EX-POST EVALUATION REPORT

ITTO Project PD 37/94 Rev.3 (I)

Strengthening of the Forest Products Laboratory of IBAMA

(Brazil)

Prepared for the ITTO
by
Dr. Sadaaki Ohta

October 2011

(45-FI-1)

Table of Contents

Acronyms and Abbreviations

ABIMCI:	Brazilian Association for Mechanically –Processed Timber
ABNT:	Brazilian Association of Technical Standards
ABC:	Brazilian Cooperation Agency
ABS (SFB):	Brazilian Forest Service
ASTM:	American Society for Testing and Materials
BSI:	British Standard Institution
CEM-CFI:	The Committee on Economic and Market Intelligence and
CFI:	The Committee on Forest Industry
CEN:	European Committee for Standardization
DBFLO:	Biodiversity Sustainable Use and Forest
DIN:	German Industrial Standard
FNABF:	National Forum of Forest-Base Industry
FUNTEC/DF:	Technology of Forestry and Geology Foundation
IBAMA:	The Brazilian Institute of Environmental and Renewable Natural Resources
ISO:	International Organization for Standardization
ITTO:	International Tropical Timber Organization
ITTA:	International Tropical Timber Agreement
LPF (FPL):	Forest Products Laboratory
TFU:	Tropical Forest Update
UnB (UNB):	University of Brasilia

Part 1 Executive Summary

Ex-post evaluation report on PD 37/94 Rev.3 (I)

Strengthening of the Forest Products Laboratory of IBAMA (Brazil)

Introduction

The ITTO Committees on Economic Information and Market Intelligence and the Committee on Forest Industry (CEM-CFI), during their Forty-fourth Sessions in December 2010 decided that an ex-post evaluation for Project PD 37/94 Rev.3 (I) be carried out to establish how well the project served its purposes and to draw up recommendations for future action.

The ex-post evaluation was conducted on 19-23 September 2011, about 3 years after project completion. The primary purpose of the ex-post evaluation aimed to provide an in-depth diagnosis of the Project in order to point out the successful and unsuccessful outcomes, the reasons for successes and failures, and the contributions of ITTO Project PD 37/94 Rev.3 (1) towards the achievement of ITTO's Objective 2000, and to draw lessons that can be used to

The Project

The ITTO project PD 37/94 Rev.3 (I) "Strengthening of the Forest Products Laboratory of IBAMA" started in September 1998 and finished in November 2008, with effective duration of ten years. The project was approved at the Twentieth Council Session of the International Tropical Timber Council (Manila, 1996). The implementing Agency was the Brazilian Institute of Environmental and Renewable Natural Resources (IBAMA).

This project was built on completed Pre-Project PCI-(VII)/6: entitled "Institutional Strengthening of the Forest Products Laboratory of IBAMA", approved and financed by ITTO. The Pre-Project allowed an evaluation of historical development of the Laboratory. Preliminary constructions with governmental organizations, private sector and non-government organizations were carried out to establish research needs and priorities.

The latest Project was planned for a duration of 24 months and a total of budget of US$ 660,703, of which US$ 556,703 was from ITTO and the rest US$ 104,000 contributed by the Government of Brazil.

Specific Objectives and Outputs

This project carried out the series of activities with two objectives:

(i) Modernization and strengthening of the Forest Products Laboratory (FPL) of IBAMA, with a view to fulfill its mission as a center of excellence in the field of tropical timber research and development, world-wide as well as in Brazil.

(ii) Improvement of tropical timber identification, standardization of timber products, monitoring of production, and trade of tropical timber.

The target outputs were as follows:

(1) Preparation of a detailed long term research programme and adequate planning and monitoring system were established and carrying on (2000-2005). IBAMA adopted the management style based on “the guide to the Project Management Body of Knowledge (PMBOK) methodology, according to Project Management Institute, Inc. (PMI) established in 2004 and based in Philadelphia, USA.

(2) Three research lines were established by the FPL, that is, Sustainability of tropical forest resources, Multiple uses of planted forests, and Agroforestry products and environment. From these three research lines, seven research sectors were further defined. Revision to the research sectors was carried out, for 2006–2010, and 2010 – 2013.

(3) During project execution a Human Resource Development programme was prepared and implemented. The programme included appropriate incentive mechanisms to enhance motivation of the staff and support research work. FPL staff members have been trained during and after project execution.

(4) The project developed and established a communication programme to disseminate the information generated from the research works. The publication list from 2000 to 2010 was obtained.

(5) The project developed and established of a computerized DATA BANK on tropical timbers with about 300 species. The DATA BANK is fully accessible to external users at http://www.ibama.gov.br/lpf/madeira/ a CD-rom version is available too. Nonetheless the DATA BANK needs to be continuously updated.

(6) Under the project, the FPL prepared and submitted at least ten basic texts of Brazilian Standards for tropical timber and timber products (including plantation timbers, terminology, specification, standardization, dimensions and Plywood Lumber drying, test methods, and so on) to the ABNT (Brazilian Association of Technical Norms).

Findings

The consultant visited seven research sectors and held discussions with the chief of each sector and co-workers on present research and its situation, especially effectiveness of the projects and future study plans.

(1) The main idea of the project in creating a research centre of tropical timber products has been relevant for the Brazilian forest industry, and this was well executed by the ITTO project.

(2) The implementation of the project had been conducted as originally planned and the inputs revealed to be totally adequate, there was a huge delay in the completion of project PD 37/94, which can be attributed to many different factors and reasons. However, most of them were due to operational problems. The problems were solved, and the activities were well executed during the last stage of this project.

(3) Planned outputs had all been delivered; consequently, the specific objectives had also been achieved. The development objective should also have been achieved as it was defined similarly to Specific Objective 1 and 2.

(4) According to the Audit analysis which was executed in 2009, at that time some comments were noted, however they all have been cleared.

(5) According to the Completion report, the LFP had 13 research themes (projects) and 22 researchers, which still remained at the time of the Ex-post evaluation. It is important to highlight that the quality of the research is quite good; however dissemination of results needs to be strengthen.

(6) It can be seen that the staff members are advanced in age, and this may result in a future problem of manpower, if a proper succession system is not put in place.

(7) Obtained technologies had been transferred to stakeholders through various means including printed materials, press and radio releases. In addition, technological presentations and publications of FPL or IBAMA have appeared in private companies, academic Journals with higher citation (Holz-Forschung, Germany, etc.), and professional organizations. Eight manuals in Portuguese were published and extended, for instance, Wood drying, Wood preservation, Wood Strength and Construction.

(8) One of the key success factors of project implementation was the involvement of stakeholders in implementing the project in various such forms as respondents, resource persons, cooperators, and trainees.

(9) A lot of Graduate, Master degree and PhD students from the University of Brasilia have been studying at FPL and obtained titles, this collaboration has been very useful for extending knowledge on timber and timber products and on sustainable forest management to the next generation.

(10) Laboratory equipment was acquired and installed under the project. At the time of the Ex-post evaluation, it was noted that all equipment granted by ITTO has been well maintained, well managed, and frequently used.

(11) Under the project, activities on standardization of timber and timber products included: preparation and submission of at least ten basic texts of standards for tropical timber products, classification of timber grades, terminology, specification, dimension measuring methods, and plywood testing methods and terminology, and wood drying procedures. All these standards were submitted to ABNT.

In spite of all key outputs had been substantially completed during the Project, the project closure was pushed further for several years by the Executing Agency in order to comply with ITTO procedures.

Lessons learned

The ITTO project highlighted the important role of the Forest Products Laboratory for the Brazilian forest sector as a center of research, development, innovation, and information on tropical timber and other forest products.

It also indicated that most improvements should be maintained in the long-term planning of the FPL, in order for it to become, in an internationally recognized research center, especially in the tropical rain forest.

It is important to highlight that this type of projects may require longer duration due to time involved in executing the research for development of technologies that may result in high added value products, and then the time involved in transferring the technology to the stakeholders.

(1) Continuous internal monitoring and revision of the research projects (average every 3 months, plus an annual presentation by the researchers) is necessary in order to assure that the goals established in the research plan may be met.

(2) Even though a Publication list, a Catalogue of products and services of the FPL have been produced and published, it seems that further dissemination systems need to be put in place in order to ease accessibility by the users.

(3) FPL staff has been contributing as a chief of the ABNT Norms Committee. This lesson learned could be replicated in similar projects.

(4) One of the most important outputs of the project was technology transfer, however techniques to materialize such transfer to the stakeholders need to be envisaged during project design, as technology transfer implies much more than exchange among world-wide researchers. The technology transfer has to be more practical (hands-on).

(5) During the Project eight timber utilization manuals were published. However, the contents of the manuals are too technical for some end users (e.i. small-medium timber industries, carpentries and workshops), and further extension of these manuals may be required.

Conclusions

Further exchanges among the FPL and other institutions such as the University of Brasilia, shall be further encouraged, especially for Graduate, Master degree and PhD students, as the FPL has reached a high quality level of research in tropical timber. It can be said that the Project by ITTO has well succeeded in these aspects.

Considering that the targets of the project are aiming at contributing to maintain the sustainability of FPL, keeping higher research level as well as finding better ways for the technology transfer of research results should be encouraged.

Timber and timber products from tropical regions, especially the Amazon, have more than 3,000 species of unknown or lesser used species. Even though the Data Bank has store the characteristics of about 300 species during the ITTO Project, further consideration should be

given in the long term research programme of the FPL. This is an area in which ITTO could continue its support.

The quality of the information of the Data Bank is pretty high, since the FPL rigorously controlled all relevant activities for the timber characterization from sample collection, sample preparation, testing methodology and testing conditions.

In addition, in case of Amazon timber species, utilization should not only limited to lumber, but also extended to its chemical utilization (extractives) which may have applications for medicals and cosmetics, etc. In this field, it will be necessary to accumulate more results of wood extractives, and wood chemical Data Base should be built up in near future.

Recommendations

Some recommendations have been reached as follows:

For the Executing Agency

Strengthening researcher's international exchange for collaborative work with other research institutions or Universities should be promoted by FPL and the Brazilian Forest Service (as FPL has been transfer under its hierarchy as of today), for example, relationship between FPL and the University of Brasilia, CIRAD Foret (France), etc. FPL is positively ready for receiving many undergraduate students, master course, and Ph.D. students.

1) Transfer of technology
   - Further dissemination of the information obtained during the project to industries, and other stakeholders, should be carried-out especially to small and medium factories. Techniques to realize the transfer of the research to the stakeholders need to be considered in the FPL long term plans.
   - Technical transfer shall be done by a specialized group in translating the research into practical terms. For this the FPL could employ senior or retired researches in collaboration with junior researches and technicians for the extension works.
   - The Brazilian forest Service could consider creating a new specialized institution focused on transfer of technology, which shall be located closer to the forest or the timber industrial area. This is an idea that has to be further thought within by the FPL.
2) The FPL could consider Bio-energy and utilization of timber residues in its future research programme, as these subjects are quite attractive from the environmental point of view.
3) The FPL could consider venturing in anatomical and morphological studies through the application of Near Infra-Red Spectrograph (NIRS) or DNA identification.
4) The information on the chemical utilization (extractives) of Amazon timbers for aiming at medical and cosmetics is very important. In this field, it will be necessary to accumulate the data for build up as new Data Base.

5) FPL has to make effort to maintain a sustainable succession of its senior research staff in order to keep in shape its s long term research programme. Wood technology fields are being highly specialized year by year. Attaining the research staff's knowledge will require at least five or ten years training or experience.
6) For the Data Bank, the Executing Agency could use IT (Information Technologies) in order to keep a record of visits (citation index).

For the ITTO

1) ITTO could further support the implementation of the recommendations above, in particular in assisting further dissemination of the research results and technology transfer.
2) Continue to support projects on wood waste utilization, such as saw dusts, residual branch trees in the forest, and bio-energy. In addition, ITTO could use its experience to support projects in Brazil for rubber-wood utilization as raw material.
3) Ensure that technical and steering meetings are held during project extension periods, it will be better to use more concrete numerical indicator for progressing of the project.

Part 2 MAIN TEXT

1. Introduction

1.1 Background and Rationale of the Evaluation

The ITTO Committee on Economic and Market Intelligence and Committee on Forest Industry (CEM-CFI), during their Forty-fourth Session in December 2010 decided that an ex-post evaluation of ITTO Project PD 37/94 Rev.3 (I) be carried out to establish how well the Project served its purpose and to draw recommendations for future action.

The ex-post evaluation was conducted on 19-23 September 2011, about 3 years after project completion. The primary purpose of the ex-post evaluation aimed to provide an in-depth diagnosis of the Project in order to point out the successful and unsuccessful outcomes, the reasons for successes and failures, and the contributions of ITTO Project PD 37/94 Rev.3 (1) towards the achievement of ITTO's Objective 2000, and to draw lessons that can be used to improve similar projects in the future.

1.2 Project Identification

Serial number:	PD 37/94 Rev.3 (I)
Title:	Strengthening of the Forest Products Laboratory of IBAMA
Host Government:	BRAZIL
Executing Agency:	Brazilian Institute of Environment and Renewable Natural Resources (IBAMA)/Forest Products Laboratory (LPF)
Starting Date:	September 1998
Effective Duration:	10 years

1.3 Project Context

The ITTO project PD 37/94 Rev.3 (I) "Strengthening of the Forest Products Laboratory of IBAMA" started in September 1998 and finished in November 2008, with effective duration of ten years. The project was approved at the Twentieth Council Session of the International Tropical Timber Council (Manila, 1996). The implementing Agency was the Brazilian Institute of Environmental and Renewable Natural Resources (IBAMA).

This project was built on completed Pre-Project PCI-(VII)/6: entitled "Institutional Strengthening of the Forest Products Laboratory of IBAMA", approved and financed by ITTO. The Pre-Project allowed an evaluation of historical development of the Laboratory. Preliminary constructions with governmental organizations, private sector and non-government organizations were carried out to establish research needs and priorities.

Compliance with ITTO objectives

The project will in principles assist in attaining objective (c) identified in the International Tropical Timber Agreement –ITTA (1983):

> "To promote and support research and development with a view to improving forest management and wood utilization."

It will also have peripheral beneficial effects on the attainment of the following ITTA objectives:

(a) "To provide an effective framework for cooperation and consultation between tropical timber producing and consuming members with regard to all relevant aspects of the tropical timber economy."

(b) "To promote the expansion and diversification of international trade in tropical timber and the improvement of structural conditions in the tropical timber market, by taking into account, on the one hand, a long-term increase in consumption and continuity of supplies, and, on the other, prices with are remunerative to producers and equitable for consumers, and the improvement of market access;"

(e) "To encourage increased and further processing of tropical timber in producing member countries with a view to promoting their industrialization and thereby increasing their export earnings."

Compliance with ITTO criteria

The project is related to the area of wood utilization, including lesser – known and lesser - used species. It is consistent with all for the criteria for research and development project listed in the ITTA: it is related to the production and use of industrial tropical timber, will benefit tropical timber economy as a whole and is relevant to both producing and consuming countries, is related to maintaining and expanding the international trade in tropical timber, offers reasonable prospects for positive economic returns in relation to costs, and particularly maximizes the use of the exiting research institution avoiding duplication of efforts.

Relationship to ITTO Action Plan

The project is consistent with the priorities of the Committee on Forest Industry particularly in relation to the areas of "Research and Extension", "Human Resources Development" and "Institutional Strengthening". It will, among other aspects, facilitate efforts to set up an International Network of Research Institutes of Tropical Timber, support existing laboratory on

research on new species and products, and help for the development of industrial infrastructure, information, research and appropriate standards.

The Yokohama Action Plan: The project's objective is relevant to the objectives of ITTA 2006 and ITTO's Action Plan 2008-2011, the category belong to the Forest Industry. In the field of Forest Industry, ITTO aims to promote the industrialization of producing member countries and thereby increase their employment opportunities and export earnings. This is reflected in the goals stated below together with the actions necessary for their achievement. Currently, tropical timber is mostly exported in the form of logs, sawn-wood or plywood; hence, development work focusing on the promotion of increased and further processing and on the manufacturing and exports of higher added-value products is needed.

There are two goals, namely:

Goal 1: Promote increased and further processing of tropical timber from sustainable sources (This goal relates to objectives (c), (d), (f), (i), (k) and (m) of Article 1 of the ITTA, 1994.)

Goal 2**:** Improve industry's efficiency of processing and utilization of tropical timber from sustainable sources (This goal relates to objectives (d), (f), (i) and (m) of Article 1 of the ITTA, 1994).

The action plans were considered as follows:

- To the extent possible given the Organization's primary focus on timber, develop, publish and disseminate techniques and technologies on product development.
- Promote development of marketing, production and commercial skills in forest industry.
- Promote increased awareness and utilization of existing information on wood properties and end-use requirements.
- Create and publicize industrial demonstration projects on, for example: fully integrated and competitive industries based on sustainable forest management.
- Undertake research into wood properties and end-use requirements, paying particular attention to the properties and availability of lesser-used species and timber plantation species and the potential markets for them.

2. Evaluation Scope, Focus and Approach

2.1 Scope and Focus

The primary purpose of this ex-post evaluation is to provide an in-depth diagnosis of the Project, identifying its successful and unsuccessful outcomes, the reasons for its successes and failures, and the contribution of the project towards the achievement of ITTO's Objective 2000 and to draw lessons that can be used to improve similar projects in the future.

The specific Terms of Reference for the evaluation are as follows:

i. To assess the project's design and contribution to the achievement of the project objectives.

ii. To assess the achievement of the project's outputs and specific objectives.

iii. To evaluate the impact and relevance of the project, detailing its impact on development and specific objectives as stated in the project documents.

iv. To determine the effectiveness of technology transfer to target groups if applicable.

v. To assess the overall post-project situation for the projects, including the conditions of their intended direct or indirect beneficiaries.

vi. To define and assess unexpected effects and impacts, either harmful or beneficial, and present the reasons for their occurrences.

vii. To analyze and assess implementation efficiency, including the technical, financial and managerial aspects.

viii. To assess the overall sustainability of the projects after completion, and include appropriate recommendations to safeguard the continuing of their positive impacts, and enhance utilization of the technologies (if applicable) and other results developed by the projects.

ix. Taking into account the results of the evaluation, make an overall assessment of the projects' relative success or failure, to summarize the key lessons learnt; and identify any issues or problems that should be taken into account in designing and implementing similar projects in future.

x. To assess the overall cost of the projects with original budget provisions, and their respective linkage with the overall results.

xi. To prepare the evaluation report in accordance with the references for the Project Evaluation Report, as contained in the ITTO Manual for Project Monitoring, Review and Evaluation, third edition and the ITTO Manual on Standard Operating Procedures 2009.

xii. To assess the project's contribution to the relevant ITTA objectives (1994 and 2006) and the relevant ITTO Action Plan.

xiii. To prepare one or more articles, for each project, for possible publication in the ITTO Tropical Forest Update (TFU) magazine, in consultation with the editor, containing an overview of the projects and summarizing the lessons learned from the evaluation work. Appropriate photographs should be provided.

2.2 Approach of Evaluation

This ex-post evaluation was carried out approximately 3 years after project closure and submission of the Completion and Final Technical Reports (October, 2008 reported by Brazilian Forest Service).

The evaluation involved

- a review of the Project Document, on-going research themes, Yearly Plans of Operation, Minutes of the Project Steering Committee Meetings, Bi-Annual Progress Reports, Project Final Technical Report (includes technical papers, study tour and other activity reports, and the Technical Manual), Project Completion Report, Audited Financial Reports, and Requests for Extension.
- an opening meeting with key project staff, mainly Head of Research and development Division to discuss how the problem was identified and the method used to develop the project design, its objectives, outputs, intended outcomes, and target beneficiaries; review of the project's accomplishments and financial reports;
- discussions with the chief of seven research sectors, that is, Anatomy and morphology, Biodegradation and preservation, Biomass energy, Engineering and physics, Forest products, Chemistry, adhesive and natural rubber and Wood drying, in addition, Information and information sector at FPL. General Director and Director of the Brazilian Forest Service (SFB), and, Division of National and International Cooperation of SFB, Project Coordinator, Department of Forestry –University of Brasilia (UnB) Director of Biodiversity Sustainable Use and Forest (IBAMA), Representative of the Regional Office.
- Final meeting with government officers, project staff and stakeholders for the Consultant to present the draft Ex-post evaluation report for feedback, the findings, comments, conclusions and recommendations, and lessons learned.

Annex B and C-1, C-2 are the lists of project staff and stakeholders who participated in the discussions. Discussions were guided by questions formulated specifically for project staff, national experts, consultants and project beneficiaries, based on the checklist provided in the ITTO Manual for Project Monitoring, Review and Evaluation (Third Edition, 2009).

3. Project Facts

3.1 Background and Origin

The trend of forest based industries in Brazil:

Tropical forest regions in the States of Brazil are the Amazon regions, Maranhao, Para, Amapa, Amazonas, Roraima, Acre, Rondonia, Goias and Mato Grosso.

Together, the states make up an area 350 million hectares in a dense humid tropical forest, corresponding to 20% of the world's tropical area and 78% of the forest reserves of Brazil. In terms of volume, the Brazilian Amazon region contains about 30% of the world's stock of tropical timber, that is, approximately 50 billion m3. The species were more than 3000 species, however, the important

Criteria are; 1) marketable wood 2) wood species previously laboratory tested for quality (lesser known species but they have some information on wood quality) 3) wood species recognized in the international world market (well-known species, mahogany for example) 4) volumetric availability for regular supply over an extended period.

Contribution of wood industry in Brazil, it is estimated that the forestry-based sector generates around US$ 37 billion and accounts for nearly 3.5% of the national GDP. Annual production per timber industries in Brazil today is shown as follows:

- Extraction of timber logs: 80,542 million m^3 from natural forests, namely, natural forest for fuel is 64,153 million m^3 and Natural forest for industrial use is 16,389 million m^3. From plantation forests, *pinus* species (pine) 48,825 million m^3, Eucalyptus 142,571 million m^3.
- Production of sawn wood: *pinus* species 9,577 million m^3, tropical timber 14,837 million m^3.
- Production of panels: Plywood from *pinus* species 2,161 million m^3, tropical timber plywood 648 million m^3, particle panels 2,784 million m^3, medium density fiber boards (MDF) 1,879 million m^3
- Paper and pulp production: pulp 11,968 (x1000 ton), industrial wrapping paper 4,424, writing paper 2,575, others about 2,000.

Origin of the project:

This project was built on completed Pre-Project PCI-(VII)/6: entitled "Institutional Strengthening of the Forest Products Laboratory of IBAMA", approved and financed by ITTO. The Pre-Project allowed an evaluation of historical development of the Laboratory. Preliminary constructions with governmental organizations, private sector and non-government organizations were carried out to establish research needs and priorities.

The ITTO project PD 37/94 Rev.3 (I) “Strengthening of the Forest Products Laboratory of IBAMA” started in September 1998 and finished in November 2008, with effective duration of ten years. The project was approved at the Twentieth Council Session of the International Tropical Timber Council (Manila, 1996). The implementing Agency was the Brazilian Institute of Environmental and Renewable Natural Resources (IBAMA).

3.2 Development Objective

This project was conceived to support national efforts for the achievement of the sustainable development of the forest industry through the development and dissemination of appropriate technologies needed to promote the rational utilization of the tropical forest resources.

The execution of the project was delayed due to difficulties faced with IBAMA with the administration of ITTO funds. The problem was solved by appointing a third party to assist in the management of funds and a new agreement between IBAMA and FUNTEC and it was approved by ITTO. Such problem delayed the Completion Report of this project.

The implementation of the project had been conducted as originally planned and the inputs revealed to be totally adequate, there was a huge delay in the completion of project, which can be attributed to many different factors and reasons. Most of them could be said due to operational problem.

3.3 Objectives and Outputs

This project carried out the series of activities with two specific objectives;

(i) Modernization and strengthening of the Forest Products Laboratory (FPL) of IBAMA, with a view to fulfill its mission as a center of excellence in the field of tropical timber research and development, world-wide as well as in Brazil.

(ii) Improvement of tropical timber identification, standardization of timber products, monitoring of production, and trade of tropical timber.

The target outputs of the project were, as follows:

(1) Preparation of a detailed long term research programme and adequate planning and monitoring system were established and carried out (2000-2005). IBAMA adopted the management style based on “the guide to the Project Management Body of Knowledge

(PMBOK) methodology, according to Project Management Institute, Inc. (PMI) established in 2004 and based in Philadelphia, USA.

(2) Three research lines were established by the FPL, that is, Sustainability of tropical forest resources, Multiple uses of planted forests, and Agroforestry products and environment. From these three research lines, seven research sectors were further defined. Revision to the research sectors was carried out, for 2006–2010, and 2010 – 2013.

(3) During project execution a Human Resource Development programme was prepared and implemented. The programme included appropriate incentive mechanisms to enhance motivation of the staff and support research work. FPL staff members have been trained during and after project execution.

(4) The project developed and established a communication programme to disseminate the information generated from the research works. The publication list from 2000 to 2010 was obtained.

(5) The project developed and established of a computerized DATA BANK on tropical timbers with about 300 species. The DATA BANK is fully accessible to external users at http://www.ibama.gov.br/lpf/madeira/ a CD-rom version is available too. Nonetheless the DATA BANK needs to be continuously updated.

(6) Under the project, the FPL prepared and submitted at least ten basic texts of Brazilian Standards for tropical timber and timber products (including plantation timbers, terminology, specification, standardization, dimensions and Plywood Lumber drying, test methods, and so on) to the ABNT (Brazilian Association of Technical Norms).

3.4 Starting Date and Duration

The ITTO project PD 37/94 Rev.3 (I) “Strengthening of the Forest Products Laboratory of IBAMA” started in September 1998 and finished in November 2008, with effective duration of ten years. The project was approved at the Twentieth Council Session of the International Tropical Timber Council (Manila, 1996). The implementing Agency was the Brazilian Institute of Environmental and Renewable Natural Resources (IBAMA).

This project was built on completed Pre-Project PCI-(VII)/6: entitled "Institutional Strengthening of the Forest Products Laboratory of IBAMA", approved and financed by ITTO. The Pre-Project allowed an evaluation of historical development of the Laboratory. Preliminary constructions with governmental organizations, private sector and non-government organizations were carried out to establish research needs and priorities.

3.5 Budget

The project was planned for duration of 24 months (2006 – 2008) and a total of budget and sources of funding;

ITTO:	US$ 556,703
Government of Brazil:	US$ 104,000
Total Budget:	US$ 660,703

3.6 Executing Agency

Brazilian Institute of Environment and Renewable National Resources (IBAMA)

Coordinating Agency is Brazilian Cooperation Agency (ABC)

4. Findings and Lessons Learned

4.1 Findings

4.1.1 Achievement of the Project

Realized versus Planned Outputs, and Achievement of 2 specific objectives;

The consultant visited seven research sectors and held discussions with the chief of each sector and co-workers on present researches and its situation, especially effectiveness of the projects and future study plans.

Following is a comparison of targets and realized outputs (specific objectives No.1 and No. 2):

(1) The main idea of the project in creating a research center of tropical timber products has been relevant for the Brazilian forest industry, and this was well executed by the ITTO project.

(2) The implementation of the project had been conducted as originally planned and the inputs revealed to be totally adequate, there was a huge delay in the completion of project PD 37/94, which can be attributed to many different factors and reasons. However, most of them were due to operational problems. The problems were solved, and the activities were well executed during the last stage of this project.

(3) Planned outputs had all been delivered; consequently, the specific objectives had also been achieved. The development objective should also have been achieved as it was defined similarly to Specific Objective 1 and 2.

(4) According to the Audit analysis which was executed in 2009, at that time some comments were noted, however they all have been cleared.

(5) According to the Completion report, the LFP had 13 research themes (projects) and 22 researchers, which still remained at the time of the Ex-post evaluation. It is important to

highlight that the quality of the research is quite good; however dissemination of results needs to be strengthen.

(6) It can be seen that the staff members are advanced in age, and this may result in a future problem of manpower, if a proper succession system is not put in place.

(7) Obtained technologies had been transferred to stakeholders through various means including printed materials, press and radio releases. In addition, technological presentations and publications of FPL or IBAMA have appeared in private companies, academic Journals with higher citation (Jour. of Holz-Forschung, Germany, etc.), and professional organizations. Eight manuals in Portuguese were published and extended, for instance, Wood drying, Wood preservation, Wood Strength and Construction.

(8) One of the key success factors of project implementation was the involvement of stakeholders in implementing the project in various such forms as respondents, resource persons, cooperators, and trainees.

(9) A lot of Graduate, Master degree and PhD students from the University of Brasilia have been studying at FPL and obtained titles, this collaboration has been very useful for extending knowledge on timber and timber products and on sustainable forest management to the next generation.

(10) Laboratory equipment was acquired and installed under the project. At the time of the Ex-post evaluation, it was noted that all equipment granted by ITTO has been well maintained, well managed, and frequently used.

(11) Under the project, activities on standardization of timber and timber products included: preparation and submission of at least ten basic texts of standards for tropical timber products, classification of timber grades, terminology, specification, dimension measuring methods, and plywood testing methods and terminology, and wood drying procedures. All these standards were submitted to ABNT.

In spite of all key outputs had been substantially completed during the Project, the project closure was pushed further for several years by the Executing Agency in order to comply with ITTO procedures.

Analyzing the publication list of activities during the Project, it could be said that the last step of the project' year, the results of activities increased in the all fields. The efficiency of the project was well developed as the roles of Research Center of Excellence.

Year No. of publication and courses works	2000	2001	2002	2003	2004	2005	2006	2007	2008
Technical publication	15	16	11	6	8	6	5	8	8
Themes of Master deg.	3	-	-	2	2	-	-	1	2
Themes of Ph.D.	1	-	-	-	1	-	-	1	3
Books	-	1	8	-	-	1	-	-	3
Graduation course works	3	1	3	2	7	7	-	-	8
Presentation at international and national conference	14	5	7	1	7	2	9	3	18

Table: Comparison of number of activities and publications during the project (2000-2008)

- It has to consider that this table was shown until 2008, so the publications will be published 2 or 3 years later (see; Publication lists were shown in the sustainability of the project).

4.1.2 Impacts and Effects

The laboratory has been played an important role in supporting the Brazilian Forest Service, at national and international level. At the same time FPL has been cooperated with the efforts for standardization of timber and timber products. The project also had peripheral beneficial effects by opening the Forest Products Laboratory for cooperation and consultation among tropical timber countries with regard to relevant aspects of the tropical timber products technologies. In addition, could encourage further processing of tropical timber in producing member countries with a view promoting their species industrialization and thereby increasing wood products added-values.

In 2008, the Brazilian Forest Service, FPL and ITTO published an introducing catalogue on the executing activities and contents of the testing technologies for being able to carry out the testing items, including publication extending service (Products and Service, 2008). In this publication was attached the request form for external and stakeholders, for all kind of end users of timber and timber products. It seems that one of the best way for technical transferring.

4.1.3 Effectiveness of strengthening of forest products Laboratory and Technology transfer

The ITTO project highlighted the important role of the Forest Products Laboratory for the Brazilian forest sector as a center of research, development, innovation, and information on tropical timber and other forest products. It also indicated that most improvements should be maintained in the long-term planning of the FPL, in order for it to become, in an internationally recognized research center, especially in the tropical rain forest. It is important to highlight that this type of projects may require longer duration due to time involved in executing the research

for development of technologies that may result in high added value products, and then the time involved in transferring the technology to the stakeholders.

- Considering that the targets of the project are aiming at contributing to maintain the sustainability of FPL, keeping higher research level as well as finding better ways for the technology transfer of research results should be encouraged.
- The quality of the information of the Data Bank is pretty high, since the FPL rigorously controlled all relevant activities for the timber characterization from sample collection, sample preparation, testing methodology and testing conditions.
- One of the most important outputs of the project was technology transfer, however techniques to materialize such transfer to the stakeholders need to be envisaged during project design, as technology transfer implies much more than exchange among world-wide researchers. The technology transfer has to be more practical.
- During the Project eight timber utilization manuals were published. However, the contents of the manuals are too technical for some end users (e.i. small-medium timber industries, carpentries and workshops), and further extension of these manuals may be required.

4.1.4 Overall post-project situation

The achievements and impacts of the project were mentioned in the previous items. From the stand points of view, the specific objectives were established successfully. Especially project organization and structure were improved and study levels almost reached at the international study ones and it will be accomplished as a Research Center of excellence.

However, number of project staff was composed only 20 researchers, in addition they have to study and to be in charge of technology transfer and cooperation with many stakeholders, as a lecturer of the UnB, for instance. In spite of a lot of master or Ph.D. student were collaborating (studying) at FPL, it is very difficult to get their permanent job at UnB. or FPL. It will be necessary to improvement for continuing the sustainability of the project's effects and efficiency, namely training of younger researchers for the next generation (successors) will be necessary. In this aspect, financial supports of ITTO will be important, not only financial but also advises from global points of views.

4.1.5 Efficiency and Operational Aspects

FPL has provided a lot of services courses, training, technical consultancy and special services in various areas as a transmission of the Technology Transferring Center. During the last stage of Project (in 2008), the catalogue was published by FPL, IBAMA. It was an output of ITTO funded project PD 37/94 Rev.3 (I). It seemed that one of the useful way for technology transfer activities, that is, courses, training, technical consultancy and special services, shown as bellow:

Training to identification of wood and charcoal, Basic course to classify natural improved rubber, Architecture and structural calculation projects on wood housing construction, Basic course on wood physical and mechanical properties, and on their technical consultancy, Studies and projects for the generation and cogeneration of biomass energy, Basic course for the generation and utilization of biomass energy, and technical consultancy on biomass energy, Technical consultancy on wood protection, Basic course on wood preservation techniques, Technical consultancy on wood drying, Basic course of wood drying and training to kiln drying operations, Basic course on wood composite materials, Technical consultancy on board development, Basic course for the production of small wood objects, Technical consultancy on introduction and utilization of lesser use timbers, and so on.

According to the Catalogue – Products and Services (published by ITTO, BFS) - the publications presented are more than 47 and 17 files formatted by PDF. FPL has been published many publications for many years, so it might be useful and effective to transfer as a later or the latest information more quickly.

FPL has been tested according to various Standard (Normas), ASTM, BSI, ABNT (Brazilian) ISO, CEN,DIN, including FPL procedure and testing methods. During the Project more than 12 Brazilian Standard have been submitted to ABNT.

4.1.6 Sustainability

ITTO contributed to the project with a total amount of US$ 500,703, while the FPL total contribution for the project amounted approximately US$ 1,250,000. In order to keep sustainability and reduce the risks to the success of the project, arrangements were made for the management of international funds made available by ITTO, which revealed to be very effective. The laboratory own funds were regularly operated through the Federal Government Mechanism.

FPL has purchased new equipment for promoting new research field, Near Infra- Red Spectrograph (NIRS), Non-destructive testing apparatus for measuring Modulus of Elasticity (MOE; strength properties of wood), and new wood drying laboratory is under construction which funded by both PFL and the association of industries.

Following is a list papers for publication that they have prepared after the project completion (2009-2010).

1) Technical indexed publications

In 2009, FPL published continuously 18 publications in this field, for example,

- OKINO, E. Y. A.; PASTORE, T. C. M.; CAMARGOS, J. A. A.; ALVES, M.V.S. (Marcus Vinicius da Silva Alves) ; SANTOS, P. H. O.; TEIXEIRA, D. E.; SANTANA, M. A. E.. Color Variation of rubberwood clones and cypress infected by Gloeophyllum striatum and

Phanerochaete chrysosporium. International Biodeterioration and Biodegradation, v. 63, p. 41-45, 2009.

And in 2010, 15 publications were published in this field, for example;

- Pastore, T. C. M.; Braga, J. W. B.; Coradin, V. T. R.; Magalhães, W. L. E.; Okino, E. Y. A.; Camargos, J. A. A.; Muñiz, G. I. B. de; Bressan, O. A.; Devrieux, F. Near infrared spectroscopy (NIRS) a potential tool for monitoring trade of similar woods: discrimination of mahogany, cedar, andiroba and curupixá. Holzforschung, 2010.

2) Graduation course works including for stakeholders (2009-2010)

In this activities have been contributed on 10 themes, in 2009 for example;

(1) LARISSA MEDEIROS ARRUDA. Propriedades de painéis aglomerados com resina sintética a partir da mistura do bambu Guadua magna Londoño & Filg. e da madeira de Pinus taeda L.. 2009. Trabalho de Conclusão de Curso. (Graduação em Engenharia Florestal) - Universidade de Brasília, Conselho Nacional de Desenvolvimento Científico e Tecnológico. Orientador: Divino Eterno Teixeira.

3) Themes of Master and Ph.D. course (2008 and 2009)

Theme of Master course; 6 Ph.D students were obtained the titles.

- Mirian de Almeida Costa. Avaliação de metodologias alternativas para caracterização do ataque de fungos apodrecedores de madeiras. 2009. Dissertação (Mestrado em Ciências Florestais) - Universidade de Brasília, . Co-Orientador: Tereza Cristina Monteiro Pastore.
- Airton Mauro de L. Santos. Avaliação teórica e experimental de vigas em “I” pré-fabricadas de madeira com flange de painéis de lâminas paralelas (LVL) e alma de painéis de partículas orientadas (OSB) e compensado. Depto de Eng. Florestal/UnB.

4) Presentation at national and International conference (2009-2010)

In 2009 and 2010 The presentations were done at the conferences, 9 presentations and 3, respectively, for example;

- Cristiano Kleber de Figueiredo; QUIRINO, W. F.; Rousset, Patrick. Análise Estatística do Efeito da Pressão na Carbonização da Madeira de Eucaliptus grandis. In: I Congresso Brasileiro sobre Florestas Energéticas, 2009, Belo Horizonte. Anais-I Congresso Brasileiro sobre Florestas Energéticas. Curitiba : Embrapa, 2009. v. 01. p. 10-18.
- Jankowsky, L.; Jankowski, I. P. (Ivaldo P. Jankowski); SANTANA, M. A. E.; Tinti, S. V. (Sirlene V. Tinti); Carvalho, J. E. de. Perspectives to better use of lumber residue: rearching new medicines for cancer treatment. In: XIII World Forestry Congress, 2009, Buenos Aires. XIII World Forestry Congress. Buenos Aires: FAO, 2009.

4.2 Lessons learned

The ITTO project highlighted the important role of the Forest Products Laboratory for the Brazilian forest sector as a center of research, development, innovation, and information on tropical timber and other forest products.

It also indicated that most improvements should be maintained in the long-term planning of the FPL, in order for it to become, in an internationally recognized research center, especially in the tropical rain forest.

It is important to highlight that this type of projects may require longer duration due to time involved in executing the research for development of technologies that may result in high added value products, and then the time involved in transferring the technology to the stakeholders.

(1) Continuous internal monitoring and revision of the research projects (average every 3 months, plus an annual presentation by the researchers) is necessary in order to assure that the goals established in the research plan may be met.

(2) Even though a Publication list, a Catalogue of products and services of the FPL have been produced and published, it seems that further dissemination systems need to be put in place in order to ease accessibility by the users.

(3) FPL staff has been contributing as a chief of the ABNT Norms Committee. This lesson learned could be replicated in similar projects.

(4) One of the most important outputs of the project was technology transfer, however techniques to materialize such transfer to the stakeholders need to be envisaged during project design, as technology transfer implies much more than exchange among world-wide researchers. The technology transfer has to be more practical (hands-on).

(5) During the Project eight timber utilization manuals were published. However, the contents of the manuals are too technical for some end users (e.i. small-medium timber industries, carpentries and workshops), and further extension of these manuals may be required.

5. Conclusions and Recommendations

5.1 Conclusions

Further exchanges among the FPL and other institutions such as the University of Brasilia, shall be further encouraged, especially for Graduate, Master degree and PhD students, as the FPL has reached a high quality level of research in tropical timber. It can be said that the Project by ITTO has well succeeded in these aspects.

Considering that the targets of the project are aiming at contributing to maintain the sustainability of FPL, keeping higher research level as well as finding better ways for the technology transfer of research results should be encouraged.

Timber and timber products from tropical regions, especially the Amazon, have more than 3,000 species of unknown or lesser used species. Even though the Data Bank has store the characteristics of about 300 species during the ITTO Project, further consideration should be given in the long term research programme of the FPL. This is an area in which ITTO could continue its support.

The quality of the information of the Data Bank is pretty high, since the FPL rigorously controlled all relevant activities for the timber characterization from sample collection, sample preparation, testing methodology and testing conditions.

In addition, in case of Amazon timber species, utilization should not only limited to lumber, but also extended to its chemical utilization (extractives) which may have applications for medicals and cosmetics, etc. In this field, it will be necessary to accumulate more results of wood extractives, and wood chemical Data Base should be built up in near future.

5.2 Recommendations

Some recommendations have been reached as follows:

For the Executing Agency

Strengthening researcher's international exchange for collaborative work with other research institutions or Universities should be promoted by FPL and the Brazilian Forest Service (as the FPL has been transfer under its hierarchy as of today), for example, relationship between FPL and the University of Brasilia, CIRAD Foret (France), etc. FPL is positively ready for receiving many undergraduate students, master course, and Ph.D. students.

1) Transfer of technology

- Further dissemination of the information obtained during the project to industries, and other stakeholders, should be carried-out especially to small and medium factories. Techniques to realize the transfer of the research to the stakeholders need to be considered in the FPL long term plans.
- Technical transfer shall be done by a specialized group in translating the research into practical terms. For this the FPL could employ senior or retired researches in collaboration with junior researches and technicians for the extension works.

- Brazilian Forest Service could consider create a new specialized institution focused on transfer of technology, which shall be located closer to the forest or the timber industrial area. This is an idea that has to be further thought within by the FPL.

2) he FPL could consider Bio-energy and utilization of timber residues in its future research programme, as these subjects are quite attractive from the environmental point of view.

3) The FPL could consider venturing in anatomical and morphological studies through the application of Near Infra-Red Spectrograph (NIRS) or DNA identification.

4) The information on the chemical utilization (extractives) of Amazon timbers for aiming at medical and cosmetics is very important. In this field, it will be necessary to accumulate the data for build up as new Data Base.

5) FPL has to make effort to maintain a sustainable succession of its senior research staff in order to keep in shape its s long term research programme. Wood technology fields are being highly specialized year by year. Attaining the research staff's knowledge will require at least five or ten years training or experience.

6) For the Data Bank, the Executing Agency could use IT (Information Technologies) in order to keep a record of visits (citation index).

For the ITTO

1) ITTO could further support the implementation of the recommendations above, in particular in assisting further dissemination of the research results and technology transfer.

2) Continue to support projects on wood waste utilization, such as saw dusts, residual branch trees in the forest, and bio-energy. In addition, ITTO could use its experience to support projects in Brazil for rubber-wood utilization as raw material.

3) Ensure that technical and steering meetings are held during project extension periods, it will be better to use more concrete numerical indicator for progressing of the project.

Acknowledgement

The author sincerely thanks and acknowledges the able assistance of the key staffs and Research Sector chiefs and researchers, and Chief of documentation and information Sector of the FPL, Professors of Brasilia University, General Director and Project coordinator of SFB, and FNABF, ABIMC's members, Regional office of ITTO, Project Manager of ITTO, Yokohama, Japan.

Photo Documentations (Photos presented in cover)

1. AT IBAMA with FPL staffs
2. Moon tree in IBAMA (*liquidambar*), seed came back from moon
3. Samples produced by FPL, the utilization of Bio-energy from waste wood
4. Salon for Ex-post presentation and staffs of FPL (IBAMA) and Stakeholders
5. An example of the texts published for technology transfer
6. Head of FPL and younger research staffs (at Bio-energy Sector)
7. Head of ITTO regional Office and consultant
8. Entrance of the FPL (Project site)
9. Basic texts submitted to ABNT (Brazilian Standard)

ANNEX Executing Agency's Views

The Executive Agency agrees in general with the Executive Summary prepared by the IITTO consultant, Dr. Ohta Sadaaki, who was always very kind, saving no efforts to report the hard work of the FPL team and project coordinator in order to obtain the expected project results, exploring as much as possible the potentialities offered by the project. However, some remarks have to be made just for the sake of clarity of the facts reported.

- The ITTO project PD 37/94 Rev.3 (1) was executed by the Brazilian Institute for the Environment and Natural Resources – IBAMA and by the Brazilian Forest Service - SFB, a unit of the Ministry of the Environment (MMA). Until August 2007, IBAMA served as the Project Executing Unit (PEU). From this time on the responsibility for project execution was assumed by SFB. Therefore, the recommendations made in the present report to IBAMA should in fact be done to SFB, to which FPL belongs since 2007.

- The CD ROM available referred in **Target Outputs**, item 5, is in fact an Interactive Key for Wood Identification Developed by FPL and is not related to the Data Bank of Brazilian Wood. . At the present time, characteristics of additional eleven wood species from the Amazon Region are being included in the Data Bank.

- Regarding Item 1 of **Findings** it should be important to point out that the idea of the ITTO project was not *to create a center* for tropical wood research but *to strengthen FPL,* an already existing research center.

- Items 2, 3 and 4 of **Recommendations** are already included in the FPL's research programme (Lines of Research 2009-2013, referred in the report). Presently, several research projects regarding these subjects are under development by FPL. Attainment of suggestion under item 6 is also in progress and will be accomplished soon.

Varlone Alves Martins, PhD

Head of FPL

Brazilian Forest Service

Annex A: ITTO-Consultant Agreed Work Schedule

11 Aug 2011 Dispatch of the following documents supporting for the evaluation orks:

(i) Relevant ITTO Manuals
(ii) Project documents
(iii) Technical reports
(iv) Project Audit Reports and
(v) Project completion reports

19-23 September 2011

Meetings with project's personnel at the FPL in Brasilia, for briefing and comprehensive discussions and analysis of project implementation and results.

Discussions with relevant stakeholders involved in the projects works.

- 01 Oct. 2011

Submission of draft report (executive summary) to ITTO, the Executing Agency and the governments of Brazil for comments and suggestions

- 15 Oct. 2011

Submission of the full final report including executive summary, and power point presentation to ITTO

- 21 Oct. 2011

Submission of article to ITTO

- 14-17 Nov. 2011

Presentation of the report during the 47th Session of the ITTO Committees on Forest Industry and Economic Information and Market Intelligence in Guatemala

Annex B: Provisionary & Actual Schedule of Ex-post Evaluation Activities

Ex-Post Evaluation Agenda; PD 37/94 Rev.3 (1)

Strengthening of the Forest Products Laboratory of IBAMA

Executed date: 19-23 September 2011, Brasilia, D.F., Brazil

Sunday, Sept. 18, 2011 – Arrivals (Brasilia)

Date and time		Activity	Venue
19/09/2011	9:00-12:00	Consultant initial meeting with Dr. Valone Martins (Head of LPF) Dr. Marcus Alves (Director of the BraziliaForest Service-SFB and project Coordinator) Mr. Daniel Tristao (Division of National and International Cooperation of SFB)	FPL (LPF)
	14:00-16:30	Visit to FPL (LPF) facilitates and discussion with chief of Secotors; Wood Anatomy and Morphology Sector Chemistry, Adhesives and Natural rubber Sector Wood Drying Sector (facilities only) and Wood Biodegradation and Preservation Sector (facilities only) Fernando Castanheira Neto;	FPL
	!6:30-17:30	Representative/National Forum of Forest-based Industry (FNABF) Brazilian Association for Mechanically, Processed Timber/ABIMCI-LPF Discussion with Dr. Valone Martins	FPL
	17:30-18:00		FPL
20/09/2011	9:00-12:00	Continue visit to FPL (LPF) facilities Forest Products Sector Wood Drying and Wood Biodegradation and Preservation Sector (chief is concurrently) Antonio Humel; General Director (SFB)	FPL
	14:00-15:00 15:00-18:00	Biomass Energy Sector	SFB

21/09/2011	8:30-11:00 11:00-12:00 14:00-16:00 16:30-17:00	Pastore Representative ITTO/Regional Office Engineering and Physics Sector Brazilian University: Joao Carlos Nedel: Director/ Directorship of Biodiversity Sustainable Use and Forest-DBFLO/IBAMA	ITTO Office FPL Brazilian Univ. (UnB) IBAMA
22/09/2011	9:00-18:00	Consultant work day	FPL
23/09/2011	9:00-12:00	Final Meeting with government officials, project staff and stakeholders for the consultant to present the draft Ex-post evaluation report for feedback and comments. (Presentation by power point)	FPL
24/09/2011		Departure of the consultant	Brasilia

- Remarks: In addition, consultant got the information on the Documentation and Information Sector (discussion with Dr. Valone Martins, Head of LPF)

Annex C-1: List of persons interviewed during the Ex-post Evaluation

Persons interviewed	Institution and Position
Dr. Marcus Alves	Director of the Brazilian Forest Service (SFB)
Dr. Verlone Martins	Head of LPF(FPL) and key staff of the Project
Mr. Daniel Tristao	Division of National and International Cooperation of SFB
Fernando Castanheria	Representative/National Forum of Forest-based Industry (FNABF), Brazilian Association for Mechanically/processed Timber (ABIMCI)
Dr. Antonio Hummel	General Director of SFB
Mr. Floriano Pastore	Representative of ITTO Regional Office
Dr. Mario Rabelo de Souza	Former Executive Director of FUNTEC
• Prof. Dr. Claudio Del Menezzi • Prof. Dr. Alexandre Florian da Casta	University of Brasilia (UnB), Lecturer of Department of Forestry
Dr. Joao Carlos Nedel	Director, Directorship of Biodiversity Sustainable Use and Forest (DBFLO/IBAMA)
• Dr. Pedro Henrique Holanda Mireles • Dr. Valeria Rigueira	General Director, Brazilian Cooperation Agency (ABC) Project Analyzer

Annex C-2: Interview with Sector Staff

1) Anatomy and Morphology

- Dr. Vera Rauber Coradin: Chief of Sector
- Dr. Tereza C. M. Pastore: Researcher

2) Chemistry, Adhessives and Natural Rubber

- Dr. Marcos Antonio Santana: Chief of Sector
- Dr. Esmaralda Arakaki Okino: Researcher

3) Forest Products

- Dr. Divino Eterno Teixeira: Chief of Sector

4) Wood Drying (4 and 5 ; concurrently chief)

5) Biodegradation and Preservation

- Dr. Fernando Goueia : Chief of Sector

6) Biomass Energy

- Dr. Patrick Rousset: Researcher
- Thiago Rodrigues : UnB. Ph. D. student
- Lucelia Alves de Macedo et al.:

UnB, M.C.students, et al

7) Engineering and Physics

Dr. Mario Rabelo de Souza: Chief of Sector

* * *