging
FAO	Food and Agriculture Organization	ROADENG	Road Engineering
FORDA	Forestry Research and Development Agency	SFM	Sustainable Forest Management
FPP	Forest Products and People	SHK	Sistem Hutan Kerakyatan (Community Forestry System)
GEF	Global Environment Facility	STREK	Silvicultural Treatment for the Regeneration of logged-over Forest in East Kalimantan
GIS	Geographic Information System	TFF	Tropical Forest Foundation
GOI	Government of Indonesia	TPTI	Tebang Pilih dan Tanam Indonesia (the Indonesian Selective Cutting and Planting System)
IFAD	International Fund for Agricultural Development	UNESCO	United Nations Educational, Scientific and Cultural Organization
INRM	Integrated Natural Resources Management	USAID	United States Agency for International Development
INTAG	Inventarisasi dan Tata Guna Hutan (Forest Inventory and Land Use)	WCS-IP	Wildlife Conservation Society - Indonesian Program
IRD	Institut de Recherche pour le Dèveloppement	WWF	World Wide Fund for Nature
ITTC	International Tropical Timber Council		
ITTO	International Tropical Timber Organization		
KMNP	Kayan Mentarang National Park		
LIPI	Lembaga Ilmu Pengetahuan Indonesia (Indonesian Institute of Sciences)		

Annexes (In CD-ROM)

Annex 1. Mid-term Review Report.

Annex 2. Minutes of the Steering Committee Meetings.

Annex 3. List of Publications and Unpublished Reports of ITTO Project PD 12/97 Rev.1(F): Forest, Science and Sustainability: The Bulungan Forest Model.

Published articles are listed by their titles.

The full texts of unpublished reports can be accessed by clicking the titles

A. LIST OF PUBLICATIONS

I. Output 1.1 - 1.4: Effect of Reduced Impact Logging

a. *Published articles*

1. Chabbert, J. and H. Priyadi. 2001. Exploitation a Faible Impact (EFI) dans une foret a Borneo. Bois et Forets des Tropiques, 269: 83-86.
2. Dwiprabowo, H. 1999 Reduced Impact Logging Research in Malinau Concession, Bulungan, East Kalimantan. Proceedings of Regional Consultation on Implementation of Codes of Logging Practice and Directions for the Future, 12-16 July 1999, Port Vila, Vanuatu. Pacific Islands Forest and Trees Support Programme.
3. Dwiprabowo, H. 1999 Reduced Impact Logging: Felling and Skidding Productivity in Malinau Concession, Bulungan. Exposé of Research Results of International Cooperation Projects, 24-25 November 1999, Jakarta. Forestry and Estate Crops Research and Development Agency, Ministry of Forestry and Estate Crops. p:121-130.

4. Elias, G.B. Applegate, K. Kartawinata, Machfudh and A. Klassen. 2001. Reduced Impact Logging Guidelines for Indonesia. ITTO/CIFOR/MoF/MacArthur/INHUTANI II. Bogor. 114 p.
5. Elias, G.B. Applegate, K. Kartawinata, Machfudh and A. Klassen. 2001. Pedoman Reduced Impact Logging Indonesia. ITTO/CIFOR/MoF/MacArthur/INHUTANI II. Bogor. 114 p.
6. Machfudh and H. Dwiprabowo. 2000. Teknik Penebangan Hutan yang Tepat, Benar dan Efisien. Bulletin Bappeda Kaltim Vol II(12):1-6.
7. Machfudh, P. Sist, K. Kartawinata and Efransjah. 2001. Changing Attitude in the Forest: A Pilot Project to Implement RIL in Indonesia Has Created Enthusiasm for the Practice Amongst Concessionaires. The Tropical Forest Update 11(2):10-11.
8. Sist, P., D. Dykstra, and R. Fimbel. 1998. Reduced Impact Logging Guidelines for Lowland and Hill Dipterocarp Forest in Indonesia. Bulungan Research Report Series No. 1a. CIFOR, Bogor, Indonesia.
9. Sist, P., D. Dykstra, and R. Fimbel. 1998. Pedoman Pembalakan Berdampak Rendah untuk Hutan Dipterocarpa Lahan Rendah dan Bukit di Indonesia. Research Report Series No. 1b. CIFOR, Bogor, Indonesia.
10. van Nieuwstadt, M.G.L., D. Sheil, and K. Kartawinata. 2001. The Ecological Consequences of Logging in the Burned Forest of East Kalimantan, Indonesia. Conservation Biology 15:1183-1186.

b. Submitted Articles

11. Sist, P., K. Kartawinata, H. Priyadi, and D. Sheil. Reduced-Impact Logging in Indonesian Borneo: Some Results Confirming the Need for New Silvicultural Prescription. *Forest Ecology and Management*.
12. Sist, P., R. Fimble, R. Nasi, D. Sheil and M-H. Chevallier. Sustainable Management of Mixed Dipterocarp Forests Needs More Ecological Rules than a Minimum Diameter for Harvesting. Ecological Application.

c. Articles in Preparation

13. Kartawinata, K., P. Sist, and S. Ridwan. Floristic Composition and Structure of a Dipterocarp Forest at Malinau, East Kalimantan, Indonesia. CIFOR, Bogor, Indonesia.

II. Outputs 1.5 – 1.6: Biodiversity and Multiple Landscape Assessments (MLA)

a. Published Articles

14. Sheil, D. and van Heist, M. 2000. Ecology for Tropical Forest Management. *International Forestry Review* 2: 261-270.
15. Sheil, D. J. A. Sayer, and T. O'Brien. 1999. Tree Diversity and Conservation in Logged Rainforest. *Science* 284:1587.
16. Sheil, D. 1999. Tropical Forest Diversity, Environmental Change and Species Augmentation after the Intermediate Disturbance Hypothesis. *Journal of Vegetation Science*, 10: 851-860.
17. Sheil, D. 2000. Conservation and Biodiversity Monitoring in the Tropics: Realities, Priorities and Distraction. *Conservation Biology* 15:1179-1182.

18. Sheil, D., R. K. Puri, I. Basuki, M. van Heist, Syafeuddin, Rukmiyati, M. A. Sardjono, I. Samsuedin, K. Sidiyasa, Chrisandini, E. Permana, E. M. Angi, F. Gatzweiler, A. Wijaya, with the help from the people of Paya Seturan, Long Lake, Rian, Langap, Laban Nyarit, Long Jalan, Lio Mutai and Gong Solok. 2002. Exploring Biological Diversity, Environment and Local People's Perspective in Forest Landscapes - Methods for a Multidisciplinary Landscape Assessment. ITTO, CIFOR and MOF.

b. Articles in Press

19. Sheil, D., Ducey, M.J., Sidiyasa, K., Samsuedin, I. (in press). A New Type of Sample Unit for the Efficient Assessment of Diverse Tree Communities in Complex Forest Landscape. *Journal of Tropical Forest Science*.

c. Submitted Articles

20. Watt, A., D. Sheil, A. Watt, O. Phillips, A. Newton, D. Moss, C. Lyal, A. Lowe, V. Kapos, S. Jones, J. Hall, J. Healey, W. Hawthorne, A. Gillison, N. Garwood, and P. Eggleton. (submitted). Towards Better Methods of Rapid Biodiversity Assessment in Tropical Forests.

d. Articles in Preparation

21. Sheil, D. and S. Wunder. (in preparation). The Value of Tropical Forest to Local Communities: A Comment.

III. Outputs 2.1 – 2.2: Resilience, Susceptibility and Response of Forest Use

a. Published Articles

22. Katz, E. 1997. NWFPs in Bulungan, E. Kalimantan, Indonesia. *In*: Mittleman, A. J., Chun K. Lai, N. Byron, G. Mihon, and E. Katz. Non-wood Forest Products Outlook Study for Asia and the Pacific: Towards 2010. FAO-RAPA, Bangkok.

23. Kuhn, C., E. Katz, and P. Levang. 2001. *At Home in the Forest: The Punan People of the Malinau River*. CIFOR, Bogor, Indonesia.
24. Obidzinski, K., I. Suramenggala, and P. Levang. 2001. *L'Exploitation Forestiere Illegale en Indonesie: Un Inquietant Processus de Legalisation Bois et Forets des Tropiques* No. 270(4): 85-97
- b. *Articles in Press***
25. Karskija, L. *Punan Malinau and the Bulungan Research Forest – A Research Report*. CIFOR, Bogor, Indonesia.
- c. *Articles in Preparation***
26. Issoufaly, Hatim, and Yusuf Tarigan. *Agro-economic surveys in Long Jalan, Tanjung Nanga, Langap, Pulau Sapi and Respen Sembuak*. CIFOR, Bogor, Indonesia.
- IV. Outputs 2.3: Rural Development Trend and Future Scenario**
- a. *Published Articles***
27. CIFOR. *Proses dan Hasil Lokakarya Pemetaan Masyarakat Hulu Sungai Malinau dengan CIFOR: Laporan Singkat*. Informal Newsletter for Malinau Community No. 1, Nopember 1999. CIFOR, Bogor, Indonesia.
28. CIFOR. *Kabar dari Tim Pendamping Pemetaan Desa Partisipatif Hulu Sungai Malinau*. Informal Newsletter for Malinau Community No. 2, Juni 2000. CIFOR, Bogor, Indonesia.
29. CIFOR. *Kabar dari Tim Pendamping Pemetaan Desa Partisipatif Hulu Sungai Malinau*. Informal Newsletter for Malinau Community No. 3, Agustus 2000. CIFOR, Bogor.
30. CIFOR. *Kabar dari Tim Pendamping Pemetaan Desa Partisipatif Hulu Sungai Malinau*. Informal Newsletter for Malinau Community No. 4, Oktober 2000. CIFOR, Bogor.
31. CIFOR. *Kabar dari Lokakarya Membangun Agenda Bersama II: Setulang*, 4-6 Desember 200. Informal Newsletter for Malinau Community No. 5, Januari 2001. CIFOR, Bogor.
32. CIFOR. *Kabar dari Tim Pendamping Pengelolaan Hutan Bersama Hulu Sungai Malinau*. Informal Newsletter for Malinau Community No. 6, September 2001. CIFOR, Bogor, Indonesia.
33. Rhee, S. 2000. *Adaptive Co-Management of Forests: How Powerful Stakeholders Represent Local Communities*. *TRI News: Annual Review of the Tropical Forestry Resources Institute, Yale School of Forestry and Environmental Studies*, vol. 19: 10-14.
34. Sellato, B. 2001. *Forest, Resources, and People in Bulungan. Elements for a History of Settlement, Trade, and Social Dynamics in Borneo, 1880-2000*. CIFOR. Bogor. Indonesia.
35. Uluk, A., I. M. Sudana, and E.K. Wollenberg. 2001. *Ketergantungan Masyarakat Dayak terhadap Hutan di Sekitar Taman Nasional Kayan Mentarang*. CIFOR. Bogor. Indonesia.
36. Wollenberg, E. 2001. *Incentives for Gaharu Collection in East Kalimantan*. *Economic Botany* (June or September 2001 issue).
37. Wollenberg, E., A.S. Nawir, and A. Uluk. 2000. *Income is not enough: The Effect of Economic Incentives on Forest Conservation*. Working paper No. 22. CIFOR. Bogor. Indonesia.
38. Wollenberg, E., D. Edmunds, and L. Buck. 2000. *Anticipating Change: Scenarios as a Tool for Increasing Adaptivity in Multi-Stakeholder Settings*. CIFOR. Bogor. Indonesia. 38 p.
39. Wollenberg, E., D. Edmunds, and L. Buck. 2000. *Using scenarios to make decisions about the future: anticipatory learning for the adaptive co-management of community forests*. *Landscape and Urban Planning* 47(1), pp. 65-77.

40. Wollenberg, E., D. Edmunds, and L. Buck. 2001. *Anticipating Change: Scenarios as a tool for adaptive forest management, a guide* CIFOR, IFAD, ITTO and MOF. Bogor. 33 pp.
41. Wollenberg, E., D. Edmunds, and L. Buck. 2001. *Mengantisipasi perubahan, skenario sebagai sarana pengelolaan hutan secara adaptif-suatu panduan* CIFOR, IFAD, ITTO and MoF. Bogor. 33pp.

b. Articles in Press

42. Edmunds, D. and E. Wollenberg. *A Strategic Approach to Multistakeholder Negotiations. Development and Change.*
43. Edmunds, D. and E. Wollenberg. *Historical Perspectives on Forest Policy Change in Asia: Finding Explanations for Why Devolution hasn't met Expectation. Environmental History.*
44. Wollenberg, E. and H. Kartodihardjo. (in press). *Devolution and Indonesia's New Basic Forestry Law. In Colfer, C., and D. Resosudarmo (edits). Indonesian Policy in the Marking. Resources for the Future.*

c. Submitted Articles

45. *Tim Pengelolaan Hutan Bersma Secara Adaptif and L. Buck. (Submitted). Pemetaan Desa Partisipatif sebagai alat menyelesaikan konflik studi kasus desa-desa daerah aliran sungai Malinau. Landscape and Urban Planning. (accepted).*

d. Articles in Preparation

46. Wollenberg, E. *Accommodation of Multiple Stakeholders. International Journal for Agriculture, Governance and Ecology. Special issue.*

B. UNPUBLISHED REPORTS

(Full Text can be accessed by clicking the title)

I. Output 1.1 – 1.4: Effects of Reduced Impact Logging.

1. Dwiprabowo, H., S. Grulois, P. Sist, and K. Kartawinata. *Cost-benefit Analysis of Reduced-Impact Logging in Malinau concession, Bulungan, East Kalimantan. CIFOR, Bogor, Indonesia.*
2. Klassen, A. W. *Procedures for Topographic Forest survey. CIFOR, Bogor, Indonesia.*
3. Klassen, A. W. *Prosedur Survei Topografi Hutan. CIFOR, Bogor, Indonesia.*
4. Klasson, Bernt. *Felling Guidelines for Reduced Impact Logging in Tropical Moist Foresty. CIFOR, Bogor, Indonesia.*
5. Klasson, Bernt. *Pedoman Penebangan Untuk Pembalakan Berdampak rendah di Hutan Tropika Basah. CIFOR, Bogor, Indonesia.*
6. Machfudh, P. Sist, H. Dwiprabowo, K. Kartawinata and H. Priyadi. *Comparison between Conventional and Reduced Impact Logging in the Bulungan Research Forest Project, A poster presented in the International Conference on the Application of RIL to Advance Sustainable Forest Management: Constraints, Challenges and Opportunity, 26 February –1 March 2001, Kuching Sarawak, Malaysia.*
7. Machfudh, K. Kartawinata, H. Priyadi, D. Sheil, and P. Sist. *Field Guide to Permanent Sample Plots in the Conventional Logging Block (Petak 28 and 29), Malinau Concession. CIFOR, Bogor, Indonesia.*
8. Machfudh, K. Kartawinata, H. Priyadi, D. Sheil, and P. Sist. *Field Guide to the Permanent Sample Plots in the Reduced Impact Logging Block (Petak 27), Malinau Concession. CIFOR, Bogor, Indonesia.*

9. Priyadi, H. Growth, Mortality and Regeneration in RIL and Conventional Logging Areas. CIFOR, Bogor, Indonesia.
10. Provendier, D. Occurrence, Structure and Impact of Logging on Regeneration of *Agathis borneensis* in a Mixed Dipterocarp Forest of East Borneo (Bulungan district). (Supported by other sources). CIFOR, Bogor, Indonesia.
11. Sheil, D. and R. Fimble. Program to Quantify Components of the Wildlife Habitat in the Hill Dipterocarp Forest of the Inhutani II Timber Concession, East Kalimantan, Indonesia: BASIC DESIGN (Revised September 1998). CIFOR, Bogor, Indonesia.
12. Sheil, D. and R. Fimble. Notes on Permanent Sample Plot Methods used by CIFOR in Bulungan (1998/1999). CIFOR, Bogor, Indonesia.
13. Sist, Plinio. Permanent Plots Design for Logging Damage Assessment in the Malinau Concession (Bulungan Research Forest). CIFOR, Bogor, Indonesia.
14. Sist, P. Main Results of The Reduced Impact Logging Experiment in the Malinau Concession (1997-2000). CIFOR, Bogor, Indonesia.
15. Sist, P. Remeasurement of PSP in Blocks 28 and 29. CIFOR, Bogor, Indonesia.
18. Iskandar, D.T. The Amphibians and Reptiles of Malinau Region, Bulungan Research Forest, East Kalimantan. Annotated Checklist with Some Notes on Ecological Preferences of the Species and Local Utilization. CIFOR, Bogor, Indonesia.
19. Lang, D.A.I. 2001. What is the Impact of Conventional Logging on Anuran Diversity and Abundance in the Bulungan Research Forest, East Kalimantan. CIFOR, Bogor, Indonesia.
20. O'Brien, T. Bulungan Biodiversity Survey: Preliminary Results. CIFOR, Bogor, Indonesia.
21. Rossenbaum, B., D. Sheil, T. O'Brien. The Wildlife of Malinau, East Kalimantan: A Review of Species Sensitivity with Recommendations for Improved Practice and Further Research. CIFOR, Bogor, Indonesia.
22. Rachmatika. I. The Fish Fauna in Bulungan Research Forest (BRF), Malinau, East Kalimantan, with Notes on Local Uses and Values. CIFOR, Bogor, Indonesia.
23. Szaro, R. Sayer, J., and Sheil, D. 1999. Biodiversity Conservation in Logged Forests, Paper commissioned by GEF. CIFOR, Bogor, Indonesia.

II. Outputs 1.5 – 1.6. Biodiversity and Multidisciplinary Landscape Assessment (MLA)

16. Fimbel, R. A. and T. O'Brien. Faunal Survey in Unlogged Forest of the Inhutani II, Malinau Timber Concession. CIFOR, Bogor, Indonesia.
17. Hubble, D.P. 2001. The Impacts of Conventional Logging on *Bufo asper*, *Rana leporine*, *Rana kuhlii* & *Rana picturata* in Dipterocarp Forest, East Kalimantan. CIFOR, Bogor, Indonesia.

III. Outputs 2.1 – 2.2: Resilience, Susceptibility and Response of Forest Use

24. Boedihartono, A. K. Traditional Healing Practices and Modern Medicine – Indigenous knowledge and Cultural Diversity in Bulungan, East Kalimantan: Long Jalan, Tanjung Nanga, Langap, Pulau Sapi and Respen Sembuak. CIFOR, Bogor, Indonesia.
25. Cesard, Nicholas. 2001. Four Ethnic Groups (Punan, Kenyah, Merap, Lun Dayeh) faced with Changes Along the Malinau River (Kalimantan Timur). CIFOR, Bogor, Indonesia.
26. Gumartini, T. The Feasibility Study: Logging Waste for Local Communities, Bulungan

- Research Forest, East Kalimantan. CIFOR, Bogor, Indonesia.
27. Holtzschere, Arnould. Establishment of Ground Control Points in BRF. CIFOR, Bogor, Indonesia.
28. Kurniawan, I. Aktivitas Perdagangan Hasil Hutan di Kabupaten Malinau, Kalimantan Timur (Trade Activities of Forest Products. In Malinau District, East Kalimantan). CIFOR, Bogor, Indonesia.
29. Mannes, J. Ketergantungan pada Sumber Daya Sungai-Studi Kasus di Sungai Malinau, Kabupaten Malinau (Dependence on River Resources – A Case study in the Malinau River, Malinau District). CIFOR, Bogor, Indonesia.
30. Obidzinski, K. and I. Suramenggala. Illegal logging in East Kalimantan – Papers on social, economic and political implications. CIFOR, Bogor, Indonesia.
31. Sitorus, S. Dampak Perusahaan terhadap Hasil Hutan dan Masyarakat Sekitar – Studi Kasus di Kabupaten Bulungan dan Malinau (Impacts of Companies on Forest Products and Surrounding Communities – A Case Study in Bulungan and Malinau Districts, East Kalimantan). CIFOR, Bogor, Indonesia.
- IV. Outputs 2.3: Rural Development Trends and Future Scenarios.**
32. ACM-CIFOR. 1999 Report of Workshop “Building an Agenda Together” (Bangun rencana bersama) and Mapping Training (Pelatihan Pengenalan Pemetaan) Long Loreh, East Kalimantan 20-24 November, 1999. CIFOR, Bogor.
33. ACM-CIFOR. 2000. Report of Workshop “Building Plans Together II” Laporan Lokakarya Bangun Rencana Bersama II 4 – 6 December 2000, Setulang, Kab. Malinau, East Kalimantan. A report. CIFOR, Bogor, Indonesia.
34. Anau, Njau and Cahyat, Ade (Editors). Pengenalan Pemetaan Desa Partisipatif di Wilayah Adat Sungai Malinau Kecamatan Malinau Kabupaten Bulungan Kalimantan Timur. CIFOR, SHK Kaltim.
35. Anau, Njau. Laporan Studi Pengamatan Partisipatif di Desa Langap, Paya Sturan, Tanjung Nanga, Long Jalan, Nunuk Tanah Kibang, Long Rat, Setarap dan Setulang, Kecamatan Malinau, Kabupaten Bulungan Mei, Juni dan Agustus 1999. 81 pp. CIFOR, Bogor, Indonesia.
36. Christopher Barr, Eva Wollenberg, Godwin Limberg, Njau Anau, Ramses Iwan, I Made Sudana, Moira Moeliono, and Tony Djogo. Forthcoming. The Impacts of Decentralization on Forests and Forest-Dependent Communities in Kabupaten Malinau, East Kalimantan. CIFOR Monograph, Bogor, Indonesia.
37. CIFOR. 2000. Pedoman Pemetaan Desa Partisipatif di Sungai Malinau. CIFOR, Bogor, Indonesia.
38. CIFOR. 2001. Ringkasan Lokakarya Pemanfaatan Lahan dan Pengelolaan Hutan dalam Era Otonomi Daerah. A report of workshop held in Malinau, East Kalimantan, 2-3 May, 2001. CIFOR, Bogor, Indonesia.
39. Limberg, Godwin. Participation of the Various Stakeholders in the Negotiation and Conflict Resolution Process. CIFOR, Bogor, Indonesia. 10 pp.
40. Limberg, Godwin. Pemetaan Wilayah Desa Langap, Kecamatan Malinau, Kab. Malinau. CIFOR, Bogor, Indonesia. 10 pp.
41. Padan, S.S.T and Laway, Y.B. 1999. Laporan Survey Kawasan Desa di Hulu DAS Malinau Kecamatan Malinau (19 Pebruari s/d Maret 1999). A survey report. SHK Kaltim, CIFOR, WWF and Plasma.
42. Patlis, Jason. 2001. Developing Laws for Local Forest Resource Management: A Rough Guide. Draft Report, CIFOR, Bogor, Indonesia.

43. Puri, R.K. 1998. An Emerging NTFP Market and its Future Prospects: The Case of the Fruit 'Mata Kucing' (*Dimocarpus longan*) in East Kalimantan. Manuscript. CIFOR, Bogor, Indonesia.
44. Rhee, Steve 1999. Kenyah Women: Political Savvy in the Face of Socio-economic Dislocation. Paper presented at the New England Conference for the Association for Asian Studies, Yale University, October 9, 1999. CIFOR, Bogor, Indonesia.
45. Rhee, Steve 2000. De Facto Decentralization and Community Conflicts in East Kalimantan, Indonesia: Explanations from Local History and Implications for Community Forestry. Paper presented at the conference "Political Ecology of Tropical Forests: Historical Perspectives," organized by the Japan Center for Area Studies, Osaka, Japan, on 28-30 November, 2000. CIFOR, Bogor, Indonesia.
46. Tim Pendamping Pemetaan CIFOR (Lembaga Penelitian Kehutanan Internasional) bersama masyarakat Sungai Malinau. 2000. Pemetaan Partisipatif di Sungai Malinau: Kegiatan dalam rangka 'Pengelolaan Hutan Bersama'. CIFOR, Bogor, Indonesia.
47. Tim Pengelolaan Hutan Bersama - ACM/BRE. 2001. Pedoman Penelitian Aksi: Partisipasi Masyarakat dalam Pengelolaan Wilayahnya. Working Draft. CIFOR, Bogor, Indonesia.
48. Tim Pengelolaan Hutan Bersama secara Adaptif (ACM) CIFOR. 2000. Pemetaan Desa Partisipatif Sebagai Alat Menyelesaikan Konflik: Studi Kasus Desa-desa Daerah Aliran Sungai Malinau Januari S/D Juli 2000. CIFOR, Bogor, Indonesia.
49. Uluk, A. and Wollenberg, E. 1998. Pemanfaatan Hutan dan Ekonomi Rumah Tangga di Kawasan Taman Nasional Kayan Mentarang (versi Bahasa Kenyah), World Wide Fund and CIFOR report. Ketergantungan Masyarakat Dayak terhadap Hutan di Sekitar Taman Nasional Kayan Mentarang. CIFOR, Bogor, Indonesia.
50. Uluk, A. Manfaat dan Dampak CIFOR bagi masyarakat di Hulu Sungai Malinau dan Sekitarnya. CIFOR, Bogor, Indonesia.
51. Uluk, A. Peta Etnik DAS Malinau, DAS Tubu, DAS Bahau. CIFOR, Bogor, Indonesia.
52. Van Heist, Miriam. December 2000. Participatory Mapping of Village Territories: Some Lessons in Adaptive Use and Management of Geographic Data. CIFOR, Bogor, Indonesia.
53. Wollenberg, E. and Uluk, A. 1998. Pemanfaatan Hutan dan Ekonomi Rumah Tangga di Kawasan Taman Nasional Kayan Mentarang (versi Bahasa Indonesia), World Wide Fund for Nature and CIFOR report.
54. Wollenberg, E.K. In preparation. The Social Nature of Forest Boundaries: Entitlement, Identity, and Exchange among Kenyah Forest Users.
55. Yasmi, Y. 2001. Conflict over Forest Management in Bulungan: What Lessons Can Be Learnt? Report. CIFOR, Bogor, Indonesia
56. Yasmi, Y. 2001. Konflik Masyarakat Loreh dengan Tambang Batu Bara: Suatu telaah terhadap Permasalahan Multidimensi di Kalangan Masyarakat Loreh. Draft. CIFOR, Bogor, Indonesia.