INTERNATIONAL TROPICAL TIMBER ORGANIZATION

I T T O

PROJECT DOCUMENT

TITLE	UTILIZATION OF SMALL-DIAMETER LOGS FROM SUSTAINABLE SOURCE FOR BIO-COMPOSITE PRODUCTS
SERIAL NUMBER	PD 40/00 Rev.4 (I)
COMMITTEE	FOREST INDUSTRY
SUBMITTED BY	GOVERNMENT OF INDONESIA
ORIGINAL	ENGLISH

SUMMARY

The project will collect and make available comprehensive information on the structure and composition of small-diameter logs (SDL), which genetically and environmentally never reach 50 cm diameter, and their potential utilization in value-added products for the bio-composite products. The research will be carried out on a plot of 300 hectares of lowland tropical rain forest to be established at PT. Alas Kusuma Forest Concession Holder, West Kalimantan. Reduced impact logging techniques will be applied to logging of SDL and an environmental impact assessment of residual stand and soil damage by logging activities will be carried out. The research will be focus on the physical, mechanical and chemical properties and identification will be produced. The project will also examine the utilization of SDL for value-added products. To complete the project, regional training courses and workshop will be organized and convened to facilitate the transfer of teehnology on SDL management and utilization to Indonesian scientists and the timber industry sector. Scientist and crews from Indonesia, Malaysia, and PNG will be invited.

EXECUTING AGENCY	FACULTY OF FORESTRY BOGOR AGRICULTURAL UNIVERSITY in cooperation with DIRECTORATE OF FOREST PRODUCT PROCESSING AND MARKETING DG OF FOREST PRODUCT DEVELOPMENT MINISTRY OF FORESTRY		
DURATION	36 MONTHS		
APPROXIMATE STARTING DATE	UPON APPROVAL		
PROPOSED BUDGET AND OTHER FUNDING SOURCES	Source	Contribution in US$	
	ITTO	**600,000**	
	Gov't of Indonesia	265,163	(in kind)
	TOTAL	**865,163**	

TABLE OF CONTENTS

PART I: CONTEXT

1. Origin

Minimum diameter cutting in Indonesian Selective Cutting and Replanting System is 50 cm, while genetically and environmentally there are some species that cannot meet this minimum diameter cutting. The characteristics of tropical rain forest are low timber production and high species diversity (Freezeilah, 1998). The Indonesian annual log production in 1998 was 21.5 million m^3, while the wood demand in the same year was 59 million m^3, so there was a huge amount of wood supply shortage namely 38.5 million m^3 (Manurung, 1999). Those logs are classified as high quality and large-diameter logs. Up to now, the bio-composite industry tends to use the high quality and large-diameter logs. While, the standing stock of those kinds of trees is declining.

CIRAD study (1998) in Family of Kalimantan shows that Dipterocarp species dominates the forest structure (24.14%) and their diameter at breast height (DBH) are able to reach more than 50 cm, followed by family of Euphorbiaceae (13.51%) and Sapotaceae (6.36%). The rest of the percentage (55.99 %) represents other 43 families with maximum DBH 40 cm or classified as small-diameter logs (SDL). It means that most of the species never reach the minimum diameter cutting (50 cm) as stated in silviculture system of Indonesian Selective Cutting and Replanting System. Developing and focusing on promotion, further processing and manufacturing of small-diameter logs (SDL) for bio-composite industry to have higher added value products is needed. The demand of wood-based panel products produced by bio-composite industry tends to increase (Marimin, 2000).

In order to minimize the negative impact during the harvest of SDL, reduced-impact logging (RIL) will be implemented. Faculty of Forestry has been supported by the ITTO fellowship program No: Rev.017/98 s, and GTZ (1998 – 1999) to develop the RIL. Elias conducted research on RIL in 1992 – 2000 in East and West Kalimantan. The results shows that RIL decrease the residual stand of dipterocarp forest until 50 %. Economically, RIL is profitable for the quality of timber in the next cutting cycle and regeneration. To determine the ability of lowland Tropical Rain Forest to produce small diameter logs and to evaluate their logging damage, the Forest Health Monitoring (FHM) technology (PD 16/95. Rev 2 (F)) will be used. Environmental impact assessment of SDL logging will be carried out and it will be focused on residual stand damage, physical and chemical properties of soil, water pollution, wildlife, and socio-economic and demographic aspects.

Recent study concerning SDL has been conducted by Forest Research Institute of Korea in cooperation with Forestry and Estate Crops Research and Development Agency (FORDA) the Ministry of Forestry and Estate Crops of the Republic of Indonesia. In this study, they define SDL as small trees, branches, twigs, etc. with their diameter less than 10 cm. Those materials come from logging waste. The scope of the study concerning processing characteristics is study on the drying and design development of handicraft articles, wood construction, the manufacture of particleboard, wood cement board, pulp, and charcoal.

In 1998 – 2001, Massijaya, Faculty of Forestry is conducting the research on bio-composite technology supported by the Ministry of National Education through the program of Competition Research Grant on the development of high quality composite boards made of wood waste and plastics. During the period of 1997 – 2001, Massijaya conducted research on the other bio-composite products, especially on composite products made of paper waste, Com-ply made of small diameter logs of fast growing tree species, composite boards made of wood waste and plastics, and laminated veneer lumber.
During the period of 1997 – 2001, Tambunan conducted research on oriented strand board (OSB), Medium density fiber (MDF) and Laminated veneer lumber (LVL) made of fast growing tree species, such as *Gmelina arborea*, *Accacia mangium*. Resin treatment,

steam treatment were also tested to find out the foundamental properties of OSB, MDF and LVL after the treatments. Resin treatment significantly increased the MOE, MOR of OSB.

In this proposed research project, SDL is defined as tree species, which genetically and environmentally never reach the minimum diameter cutting (50 cm). The proposed bio-composite study concern with, oriented strand board (OSB), Com-Ply, laminated beams, LVL, and Com-Ply Lumber. FORDA`s study has been conducted in Jambi Province while this proposed research project will be conducted in West Kalimantan. Regarding these points of view, this proposed research project would be totally different with the previous study in term of raw material, technical aspect and study site. Small – diameter logs are produced by the genetic and environmental factors that also found in Malaysian and Papua New Guinea forests.

In order to overcome the wood shortage problem, utilization of small-diameter logs is a prospectus alternative. The utilization of SDL until now is not implemented yet because insufficient technical data on SDL properties, knowledge on appropriate SDL logging system and processing technology.

This situation calls for type of management that harmonize the social, institutional and economic demands with the capacity of the concept through a well design of forest management system, including forest industry development. Such programs will encourage public and private investment in the business opportunities using SDL species. So far, the consumer countries such as Japan, USA, Germany and France have been mastering the bio-composite technology. The transfer of bio-composite technology from those consumer countries to producer countries will strengthen the cooperation among the ITTO member countries.

Japan is one of countries has been developing the technology in using SDL. The University of Tokyo, Japan, intent to develop the technology on utilization of SDL to produce various products. The technical assistance and contribution of Japan to develop the technology on utilization of SDL will strengthen the linkages between producer and consumer countries. Such kind of technology and technical assistance should also be disseminated to the other ITTO producer countries.

Dr. Masatoshi Sato, prominent scientist from Department of Global Agriculture and Agricultural Life Science, and his group pays attention on the use of SDL for bio-composite industries through his Letter of Intent dated on 9 July 1999 (Annex C.1). They will try in their capacity to support the project. Alas Kusuma Group will provide the site study and logging operation, while Bumi Raya Group will provide the factory equipment for processing SDL. Their intention to execute the project is expressed in their Letter of Intent (Annexes C.2 and C.3). Those companies are located in West Kalimantan, Indonesia.

2. Sectoral Policies

Forest provides a wide array of benefits to human society, which is either tangible (e.g., timber, non-wood forest products) or intangible (e.g. water and soil protection, recreation, existence value) in nature. Future role of forest in Indonesia will be the role in industrialization, promoting sustainable raw-material supply and diversifying into non-timber products, in respect to the ecological function. Therefore, the Indonesian authorities prioritize the development of sustainable forest management of tropical rain forest and timber plantation. It is stated in "GBHN" (Indonesian Development Guidelines) and UUPK No. 41 Th. 1999.

UUPK No. 41, 1999 describes clearly general principles of management, development and utilization of the national forest estate and natural forest resources. While, forest policy underlines the importance of improving the knowledge on potential timber

resources, the management of that potential and the planning of its utilization. Forest utilization will be described to the added value products to optimize the use of raw materials coming from sustainable sources.

Ministry of Forestry and Estate Crops, the Republic of Indonesia, promote also the forest research development on sustainable forest management, silviculture and wood utilization efficiency as well.

The national program on Research and Technology issued by the Indonesian National Research Council also give priority to the Environment Development Technology. Indonesia confirms its adherence to international objectives. Among them are the ITTO Target 2000, the objectives and recommendation of the United Nations Conference on the Environment and Development held in Rio de Janeiro in 1992, the Convention on International Trade in Wild Fauna and Flora Species Threatened with Extinction (CITES) and the world heritage.

Indonesia, Malaysia and Papua New Guinea as a member of ITTO have an obligation to support the ITTO objectives towards the sustainable forest management. In other hand, Papua New Guinea exports round logs amounted to 3,0 million m^3 per annum, while the PNG Logging Code of Practice is being developed. The Forest Industry Association (FIA) is fully aware of the issues of certification and sustainability. The transfer of technology of bio-composite to the other ITTO producer countries will enhance the product diversity made of wood. It may influence to the policy of the countries.

3. Programs and Operational Activities

The mission of Indonesian Forestry Development is to manage the forest in sustainable way and to minimize the logging impact; to produce raw materials for wood industry (bio-composite industry) from the sustainable sources.

At the present time, there are limited timbers species on the wood markets or traded internationally due to their unknown fundamental properties. Such condition accelerates deforestation to find out the most marketable species.

The project will be executed in the state natural forest production on lowland tropical rain forest. Its supervision will be carried out by the Project Steering Committee that consisted of the representatives of the Ministry of Forestry and Estate Crops, the Directorate General of Forest Utilization, the ITTO representative, the FORDA representative, the representatives of Project Executing Agency and the representative of the University of Tokyo and the representatives from the forest concession holders partners (Alas Kusuma Group, and Bumi Raya Group). The Project Executing Agency will be the Faculty of Forestry, Bogor Agricultural University, Bogor, Indonesia.

The scientists supporting the project will be invited from Bogor Agricultural University, FORDA, and other national and international experts. Dr. Masatoshi Sato and his group will offer the technical assistance from Department of Global Agriculture and Agricultural Life Science, the University of Tokyo, Japan on training programs for the Indonesian Scientists.

The proposed bio-composite study concern with oriented strand board (OSB), Com-Ply, laminated beams, LVL, and Com-Ply Lumber. Such kind of technology in Malaysia and Papua New Guinea is still needed. To transfer the technology of bio-composite scientists and crews from FRIM, in Kuala Lumpur Malaysia and FORI in Lae, Papua New Guinea will be invited, and the workshop as well.

PART II: THE PROJECT

1. Project Objectives

1.1. Development Objective

The development objective of the project is to contribute to the continuity of timber production, forest resource security, socio-benefit from sustainable sources, determination of SDL wood properties, and technology transfer of utilization of SDL for value-added bio-composite products.

1.2. Specific Objectives

The specific objectives are the following:

1. To asses market needs of USDL from the tropical rain forest.
2. Determine the wood properties and utilization technology of SDL and transfer this technology for manufacturing of value – added bio-composite products.

2. Justification

2.1. Problems to be addressed

Indonesian Selective Cutting and Replanting System have been implemented in Natural Production Forest in Indonesia since 1972. Its minimum diameter cutting is 50 cm. In fact, genetically and environmentally there are some tree species that never reach the minimum diameter cutting of 50 cm. SDL of 10-49 cm represent 70 % of natural forest biomes. Technically these species could be used as raw materials for bio-composite industries and economically they are also marketable. Utilization of small-diameter logs might conserve the remaining natural forests.

In this proposed research project, bio-composite define as materials that have the commonality of being glued or bonded together. There are many types of bio-composites in the market now. They can be grouped into four products type, namely: panel products (plywood, block-board, fiberboard, particleboard, oriented strand board, Com-Ply), molded products (automotive panels, doors skin), inorganic bonded products (cement and gypsum boards, roofing products), lumber and timber products such as laminated beams, LVL, Com-Ply Lumber, Parallam, Oriented Strand Lumber, Railroad ties (Maloney, 1996; Rowell, 1998).

Demonstration plots to evaluate the ability of lowland tropical rain forest to produce small-diameter logs and their appropriate logging system are needed. Reduced-impact logging system will be implemented. Database on wood properties of SDL species and wood utilization is also needed to support the bio-composite industry. Training courses and seminar are important components to disseminate SDL technology in relation to the transfer of technology for decision makers, scientists, forest managers, and crew levels. Schematic problem tree of SDL utilization is shown in Figure 1.

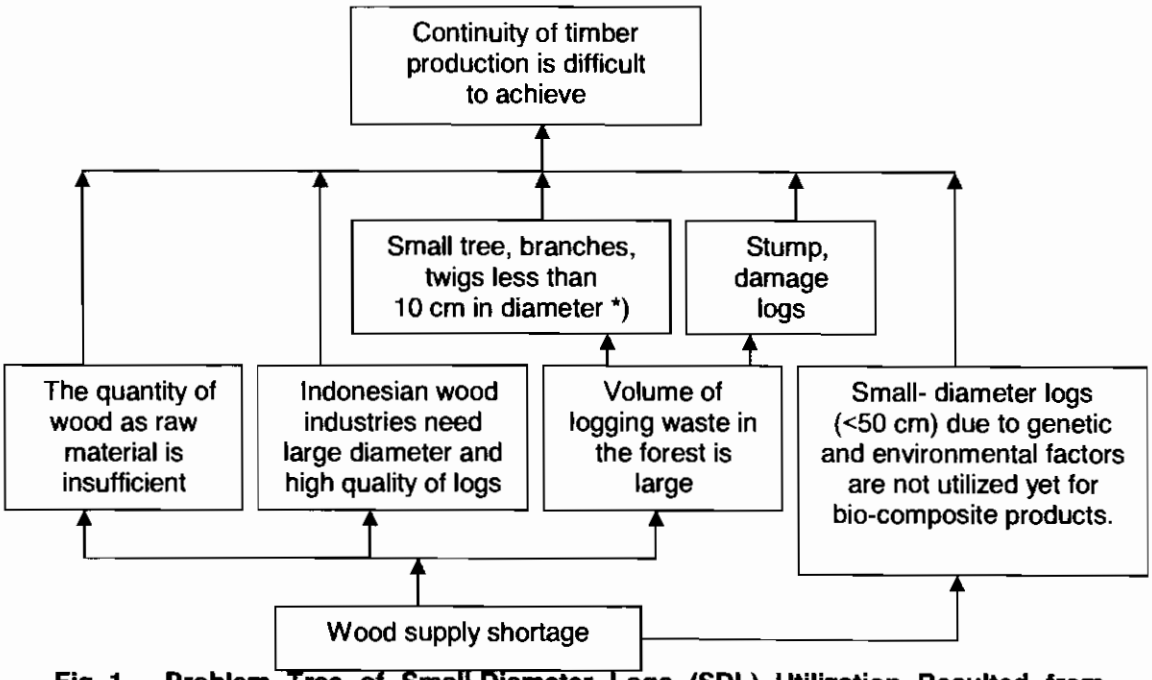


Fig. 1. Problem Tree of Small-Diameter Logs (SDL) Utilization Resulted from Genetic and Environmental Factors.

Note: *) Research on utilization of small tree, branches and twigs less than 10 cm in diameter has been done by FORDA.

2.2. Intended Situation after Project Completion

There will be some important changes after completion of the proposed research project, especially on the silviculture system, logging practice, wood supply for bio-composite industries, diversification products, improvement on the efficiency of wood utilization, and better database on wood properties. The remaining natural forest can be conserved. The number of experts on bio-composite technology will increase, especially in Indonesia, Malaysia and Papua New Guinea.

2.3. Project Strategy

Tropical rain forest represents high tree diversity and low timber production (Freezeilah, 1998). The existing condition showed that most of Indonesian bio-composite industries, especially plywood and sawmill industries need large diameter and high quality of wood, while 70 % of biomes is dominated by SDL that is controlled by genetic and environmental factors.

At the present time, the utilization of SDL to help alleviate the growing wood shortage is not yet a reality. This situation is the results of limited information on wood processing technology and inadequate data on fundamental properties of SDL, their logging system and their silvicultural aspects. Schematic reason for selection of SDL utilization for bio-composite industry is shown in Figure 2. Detail explanation concerning problems, causes and alternative solutions is shown in Table 1.

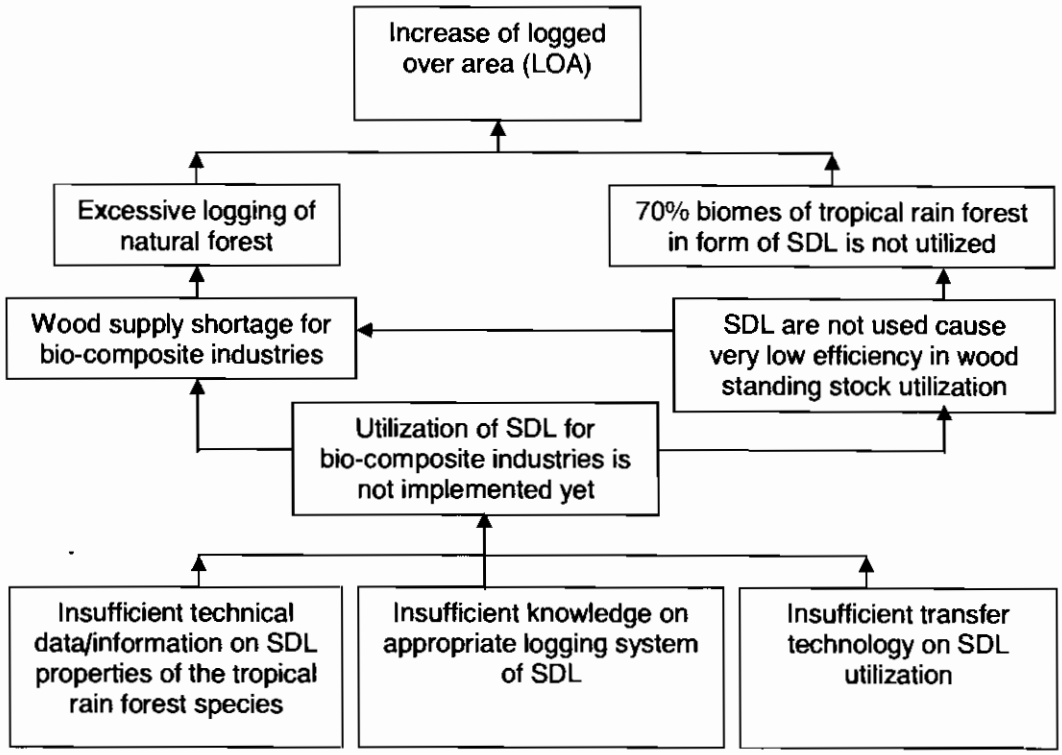


Fig. 2. Reason for Selection on Small-Diameter Logs Utilization for Bio-Composite Industries.

Table 1. Clarification of Problems, Causes and Alternative Solutions

Problem	Causes	Alternative Solutions
Utilization of small-diameter logs (SDL) for bio-composite industries is not implemented yet	Insufficient data / information on SDL potency in tropical rain forest	• Assess all available information from other sources to obtain comparable and usable results from other countries with similar problems. • Evaluation and determination of tropical rain forest on their ability to produce Small Diameter Logs.
	Insufficient knowledge on appropriate logging systems of small-diameter logs.	• Assess all available information from other sources to obtain comparable and usable results from other countries with similar problem. • Carry out field experimental test to determine the appropriate logging system for SDL. • Evaluation and determination of appropriate logging technology / system for Small Diameter Logs. • Hire the expert on logging system.

Problem	Causes	Alternative Solutions
Utilization of small-diameter logs (SDL) for bio-composite industries is not implemented yet	Insufficient technical data on wood properties of small - diameter logs	• Assess all information available and consultation to the other experts. • Comparable and usable results from other countries on SDL utilization. • Capacity building of Wood Technology Division to carry out research on SDL properties. • To conduct a research on the wood properties of small diameter logs.
	Insufficient transfer of technology on utilization of small - diameter logs.	• Information dissemination on utilization of bio-composite products made of SDL. • Training course on bio-composite technology. • Collaboration with other countries, which are more advance on SDL utilization technology.

Utilization of small diameter logs for bio-composite industry is not implemented yet. It is caused by three major problems, namely insufficient data / information on SDL potency in tropical rain forest, insufficient knowledge on their appropriate logging systems, insufficient technical data on their wood properties and insufficient transfer of technology on utilization of small - diameter logs.

Among the alternative solutions in Table 1, the best strategies to solve these problems are (1) to conduct the evaluation and determination of tropical rain forest on their ability to produce small diameter logs, (2) to conduct evaluation and determination of appropriate logging technology / system for Small Diameter Logs, (3) to conduct a research on the wood properties of small diameter logs for bio-composite products, (4) to conduct the training course on bio-composite technology, (5) to conduct the collaboration with other countries, which are more advance on SDL utilization technology.

The inventory of small diameter logs will illustrate the ability of a forest that might be possible to produce the trees that their growth never reach the minimum diameter cutting as required by the Indonesian Selective Cutting and Replanting System (50 cm). It is possible that those species have good economical value. Since it is new concept, an appropriate logging system must be determined to minimize the environmental impact into an acceptable level. Therefore, environmental impact assessment due to the SDL logging must be studied. Those small diameter logs then must be examined to determine their properties to meet the requirements of certain bio-composite products. Japan is one of the consumer countries that is known very advance on mastering the bio-composite products. It is a great honor that University of Tokyo would like to collaborate for sharing their technology on bio-composite products through the training course. Since the bio-composite industry needs skilled persons, the training course on bio-composite technology is a compulsory for the producer countries such as Indonesia, Malaysia and Papua New Guinea.

2.4. Target Beneficiaries

The project will benefit to the entire Indonesian forestry and bio-composite industries sectors and other ITTO member countries as well. It will contribute to the awareness of decision-makers and foresters on sustainable forest management issues in their fourfold dimension: ecological and genetic, forest management, and bio-composite industries. Students from undergraduate, and postgraduate studies are also invited to joint for their research programs. PhD students are also invited for their dissertations.

The information and experience derived from the project output will be disseminated

through trainings, publications, and workshops. Stakeholders such as Alas Kusuma and Bumi Raya Utama Group have shown their interest to support this project (Annexes C.1 and C.2). They will be one of the beneficiaries after the project completion.

2.5. Technical and Scientific Aspects

Indonesian Selective Cutting and Replanting System has been implemented since 1972 in lowland tropical rain forest. The minimum diameter cutting in this silvicultural system is 50 cm. The number of trees per hectare with 50 cm up in diameter is limited. Such situation will promote the forest destruction in wider area. The remaining natural tropical rain forest must be conserved. In fact, there are some small-diameter logs that their diameter growth is controlled by genetic and environmental factors. SDL of 10-49 cm represent 70 % of natural forest biomes (CIRAD, 1998).

Wood supply in Indonesia comes from Natural Forest, Timber Estate, and Community Forest. The timber is harvested using conventional logging method. Timber harvesting is considered the most destructive operation and, if uncontrolled, causing severe damage to the residual stands and soils. Elias (1997, 1998, 1999) showed that reduced-impact logging system reduced the damage to the residual stand up to 30 %. The type of damage was mostly crown and stem damages (Supriyanto and Kasno, 2000, Kasno and Nuhamara, 2000). Soil damage in general can be recovered in the period of 3 – 5 years after logging (Siregar and Supriyanto, 2000).

Recent studies done by Kartodihardjo (1999) showed that log demand in Indonesia is 45.8 million cubic meter/year, while 105 unit plywood industries need 16.3 million cubic meter/year, 1701 sawmills need 26.57 million cubic meter/year, and 6 unit pulp and paper industries need 14.31 million cubic meter/year or totally 57.1 million cubic meter/year. It means wood supply shortage 11.3 million cubic meter/year, while illegal cutting showed 30 million cubic meter/year.

Most of timber export in Malaysia and Papua New Guinea in round logs. Malaysia exports 20.8 million m3 per year, and Papua New Guinea exports 3.0 million m3 per year. The Bio-composite products in those country is still needed.

Bio-composite products in Indonesia will increase linearly from year to year. In 2010 and 2019, it is projected that the need of raw material for bio-composite industry will be 65.6 million cubic meter and 106.3 million cubic meters, respectively. The wood supply shortage in the same year will be 29.4 million cubic meter and 70.1 million cubic meter (Marimin *et al.,* 2000).Utilization of small diameter logs must be promoted through bio-composite technology.

Bio-composite products can be developed from various kinds of raw materials such as wood wastes (Massijaya, 1999, Massijaya and Okuma, 1998a and 1998b), paper waste (Massijaya and Okuma, 1996), mixed-wood and plastic wastes (Massijaya, 2000).
Recent study was also conducted by FORDA on utilization of twigs, branches and other logging wastes for handicraft articles, wood construction, particleboards, pulp and charcoal (FORDA, 1999).

In this proposal, the bio-composite study concerns with, oriented strand board (OSB), Com-ply, laminated beam, LVL, and Com-ply lumber.

2.6. Economic Aspects

This proposed research project would contribute directly and indirectly to the promotion, further processing and manufacturing of bio-composite products made of SDL to achieve higher added value of small-diameter logs such as to provide more wood supply for wood-based consumption, increasing wood industry investment, increasing of wood-based products and export income, to provide more job opportunities for the local people and regional growth income. The results of the project will create more job

opportunities to the community especially on plantation, logging, wood processing, and marketing and distribution activities. Various bio-composite products will be produced, therefore, industry will used the raw material efficiently. Societal value to the raw material will affect the economic role of wood-based industry in Indonesia, Malaysia and Papua New Guinea.

2.7. Environmental Aspects

The site project represents lowland tropical rain forests in West Kalimantan managed by Alas Kusuma Group. SDL will be processed in Bumi Raya Group for selected bio-composite products. Experimental plots will be located in natural and logged-forests to assess the ability of the forests to provide SDL.

The positive environmental impacts of this research will promote the wood utilization efficiency, and to conserve the remaining natural forest. The negative impact of SDL exploitation may affect the forest structure and composition if the implementation of wood harvesting is not conducted properly.

In this proposed research project, reduced impact logging will be implemented to maintain the forest structure and composition regarding the number of trees per hectare and their diameter distribution. If the system is well implemented, the forest structure will follow the curve below.

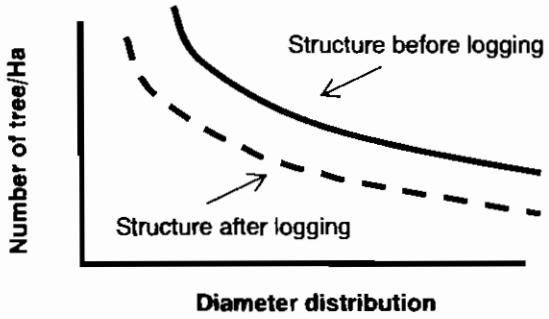


Fig. 3. Forest structure condition before and after logging

2.8. Social Aspects

This proposed activities classified as research and development, therefore the social and demographic conditions in the study site must be considered.

Directly and indirectly the Bio-composite products will affect income, welfare, job opportunities, social structure, culture orientation and access to forest resources and societal value to the wood-based products. Bio-composite products maybe able to educate or enhance the local people knowledge especially on the utilization of forest resources efficiently in Indonesia and other producing member countries as well.

2.9. Risks

Utilization of SDL is a new idea of wood utilization efficiency and policy perspective in Indonesia, Malaysia and Papua New Guinea. With regard to the project execution, there are some risks of failure if there are lack of cooperation with the private timber sectors, and lack of adequate research capacity of the executing agency and labor strikes. Therefore, a firm cooperation with other institutions, such as FORDA, the University of Tokyo, the companies and local people, is needed to optimize the resources (scientists, equipment, facilities, and fund).

3. Outputs

3.1. Specific Objective 1: **To assess market needs of SDL from the tropical rain forest.**

- Output 1.1: Assess market needs.

3.2.Specific Objective 2: **Determine the wood properties and utilization technology of SDL and transfer this technology for manufacturing of value-added bio-composite products.**

-Output 2.1. Address technical gaps in producing bio-composite products.

-Output 2.2. Determine equipment needs.

-Output 2.3. Address production coordination.

-Output 2.4. Mitigate potential trade barriers.

-Output 2.5. Comply with relevant standards.

-Output 2.6. Conduct regional workshop.

4. Activities

4.1. Output 1.1. **Assess market needs.**

-Activity 1.1.1. **Review market data.**

This activity will focus on sales of veneer, plywood, block-board, particleboard and oriented strand-board. Initial discussions during project formulation included engineered wood products such as glued-laminated timber, laminated veneer lumber and parallel strand lumber, but it was determined that the technical issues to be addressed with producing these products from SDL could not adequately be addressed within the budget or time constraints of this project. Although these products represent merging markets for tropical timber, such efforts would involve considerably more laboratory research and prototype evaluation. As such, the project will focus on using SDL to meet and increase the market demand for known commodities that have been proven in the marketplace.

-Activity 1.1.2. **Determine where potential for market growth exists.**

Trade associations that work most closely with demand and market trends will conduct an analysis of future market growth and make recommendations of which products have the most chance to succeed based on market trends, product acceptance and the time and budget constraints of the project.

4.4. Output 2.1. **Address technical gaps in producing bio-composite products.**

-Activity 2.1.1. **Identify suitable wood species and evaluate mechanical properties.**

This activity will focus on examining the wood properties of species identified as possible source of SDL, based on findings from components 1, 2 and 3. Species known to have a wide range of properties that make them unsuitable for manufacturing bio-composite products will be excluded from further investigation. Species currently used in production (plantation thinning) will be a primary focus. Species from native forests will be subjected to mechanical or physical test as necessary to determine their suitable for use in composite products.

-Activity 2.1.2. **Identify milling issues.**

This activity will focus on constraints in the manufacturing process as they pertain to the raw material. This may include issues with physical or mechanical properties equipment limitations for milling or drying and handling of SDL.

-Activity 2.1.3. **Identify suitable species/evaluate mechanical properties.**

Based on either known or established variability in physical or mechanical properties, means of establishing quality control will be investigated. Quality control factors may include density, moisture content, size or other factors.

-Activity 2.1.4. **Evaluate products manufactured from SDL.**

Based on the findings of the market assessment and candidate wood species, bio-composite products will be manufactured according to end-use requirements. The species products will not be known until previous activities are competed. As an illustration of an experimental design that might be used, the testing requirements for wood wool cement board are given below.

For plantation thinning in the Philippines, material will be selected according to the most widely planted species. Accordingly, bagras (*Eucalyptus deglupta*), moluccana sau (*Paraserianthes falcataria*), and yemane (*Gmelina arborea*) with 191,000 ha, 133,000 ha and 107,000 ha, respectively, of cumulative stand area nationwide will be considered in the project. (Report of Alonzo, D.S., et.al.: Utilization of some ITSP in the Philippines, Philippines Lumberman 1998).

Considering the three wood species mentioned above the following experimental design is envisioned. The process variable would be based on 162 wood wool cement boards (WWCB) per wood species.

Density	: 650, 750, 850
Thickness	: 8, 12, 19
Wood/Cement ratio	:30/70,40/60,50/50
Type of chemical	:none,$CaCl_2$, Al2$(SO_4)_3$

The panels will be evaluated for basic properties : modulus of rupture, modulus of elasticity, nail-head-pull-through, thickness swelling and water absorption of the composites. Statistical analysis on the test results will be done to compare and determine if the parameters significantly affect the properties. Composites with MOR, MOE, NHPT and lowest TSWA comparable to current products will be considered viable for production. Results will be compared to relevant industry or international standards.

4.5. Output 2.2. **Determine equipment needs.**

-Activity 2.2.1. **Review equipment availability.**

Based on the products selected for use of SDL, this activity will focus on needs of the industry for handing and processing SDL with minimal impact on current operations. This will be done with the cooperation and input of operating mills.

-Activity 2.2.2. **Identify source and costs for equipment.**

Once equipment needs have been identified, this activity will serve as the means of identifying reliable sources of the equipment and current costs. An assessment will be made of potential difficulties, such as parts and service. The findings will be presented as a guide of processing SDL for the specific product(s) determined to have potential as viable products in the market.

4.6. Output 2.3. **Address production coordination.**

-Activity 2.3.1. **Work with mills to identify issues on in corporation of SDL.**

This activity will focus the issues with operational mills to products using material from SDL. This will help to identify how to handle incoming SDL, how to incorporate new equipment into the production stream and the issues that may limit use of SDL into current production.

4.7. Output 2.4. **Mitigate potential trade barriers.**

-Activity 2.4.1. **Identify standards.**

No products can compete on the global market unless they adhere to establish, accepted regional or international standards. This is particularly true of bio-composite products. Depending on the products and markets identified, appropriate standards will be identified for purposes of ensuring compliance with the standards. Standards may include quality control on the manufactures product or performance requirements for the products.

-Activity 2.4.2. **Coordinate with output 2.1. for appropriate test.**

Trade barriers should not be imposed on the SDL that are manufactured from lesser used species or thinning of forest plantation species. In fact, the use of these discarded species is considered as environmentally process and should be encouraged. To ensure acceptance of the products will be coordinated with physical and mechanical test of the prototype products. Obviously numerous test can be conducted on a product. This step will ensure that only the relevant test will be conducted; i.e. those test which are necessary to demonstrate compliance with regional or international standards.

-Activity 2.4.3. **Establish quality control procedures.**

In addition to meeting the requirements of standards, bio-composite products must demonstrate reliable quality control measures to be competitive. This activity will focus on either established quality control procedures for existing products or drafting appropriate quality control procedures based on variations from established practice.

4.8. Output 2.5. **Comply with relevant standards.**

-Activity 2.5.1. **Coordinate with international standards bodies.**

This activity will focus on ensuring compliance with existing product standards by coordinating the project activities and findings with appropriate international standards bodies. The appropriate body will be a function of the selected products and target markets. For example, if products is intended for use in Japan, project staff will coordinate with JAS officials to verify that appropriate steps have been taken to allow for sale and use of the product in the target market.

4.9. Output 2.6. **Conduct regional workshop.**

-Activity 2.6.1. **Produce workshop materials.**

The workshop materials consist of papers, samples of bio-composite products made of SDL, stationary, etc.

-Activity 2.6.2. **Travel cost to conduct the workshop.**

Travel cost to conduct the workshop will be used to support the invited participants.

-Activity 2.6.3. **Operational cost in production of workshop materials.**

The workshop materials will be produced in sufficient quality according to the number of participants.

-Activity 2.6.4. **Operational cost in conducting the workshop.**

Operational cost in conducting the workshop consists of food, accommodation and perdiem, for the invited papers.

5. *Logical Framework*

PROJECT ELEMENTS	INDICATORS	MEANS OF VERIFICATION	ASSUMPTIONS
Development Objective : The development objective of the project is to contribute to the continuity of timber production, forest resource security, socio-benefit from sustainable sources, determination of SDL wood properties, and technology transfer of utilization of SDL for value-added bio-composite products.	- Utilization of SDL from sustainable sources for bio-composite products will increase 5 % by the year of 2005. - Various Bio-composite products are formulated.	- Number of bio-composite products. - Number of bio-composite industries using SDL increase.	- A firm cooperation with other institutions (FORDA, the University of Tokyo, companies and local people) run well to optimize the resources (scientists, equipment, facilities, and fund). - Continued support from the Government of Indonesia for the development of bio-composite products to conserve the remaining natural forest.
Specific Objective 1: To asses market needs of USDL from the tropical rain forest.	Database on potential for sale and trade of various bio-composites products using SDL.	- Market data from participating countries and ITTO. - Report on SDL species.	- Market data is available. - Genetically and environmentally, the diameter growth some species is limited. - Cooperation with companies and other institutions run well. - Experts, study site, fund and continued support from GOI are available.
Output 1.1. Assess market needs.	Potential for future market growth for bio-composite products is determined.	Report on potential for future market growth for bio-composite products.	Market data is available.

PROJECT ELEMENTS	INDICATORS	MEANS OF VERIFICATION	ASSUMPTIONS
Specific Objective 2. Determine the wood properties and utilization technology of SDL and transfer this technology for manufacturing of value-added bio-composite products.	- Database on SDL wood properties is established. - Equipment for production, transportation, satiation are identified. - Relevant market standards of bio-composite products are determined.	- Reports on finding of available equipment for production, transportation, specialized handling of products from SDL. - Reports that identifies the relevant market standards and how they have been addressed.	- Cooperation's among the parties run well. - Equipment and bio-composite technology of SDL is available.
Output 2.1. Address technical gaps in producing bio-composite products.	Samples of SDL will be collected for wood properties determination.	Report that identifies suitable wood species from native forest or plantation SDL for manufacturing bio-composite products.	- Cooperation among the parties runs well. - Equipment for wood properties testing is available.
Output 2.2 Determine equipment needs.	Establishment of equipment requirements for producing the various bio-composite products.	Report summarizing the findings of available equipment for producing bio-composite products, the costs of the equipment and gaps in the available technology as it pertains to production of SDL.	Source and costs for equipment is available and based on the SDL properties.
Output 2.3. Address production coordination	Issues for incorporating SDL into the production stream is identified.	Report that identifies how SDL can be incorporated into the transportation and sorting operations, needs for specialized handing equipment in the mill and issues related post-manufacture.	- Cooperation's with factories/miles run well. - Data on market assessment is available.

PROJECT ELEMENTS	INDICATORS	MEANS OF VERIFICATION	ASSUMPTIONS
Output 2.4. Mitigate potential trade barriers.	Identification and mitigatation potential trade barriers by producing bio-composite products in compliance with internationally recognized standards.	Report that identifies the relevant market and trade issues and how they have been addressed.	-Quality control procedures is available. -Coordination among the institutions run well. -Bio-composite technology of SDL is determined.
Output 2.5. Comply with relevant standards.	Ensure the acceptance of manufactured bio-composite products.	Report that identifies the relevant national, regional or international standards and the test and/or quality control procedures that satisfy the standards.	Coordination with international standards bodies is well done.
Output 2.6. Conduct regional workshop.	Transfer the developed technology and knowledge to the industry.	- Completion of a regional workshop for industry personnel. - Proceeding of the workshop. - Workshop participant number of technical reports, educational reports, and publications.	Fund, participants, workshop material are available.

6. *Work Plan*

Output/Activities	Yearly Quarter											
	Year 1				Year 2				Year 3			
	1	2	3	4	1	2	3	4	1	2	3	4
Output 1.1. Assess market needs												
A 1.1.1 Review market data	■	■										
A.1.1.2. Determine where potential for growth exists	■	■										
Output 2.1. Address technical gaps in producing bio-composite products												
A.2.1.1. Identify suitable wood species and evaluate mechanical properties		■	■	■	■							
A.2.1.2. Identify milling issues					■	■						
A.2.1.3. Identify/address quality control concerns for raw material						■	■	■				
A.2.1.4. Evaluate products manufactured from SDL							■	■	■	■	■	
Output 2.2 Determine equipment needs												
A.2.2.1 Review equipment availability									■	■		
A.2.2.2 Identify source and costs for equipment											■	■
Output 2.3. Address production coordination												
A.2.3.1. Work with mills to identify issues on in corporation of SDL										■	■	
Output 2.4. Mitigate potential trade barriers												
A.2.4.1. Identify standards							■	■				
A.2.4.2. Coordinate with output 2.1. for appropriate test								■	■			
A.2.4.3. Establish quality control procedures									■	■	■	■

Output/Activities	Yearly Quarter											
	Year 1				Year 2				Year 3			
	1	2	3	4	1	2	3	4	1	2	3	4
Output 2.5. Comply with relevant standards												
A.2.5.1. Coordinate with international standards bodies												
Output 2.6. Conduct regional workshop												
A.2.6.1. Produce workshop materials												
A.2.6.2. Travel cost to conduct the workshop												
A.2.6.3. Operational cost in production of workshop materials												
A.2.6.4. Operational cost in conducting the workshop												
PROJECT ORGANIZATION												
• Administrative personnel												
• PSC meeting												
• PEA meeting												
• Project monitoring, evaluation and administration by ITTO												

7. Budget

7.1. Overall Project Budget by Activity

	BUDGET COMPONENT							
OUTPUTS/ACTIVITIES Non-Activity Based Expenses	**10.Project Personnel**	**20.Sub-Contract (TA&Cons, Trainning)**	**30. Duty Travel**	**40.Capital Items (Opr.Cost)**	**50. Consum-able Items (Material)**	**60.Miscella-neous**	**Quarter Year**	**GRAND TOTAL**
OUTPUT 1.1. Assess market needs								
A 1.1.1. Review market data	5000 (c)	4000 (c)	5000 (c)	0	0	0	Q1,Q2,Y1	14000 (c)
A.1.1.2. Determine where potential for growth exist	5000 (c)	3000 (c)	3000 (c)	0	0	0	Q1,Q2,Y1	11000 (c)
SUB-TOTAL	**10000 (c)**	**7000 (c)**	**8000 (c)**	**0**	**0**	**0**	**Q1,Q2,Y1**	**25000 (c)**
OUTPUT 2.1. Address technical gaps								
A.2.1.1. Identify suitable species/evaluate mechanical properties	10000 (c)	2800 (c)	2500 (c)	6000 (c)	10500 (c)	0	Q2,Q3,Q4 Y1,Q1,Y2	31800 (c)
A.2.1.2. Identify milling issues	10000 (c)	4200 (c)	1500 (c)	4000 (c)	2000 (c)	0	Q1,Q2,Y2	21700 (c)
A.2.1.3. Identify/address quality control concerns for raw material	15000 (c)	2400 (c)	1500 (c)	5000 (c)	11200 (c)	0	Q2,Q3 Q4,Y2	35100 (c)
A.2.1.4. Evaluate products manufactured from SDL	50000 (c)	10000 (c)	2500 (c)	25000 (c)	20000 (c)	0	Q3,Q4,Y2 Q1,Q2,Q3,Y3	107500 (c)
SUB-TOTAL	**85000 (c)**	**19400 (c)**	**8000 (c)**	**40000 (c)**	**43700 (c)**	**0**	**Q1,Q2,Q3,Q4 Y1,Y2,Y3,Y4**	**196100 (c)**
OUTPUT 2.2. Determine equipment needs								
A.2.2.1. Review equipment availability	10000 (c)	1800 (c)	2400 (c)	4500 (c)	300 (c)	0	Q1,Q2,Y3	19000 (c)
A.2.2.2. Identify source and costs for equipment	5000 (c)	1200 (c)	1200 (c)	4000 (c)	400 (c)	0	Q3,Q4,Y3	11800 (c)
SUB-TOTAL	**15000 (c)**	**3000 (c)**	**3600 (c)**	**8500 (c)**	**700 (c)**	**0**	**Q1,Q2,Y3 Q3,Q4,Y3**	**30800 (c)**
OUTPUT 2.3.Address production coordination								
A.2.3.1 Work with mills to identify issues on in corporation of SDL	10000 (c)	7200 (c)	3000 (c)	8000	1700	0	Q2,Q3,Y3	(c)
SUB-TOTAL	**10000 (c)**	**7200 (c)**	**3000 (c)**	**8000 (c)**	**1700 (c)**	**0**	**Q2,Q3,Y3**	**29900 (c)**
OUTPUT 2.4.Mitigate potential trade barriers								
A.2.4.1.Identify standards	5000 (c)	1800 (c)	3000 (c)	2000 (c)	0	0	Q3,Q4,Y2	11800 (c)
A.2.4.2.Coordinate with Component 4 for appropriate test	0	1200 (c)	0	2000 (c)	0	0	Q4,Y2 Q1,Y3	3200 (c)
A.2.4.3.Establish quality control procedures	10000 (c)	9000 (c)	0	5000 (c)	0	0	Q1,Q2,Q3 Q4,Y3	24000 (c)
SUB-TOTAL	**15000 (c)**	**12000 (c)**	**3000 (c)**	**9000 (c)**	**0**	**0**	**Q1,Q2,Q3 Q4,Y2,Y3**	**39000 (c)**
OUTPUT 2.5.Comply with relevant standards								
A.2.5.1.Coordinate with international standards Bodies	10000 (c)	3400 (c)	3000 (c)	0	400 (c)	0	Q1,Q2,Q3 Q4,Y3	16800 (c)
SUB-TOTAL	**10000 (c)**	**3400 (c)**	**3000 (c)**	**0**	**400 (c)**	**0**	**Q1,Q2,Q3 Q4,Y3**	**16800 (c)**

	BUDGET COMPONENT							
OUTPUTS/ACTIVITIES **Non-Activity Based Expenses**	**10.Project Personnel**	**20.Sub-Contract (TA&Cons, Trainning)**	**30. Duty Travel**	**40.Capital Items (Opr.Cost)**	**50. Consum-able Items (Material)**	**60.Miscella-neous**	**Quarter Year**	**GRAND TOTAL**
OUTPUT 2.6.Conduct regional workshop								
A.2.6.1.Produce workshop materials	0	10000 (c)	0	0	0	0	Q3,Y3	10000 (c)
A.2.6.2.Travel cost to conduct the workshop	0	30000 (c)	0	0	0	0	Q3,Y3	30000 (c)
A.2.6.3.Operational cost in production of Workshop Materials	0	2000 (c)	0	0	0	0	Q3,Q4,Y3	2000 (c)
A.2.6.4.Operational cost in conducting the workshop	0	8083 (c)	0	0	0		Q4,Y3	8083 (c)
SUB-TOTAL	**0**	**50083 (c)**	**0**	**0**	**0**	**0**	**Q3,Q4,Y3**	**50083 (c)**
PROJECT ORGANIZATION								
Contigencies	0	0	0	0	0	38768 (c)		38768 (c)
PSC and PEA meeting (Mid term Evaluation)	10000 (c)	0	10000 (c)	0	10000 (c)	0		30000 (c)
Ex-post Evaluation	10000 (c)	0	10000 (c)	0	10000 (c)	0		30000 (c)
Project monitoring, evaluation, and by ITTO (ITTO Program Support)	22000 (c)	0	22000 (c)	0	24549 (c)	0		68549 (c)
CFC Monitoring	0	22500 (c)	0	0	0	0		22500 (c)
Independent Audit	0	22500 (c)	0	0	0	0		22500 (c)
SUB-TOTAL	**42000 (c)**	**45000 (c)**	**42000 (c)**	**0**	**44549 (c)**	**38768 (c)**		**212317 (c)**
GRAND TOTAL	**187000 (c)**	**147083 (c)**	**70600 (c)**	**65500**	**91049 (c)**	**38768 (c)**		**600000 (c)**

Note :
(C) = CONTRIBUTION OF THE CFC

7.2. Yearly Project Budget by Source

A. Contribution of Faculty of Forestry
Bogor Agricultural University (In Kind)

BUDGET COMPONENT	VALUE US $	UNIT	UNIT PER YEAR			TOTAL	AMOUNT IN US $			
			Y.1	Y.2	Y.3	UNIT	Y.1	Y.2	Y.3	TOTAL
40. CAPITAL ITEMS										
Offices	20,000	Yearly	5%	5%	5%	15%	1,000	1,000	1,000	3,000
Office Equipment										
(AC, Computers, Internet)	25,000	Yearly	20%	20%	20%	60%	5,000	5,000	5,000	15,000
Laboratories	50,000	Yearly	5%	5%	5%	15%	2,500	2,500	2,500	7,500
LABORATORY EQUIPMENT										
Microtome	5,000	Unit	10%	10%	10%	30%	500	500	500	1,500
Staining Yard	1,000	Unit	10%	10%	10%	30%	100	100	100	300
Microscope Photonic/Flouresence	25,000	Unit	20%	20%	20%	60%	5,000	5,000	5,000	15,000
Stereo Microscope	3,000	Unit	15%	15%	15%	45%	450	450	450	1,350
Camera Photo	1,500	Unit	20%	20%	20%	60%	300	300	300	900
Handycam	1,750	Unit	20%	20%	20%	60%	350	350	350	1,050
Chainsaw 5 Unit @ 1000	5,000	Unit	20%	20%	20%	60%	1,000	1,000	1,000	3,000
Compass 5 Unit @ 300	1,500	Unit	20%	20%	20%	60%	300	300	300	900
Theodolit 5 Unit @ 700	3,500	Unit	20%	20%	20%	60%	700	700	700	2,100
Planimeter 3 Unit @ 700	2,100	Unit	20%	20%	20%	60%	420	420	420	1,260
Culvimeter 10 Unit @ 25	250	Unit	20%	20%	20%	60%	50	50	50	150
Drawing Desk	250	Unit	20%	20%	20%	60%	50	50	50	150
Haga Meter 5 Unit @ 500	2,500	Unit	20%	20%	20%	60%	500	500	500	1,500
Spiegel Relascope 2 Unit @ 3000	6,000	Unit	20%	20%	20%	60%	1,200	1,200	1,200	3,600
Small Scale Hot Press	5,000	Unit	15%	20%	20%	55%	750	1,000	1,000	2,750
Circular Saw	7,500	Unit	20%	20%	20%	60%	1,500	1,500	1,500	4,500
Planer	7,500	Unit	15%	20%	20%	55%	1,125	1,500	1,500	4,125
Diskc Refiner	7,500	Unit	15%	20%	20%	55%	1,125	1,500	1,500	4,125
Disk Flaker	7,500	Unit	15%	20%	20%	55%	1,125	1,500	1,500	4,125
Hammermill	7,500	Unit	15%	20%	20%	55%	1,125	1,500	1,500	4,125
Dryer	12,000	Unit	15%	20%	20%	55%	1,800	2,400	2,400	6,600
Blender and Spray Gun	755	Unit	20%	20%	20%	60%	151	151	151	453
COMPONENT TOTAL							**28,121**	**30,471**	**30,471**	**89,063**
GRAND TOTAL (IN KIND)							**28,121**	**30,471**	**30,471**	**89,063**

B. Contribution of Alas Kusuma (In Kind)

BUDGET COMPONENT	VALUE US $	UNIT	UNIT PER YEAR			TOTAL UNIT	AMOUNT IN US $			
			Y.1	Y.2	Y.3		YEAR 1	YEAR 2	YEAR 3	TOTAL
10. PROJECT PERSONNEL										
12. ADMINISTRATIVE PERSONNEL	50	Monthly	9	9	9	27	450	450	450	1350
Technician 48 M/Month	25	Monthly	9	9	9	27	225	225	225	675
Skilled Labour 96 M/Month	25	Monthly	9	9	9	27	225	225	225	675
19. COMPONENT TOTAL							**900**	**900**	**900**	**2700**
30. DUTY TRAVEL	0	0	0	0	0	0	0	0	0	0
32. TRANSPORT COST IN THE FIELD	25	Monthly	9	9	9	27	225	225	225	675
33. ACCOMODATION AND FOOD	10	Monthly	9	9	9	27	90	90	90	270
39. COMPONENT TOTAL							**315**	**315**	**315**	**945**
40. CAPITAL ITEMS	0	0	0	0	0	0	0	0	0	0
41. PREMISES										
Offices	20000	Yearly	4%	4%	4%	12%	800	800	800	2400
Office Equipment	25000	Yearly	4%	4%	4%	12%	1000	1000	1000	3000
Chainsaw	2000	Unit	5%	5%	5%	15%	100	100	100	300
Skidder/Tractor	75000	Unit	5%	5%	5%	15%	3750	3750	3750	11250
Loader/Unloader	75000	Unit	5%	5%	5%	15%	3750	3750	3750	11250
Buldozer	75000	Unit	5%	5%	5%	15%	3750	3750	3750	11250
Scriper	100000	Unit	5%	5%	5%	15%	5000	5000	5000	15000
Compactor	97400	Unit	5%	5%	5%	15%	4870	4870	4870	14610
Dump Truck	75000	Unit	5%	5%	5%	15%	3750	3750	3750	11250
49.COMPONENT TOTAL							**26770**	**26770**	**26770**	**80310**
60. MISCELLANEOUS	100000 0	-	0	0	0	0	0	0	0	0
69. COMPONENT TOTAL	**0**	-	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
GRAND TOTAL (IN KIND)							**27985**	**27985**	**27985**	**83955**

C. Contribution of Bumi Raya Group (In Kind)

BUDGET COMPONENT	VALUE US $	UNIT	UNIT PER YEAR			TOTAL UNIT	AMOUNT IN US $			
			Y.1	Y.2	Y.3		YEAR 1	YEAR 2	YEAR 3	TOTAL
10. PROJECT PERSONNEL										
12. ADMINISTRATIVE PERSONNEL	50	Monthly	9	9	9	27	450	450	450	1350
Technician 48 M/Month	25	Monthly	9	9	9	27	225	225	225	675
Skilled Labour 96 M/Month	25	Monthly	9	9	9	27	225	225	225	675
19. COMPONENT TOTAL							**900**	**900**	**900**	**2700**
30. DUTY TRAVEL	0	0	0	0	0	0	0	0	0	0
32. TRANSPORTATION COST IN THE FIELD	25	Monthly	9	9	9	27	225	225	225	675
33. ACCOMODATION AND FOOD	10	Monthly	9	9	9	27	90	90	90	270
39. COMPONENT TOTAL							**315**	**315**	**315**	**945**
40. CAPITAL ITEMS										
41. PREMISES										
Offices	20000	Yearly	4%	4%	4%	12%	800	800	800	2400
Office Equipment	25000	Yearly	4%	4%	4%	12%	1000	1000	1000	3000
Band Saw	2000	Unit	5%	5%	5%	15%	100	100	100	300
Circular Saw	75000	Unit	5%	5%	5%	15%	3750	3750	3750	11250
Planer	75000	Unit	5%	5%	5%	15%	3750	3750	3750	11250
Sander	75000	Unit	5%	5%	5%	15%	3750	3750	3750	11250
Lathe	100000	Unit	5%	5%	5%	15%	5000	5000	5000	15000
Dry Kiln	50000	Unit	5%	5%	5%	15%	2500	2500	2500	7500
Glue Spreader	75000	Unit	5%	5%	5%	15%	3750	3750	3750	11250
Cold Press	50000	Unit	5%	5%	5%	15%	2500	2500	2500	7500
Hoot Press	50000	Unit	5%	5%	5%	15%	2500	2500	2500	7500
Conditioning Room	2000	Unit	5%	5%	5%	15%	100	100	100	300
49. COMPONENT TOTAL							**29500**	**29500**	**29500**	**88500**
60. MISCELLANEOUS	0	-	0	0	0	0	0	0	0	0
69. COMPONENT TOTAL	**0**	**-**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
GRAND TOTAL (IN KIND)							**30715**	**30715**	**30715**	**92145**

D. Summary of Budget by Sources

COMPONENTS	SOURCE OF FUND			
	CFC	ITTO	COUNTERPART CONTRIBUTION (IN KIND)	TOTAL PROJECT
1. Assess market needs	25,000	0	0	25,000
2. Inventory resource availability	0	0	0	0
3. Establish suitable logging practices and harvesting methods for SDL	0	0	0	0
4. Address technical gaps	196,100	0	130,000	326,100
5. Determine equipment needs	30,800	0	20,000	50,800
6. Adress production coordination	29,900	0	15,000	44,900
7. Mitigate potential trade barries	39,000	0	25,000	64,000
8. Comply with relevant standards	16,800	0	0	16,800
9. Regional Workshop	50,083	0	75,163	125,246
SUB-TOTAL	**387,683**	**0**	**265,163**	**652,846**
Contingencies (10%)	38,768	0	0	38,768
ITTO Programme Support	68,549	0	0	68,549
CFC Monitoring Costs	22,500	0	0	22,500
Mid Term Evaluation	30,000	0	0	30,000
Ex-post Evaluation	30,000	0	0	30,000
Independent Audit	22,500	0	0	22,500
TOTAL PROJECT	**600,000**	**0**	**265,163**	**865,163**
COUNTERPART CONTRIBUTION (IN KIND)				
Bogor Agricultural University (in kind)			89,063	
Alas Kusuma Group (in kind)			83,955	
Bumi Raya Group (in kind)			92,145	
TOTAL COUNTERPART CONTRIBUTION			**265,163**	

E. Consolidated Yearly Project Budget
Contribution of CFC

	Budget Component	TOTAL	YEAR 1	YEAR 2	YEAR 3
10	**Project Personnel**				
	11. National Experts (Scientists)	85000	30000	30000	25000
	12. National Consultants	43200	14100	14100	15000
	13. Other Labour	16800	5600	5600	5600
	19. Component Total	**145000**	**49700**	**49700**	**45600**
20	**Sub-Contracts**				
	21. Assess Market Needs	7000	7000	0	0
	22. Address Technical Gaps	19400	6400	6500	6500
	23. Determine Equipment Needs	3000	0	0	3000
	24. Address Production Coordination	7200	0	0	7200
	25. Mitigate Potential Trade Barriers	12000	0	6000	6000
	26. Comply With Relevant Standards	3400	0	0	3400
	27. Conduct Regional Workshop	50083	0	0	50083
	29. Component Total	**102083**	**13400**	**12500**	**76183**
30	**Duty Travel**				
	31. Daily Subsistence Allowance	12600	0	6300	6300
	32. International Travel	10000	3000	3000	4000
	33. Transport Costs	6000	2000	2000	2000
	39. Component Total	**28600**	**5000**	**11300**	**12300**
40	**Capital Items**				
	41. Address Technical Gaps	40000	13000	13000	14000
	42. Determine Equipment Needs	8500	0	0	8500
	43. Address Production Coordination	8000	0	0	8000
	44. Mitigate Potential Trade Barriers	9000	0	4500	4500
	45. Operational Cost For Silviculture	0	0	0	0
	46. Operational Cost For Logging	0	0	0	0
	49. Component Total	**65500**	**13000**	**17500**	**35000**
50	**Consumable Items**				
	51. Address Technical Gaps	43700	14500	14600	14600
	52. Determine Equipment Needs	700	0	0	700
	53. Address Production Coordination	1700	0	0	1700
	54. Mitigate Potential Trade Barriers	400	0	0	400
	55. Office Supplies For Silviculture	0	0	0	0
	56. Office Supplies For Logging	0	0	0	0
	57. Data Analysis, Report Writing And Publication For Silviculture	0	0	0	0
	58. Data Analysis, Report Writing And Publication For Logging	0	0	0	0
	59. Component Total	**46500**	**14500**	**14600**	**17400**
60	**Miscellaneous**				
80	**ITTO Monitor, Evaluat., And Administ. Cost**				
	81a. ITTO Monitoring and Review Costs	24105	8035	8035	8035
	81b. ITTO Programme Support Costs	44444	14818	14818	14808
	82. CFC Monitoring	22500	7500	7500	7500
	83. Mid Term And Ex-Post Evaluation	60000	0	30000	30000
	84. Independent Audit	22500	7500	7500	7500
	85.Contingencies	38768	12922	12922	12924
	89. Component Total	**188212**	**42740**	**72740**	**72732**
90	**Refund Of Pre-Project Cost**				
	GRAND TOTAL	**575895**	**138340**	**178340**	**259215**

PART III. OPERATIONAL ARRANGEMENTS

1. Management Structure

Prior to the project execution, Letter of Intents from the University of Tokyo (Annex C.1), Alas Kusuma Group (Annex C.2) and Bumi Raya Group (Annex C.3) were signed. The University of Tokyo will provide possible means for technical assistance. PT Alas Kusuma Group and Bumi Raya Group will provide possible means for logging operations and bio-composite production.

The project activities will be coordinated by the Project Manager of the Project Implementing Agency (PIA) under supervision of the Project Steering Committee (PSC), and Project Executing Agency (PEA).

It will be accountable to the project steering committees chaired by the Director of Forest Research and Development Agency (FORDA) or the Director of Bureau International Cooperation and Investment Ministry of Forestry (MOF), while the representative of ITTO, the representative of donor countries and the representative of the University of Tokyo will be the members. The representative of CFC is also invited. The structure of the project organization is shown in Figure 4.

The PSC meeting will be conducted every 6 months, while for the PEA meeting every 3 months.

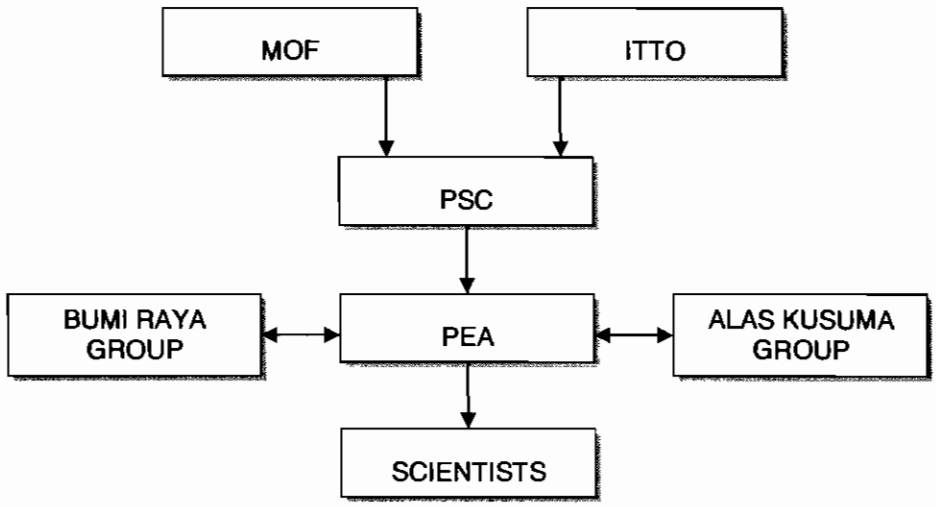


Fig. 4. Project Organization

The role of the Project Steering Committee is to guide and to monitor the project, to approve work plan, progress and annual reports, to examine the project management, and to report to the ITTO Head Quarter. In overall the Project Steering Committee functions as project governance body.

Project Executing Agency staff will include Project management staffs and scientists. Project management staffs consist of the Chairman of the Project Executing Agency, the Chairman of the Project Implementing Agency or the Dean Faculty of Forestry (Prof. Dr. Cecep Kusmana, MS), the project manager (Prof. Dr. Yusuf Sudohadi), the secretary and treasure (Dr. Supriyanto), the assistant project manager for training program (Prof. Dr. Elias), the assistant project manager for wood marketing (Mr. Bedyaman Tambunan), the assistant project manager for bio-composite (Dr. Muh.Yusram Massijaya), laboratory technicians (3 persons). The scientists will be invited from National and International experts. The organization of the Project Executing Agency is shown in Figure 5.

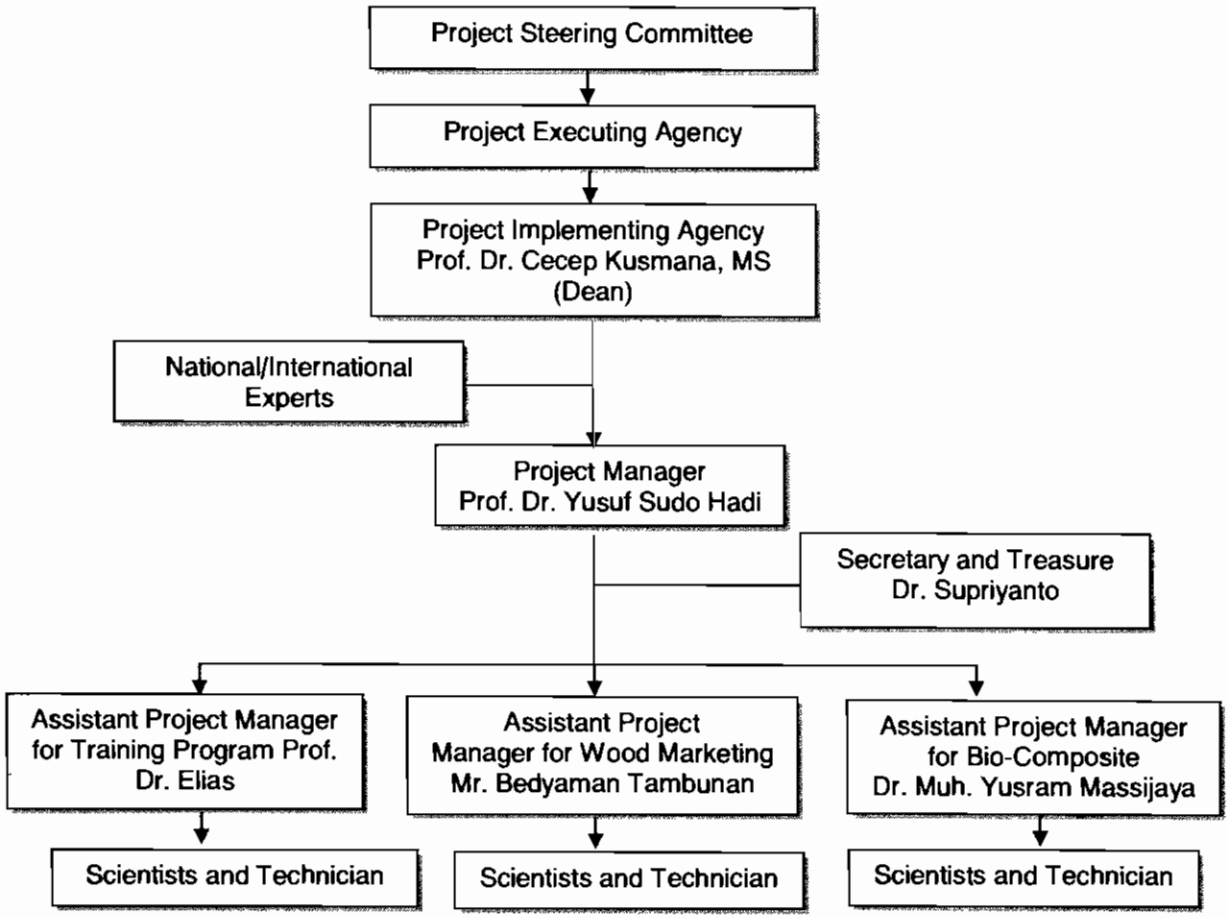


Fig. 5. Project Executing Agency Organization

The curriculum vitae of key staffs (Dean of Faculty of Forestry, Project Manager and Assistants Project Managers) are attached as Annexes B.1, B.2, B.3, B.4, B.5, and B.6, while the curriculum vitae of Dr. Masatoshi Sato and the chairman of Project Executing Agency, Mr. Banjar Yulianto Laban is attached as Annex B.7 and B.8.

2. Monitoring, Reporting and Evaluation

a. Arrangements for Reporting

The project will submit a progress report (quarterly report) to the ITTO Secretariat every four months and other reports upon the request of the ITTO Head Quarter. Annual Report will be submitted after the review of Project Steering Committee. An independent financial auditor will also be appointed to audit the financial cash flow of the Project Executing Agency and Implementing Agency. On project completion, a final report will be submitted to ITTO within three months of the date of completion.

b. Arrangement for ITTO Monitoring and Review

Every year, the ITTO Secretariat will carry out a project monitoring and review mission in study site. The Project Steering Committee meeting will also be convened each year in order to review the general progress of the project, to solve unexpected problems and to endorse the PSC minutes to the ITTO. A workshop will be held towards the completion of the project in order to approve its results. It will involve the representatives of the public and private sectors and NGO's, one representative from the ITTO and external experts in the wood technology and forest industry.

c. Evaluation

A project evaluation mission will be conducted annually. Three months before project completion, the ITTO Head Quarter will evaluate the project results. The recommendations resulting from the evaluation could be used to plot the broad outline for the next phase (Pilot Project of bio-composite industry in the field). Nevertheless, during monitoring missions, the Secretariat of ITTO will be entitled to carry out an early mid-term review if it so decides. Post-project evaluation will also be carried out to evaluate the project sustainability.

3. Future Operation and Maintenance

On project completion, the relevant Indonesian Ministry (Ministry of Forestry, Ministry of Industry, National Institute for Industry, Ministry of National Education) will pursue the research and development and the demonstration activities and the management of SDL will be undertaken by the Ministry of Forestry.

The established facilities will continue to be used for training in utilization of SDL coming from the sustainable sources, and demonstration and socialization of SDL utilization technology.

PART IV: THE TROPICAL TIMBER FRAMEWORK

1. Compliance with ITTA 1994 Objectives

Promotion on utilization of small diameter logs for bio-composite products is needed. This project proposal will initiate the cooperative research between producer and consumer countries that will lead to the wood utilization efficiency, the promotion and support research and development on bio-composite technology for further processing of tropical timber, the employment opportunities and development of forest industry.

Accordingly, this project complies with the ITTO Objectives laid down in Article 1 (f), (I), (j) of the International Tropical Timber Agreement (ITTA) 1994:

(f). To promote and to support research and development with a view to improve forest management and efficiency of wood utilization as well as to increase the capacity in conserving and enhancing other forest values in timber producing tropical forests;

(i). To promote the increase and further processing of tropical timber from sustainable sources in producing member countries with a view to promote their industrialization and thereby to increase their employment opportunities and export earnings;

(j). To encourage members to support and develop industrial tropical timber reforestation and forest management activities as well as rehabilitation of degraded forest land, with due regard for the interest of local communities dependent on forest resources.

Therefore, the implementation of the potential uses of small diameter logs must be elaborated with species structure and composition, logging system, and wood properties for various bio-composite products.

The specific objectives of this research proposal are as follows:

1. To assess market needs and evaluate the availability, structure and composition of SDL in tropical rain forest in West Kalimantan and their reduced-impact logging systems.
2. Determine the wood properties and utilization technology of SDL and transfer this technology for manufacturing of value-added bio-composite products.

The results of the study will contribute to the conservation of the remaining natural forest.

To conserve the remaining natural tropical rain forests, improvement on wood utilization efficiency is a must. The implementation of limit diameter cutting in Indonesian selective cutting and replanting system does not consider the diameter growth of the species that is limited by genetic and environmental factors. Those small diameter logs can be used for bio-composite products to obtain greater added value of production of the optimal mix good and services. To minimize the environmental impact due to SDL logging, the reduced-impact logging should be carried out.

In this regard, this project complies with the project selection criteria mentioned in ITTO Objectives of ITTO Libreville Action Plan 1998 – 2001.

- Security of forest resources and prevention of un-planned deforestation;
- Production of the optimal mix of goods and services;
- Improvement of the utilization of the resource to give the greatest possible social benefit;
- Improvement of the social and political environment concerning forest management.

2. Compliance with ITTO Action Plan

This project complies with ITTO actions promoted in the fields of forestry policy, timber utilization, research, participation of local communities, in order to achieve criteria and indicators of Sustainable Forest Management. In particular, it complies with the objectives of the ITTO Libreville Action Plan 1998 - 2000. It complies with the priorities of the ITTO Libreville Action Plan as listed below:

- Adopt a forest policy and apply legislation;
- Apply reduced impact logging;
- Limit timber harvest to the sustained yield capacity;
- Raise public awareness that timber harvesting can be consistent with the sustainability of tropical forests.
- Train the workers force, including supervisors, in reduced impact logging.

To achieve those action plans, this research will be carried out in cooperation with the University of Tokyo, Japan and other institutions to support research and development studies to improve efficiency product processing especially in bio-composite products. The project will provide the opportunities to provide an effective consultation, development among the ITTO member countries.

The reasons for ITTO support towards sustainable forest management is in compliance with ITTA 1994 concerning the following aspects:

(a). To provide an effective framework for consultation, international co-operation and policy development among all members with regard to all relevant aspects of the world timber economy;

(b). To provide a forum for consultation and to promote non-discriminatory timber trade practices;

(c). To promote and support research and development with a view to improve forest management and efficiency of wood utilization as well as to increase the capacity of conserving and enhancing other forest values in timber producing tropical forest;

(d). To promote the increase and further processing of tropical timber from sustainable sources in producing member countries with a view to promote their industrialization and thereby to increase their employment opportunities and expert earnings

The proposed research project is also complies of the specific goals and supporting actions of ITTO Action Plan 1998 to 2000 formulated log ITTO substantive work in forest industry area as describe below:

Goal 1: Promote increased and further processing of tropical timber from sustainable sources.

So far the use of small-diameter logs that is controlled by the genetics and environmental factors, is not promoted yet due to insufficient data on their silvicultural aspect, their reduced-impact logging system, and their wood properties. The information on their wood properties will be used for further processing, especially for bio-composite products to promote the value added of small-diameter logs as stated in the Goal 1. Action Plan 1998 to 2000.

Goal 3: Improve efficiency of processing of tropical timber from sustainable sources.

The bio-composite products in this research proposal are oriented strand board (OSB), com-ply, laminated beans, LVL, and comply lumber. Those bio-composite products are very important in wood utilization efficiency. This is related to the Goal no. 3 of the ITTO Action Plan to 2000.

Bibliography

1. CIRAD. 1998. Silvicultural Research in a Lowland Mixed Dipterocarp Forest of East Kalimantan, The Contribution of STREK Project. CIRAD-forest, FORDA, PT INHUTANI I. Jakarta.

2. Elias, 1997. Conventional Versus Reduced Impact Wood Harvesting in Tropical Natural Forest in Indonesia. Paper Submitted to XI World Forestry Congress, 13-22 October 1997, Turkey, 6p.

3. Elias, 1998. Reduced Impact Wood Harvesting in the Frame of FAO Code. A Concept for East Kalimantan, Indonesia, Faculty of Forestry IPB. Bogor. 6p.

4. Elias, 1999. Reduced Impact Timber Harvesting in the Indonesian Selective Cutting and Planting System, IPB Press. Bogor. 76p.

5. Freezeilah, B.C.Y. 1998. General Lecture at the Faculty of Forestry, Gadjah Mada University, Yogyakarta, 10 August 1998.

6. ITTO, 1998. Criteria and Indicators for Sustainable Management of Natural Tropical Forests. ITTO Policy Development Series No. 7.

7. ITTO, 1998. ITTO Libreville Action Plan. ITTO Policy Development Series No. 8.

8. Kasno and S.T. Nuhamara. Assessment of Damage Indicator in Forest Health Monitoring. One-day Seminar on Forest Health Monitoring to Monitor the Sustainability of Indonesian Tropical Rain Forest. ITTO Project PD 16/95 Rev.2 (F),
SEAMEO BIOTROP, February 2000.

9. Mangold, R. 1997, Forest Health Monitoring Field Methods Guide (International – Indonesia), USDA Forest Service, Washington DC.

10. Maloney, T. M, 1996. The Family of Wood Composite Materials. Forest Products Journal. 46(2) : 19-26.

11. Massijaya, M.Y. and M. Okuma, 1996. Development of Board Made from Waste Newspaper (I): Production and fundamental properties of waste Newspaper boards. Journal of the Japan Wood Research Society. Vol. 42, No. 42, p.123-1249.

12. Massijaya, M.Y. and M. Okuma,1998. Development of Composite Boards Made from waste Newspaper and Wood Particles (III): Resin Distribution between Waste Newspaper and Wood Particles. Proc. Int. Wood Sci. Seminar. Serpong, Indonesia. Nov.6-7.

13. Massijaya, M.Y. and M. Okuma, 1998. Development of Composite Boards Made from Waste Newspaper and Wood Particles (II): Optimization of Resin Level. Proc. The Fourth Pacific Rim Bio-Based Composites Symposium. Bogor, Indonesia. Nov.2-5.

14. Massijaya, M.Y. 1999. Development of Composite Boards Made from Office-waste Paper and Wood Particles. Abstract. The 49th Annual Meeting of Japan Wood Research Society. Tokyo, Japan.

15. Rowell, R. M., 1998. The State of Art and Future Development of Bio-Based Composite Science and Technology Towards the 21st Century. Proceedings of The Fourth Pacific Rim Bio-Based Composites Symposium. Bogor. Indonesia. November 2-4, 1998.

16. Siregar C.H. and Supriyanto. Assessment of Soil Indicator in Forest Health Monitoring. One-day Seminar on Forest Health Monitoring to Monitor the Sustainability of Indonesian Tropical Rain Forest. ITTO Project PD 16/95 Rev.2 (F), SEAMEO BIOTROP, February 2000.

17. Supriyanto and Kasno. Assessment of Stem Damage Indicator in Forest Health Monitoring. One-day Seminar on Forest Health Monitoring to Monitor the Sustainability of Indonesian Tropical Rain Forest. ITTO Project PD 16/95 Rev.2 (F), SEAMEO BIOTROP, February 2000.

18. United Nations, 1994. International Tropical Timber Agreement, 1994. New York and Geneva. TD/Timber.2/16.

ANNEX A
PROFILE OF THE EXECUTING AGENCY
FACULTY OF FORESTRY
BOGOR AGRICULTURAL UNIVERSITY (IPB)

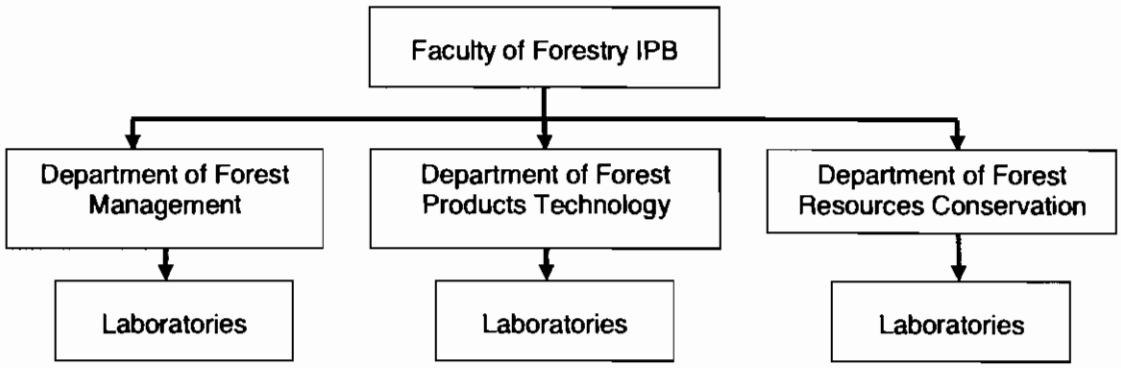
1. The Expertise of The Executing Agency

The Faculty of Forestry, Bogor Agricultural University (IPB) is one of the famous Faculties of Forestry in Indonesia. The missions of the Faculty of Forestry IPB are :

a. To develop Faculty of Forestry IPB as a research-based higher education institution to produce qualified human resource capable of mastering forest science and technology, and sensitive to the needs of society.
b. Perform Faculty of Forestry IPB as a higher education institution capable to anticipate and solve the problems in sustainable forestry development based on scientific and rational approaches.
c. Establishment Faculty of Forestry IPB as quality oriented and professional higher education institution to produce internationally recognized achievements.
d. To develop Faculty of Forestry IPB as trendsetter for forestry and other related profession and scientific community, business community, government and NGO in the national as well as international level.

The goal of Faculty of Forestry IPB is to provide leadership in forestry through enhance cooperation/collaboration, networking, partnership and linkages among the institutions and other relevant organization either national or international levels.

The organizational chart is as follows :



The field of expertise consists of :

a. Forest Management; research and development on forest planning models, development of forest biotechnology, research and development on forest improvement, research and analysis on forestry socio-economics.
b. Forest Products Technology; planning and analysis of forest engineering economics, research and development on reduced impact forest harvesting, research and development on forest products as raw material of bio-active, chemical, coloring and aromatic produces, development of added value of wood and non-wood industries.
c. Forest Resources Conservation; research and development on the management of conservation and protection forests, research and development on the endangered species management, research and development on wildlife breeding in captivity, research and development on eco-tourism, bio-prospecting.
d. Policy analysis; policy analysis on the increasing role of forestry private sectors, policy analysis on the development of small holder forestry and small capitalized industry in forestry sector, analysis on public policy in forestry sector.

The projects carried out by the Faculty of Forestry Bogor Agricultural University in last 3 years can be seen in Table 1.

Table 1. List of main projects conducted by Faculty of Forestry IPB in last three years

No.	Project Title	Sponsor	Year	Status
1.	Forest Fire	ITTO	1997-1999	Completed
2.	Forest Fire Training	ITTO	1998,1999	Completed
3.	Determination of forest management	PERHUTANI	1998-1999	Completed
4.	Identification of mangrove forest in 5 province	MOFEC	1998-1999	Completed
5.	Research on cutting technique of teak wood in relation to the wood properties	PERHUTANI	1998 - 1999	Completed

2. The Infrastructure of The Executing Agency

The Faculty of Forestry IPB occupies an area of about 3000 m^2 land, and 10,000 m^2 building facilities. There are three main buildings, comprise of classrooms, studios for practical works, seminar/discussion rooms, libraries, laboratories, rooms for staffs and administrative officers.

Faculty of Forestry IPB has totally 22 laboratories/studios are as follows:

a. Laboratories in the Department of Forest Management are forest inventory, forest planning, forest biometrics, forest protection, silviculture, forest ecology, forest influence, and socio-economics and policy.
b. Laboratories in the Department of Forest Products Technology are forest engineering, forest harvesting, solid wood, bio-composite, pulp and paper, wood engineering, forest products industry and management of forest industry.
c. Laboratories in the Department of Forest Resource Conservation are; wild life ecology, wild life breeding, environmental analysis, plants conservation, natural recreation and conservation area management.

Faculty of Forestry also has two field laboratories, namely Gunung Walat Educational Forest about 359 ha large, in Sukabumi area and arboretum in Darmaga Campus.

3. Budget

Budget of the Faculty of Forestry IPB in last three years can be seen in Table 2.

Table 2. Budget of the Faculty of Forestry IPB in last three years (million rupiah)

No.	Explanation	1999	1998	1997
1.	Personnel	259	259	259
2.	Duty Travel	168	168	165
3.	Capital Items	500	1000	1000
4.	Consumable Items	185	200	195

4. Personnel

The Faculty of Forestry IPB personnel in the forestry-related field are totally 142 staffs, consists of PhD degree are 40 persons (14 among them are Professor), Master degree are 77 persons, and Bachelor degree are 25 persons.

ANNEX B
CURRICULUM VITAE OF KEY STAFF

Annex B.1.
CURRICULUM VITAE
Prof. Dr. Ir. CECEP KUSMANA, MS

1. Name : Prof. Dr. Ir. Cecep Kusmana, MS

2. Title : Dean of Faculty of Forestry IPB

3. Office Address : Faculty of Forestry Bogor Agricultural University,
Kampus IPB Darmaga, P.O. Box 168 Bogor 16001, Indonesia
Tel. No. 62-251-621 677, Fax. No. 62-251-621 256

4. Education :
1993 : Doctor Degree on Forest Ecology, Kyoto University, Japan.
1998 : Master of Science on Natural Resources and Environmental Management, Bogor Agricultural University, Bogor, Indonesia.
1983 : Forest Engineer, Faculty of Forestry, Bogor Agricultural University, Bogor, Indonesia.

Annex B.2.

CURRICULUM VITAE

Prof. Dr. Ir. YUSUF SUDO HADI, M.Agr.

1. Name : Prof. Dr. Yusuf Sudo Hadi, M.Agr.

2. Personal Circumstances

   Place and date of birth : Bogor, November 13, 1952

   Nationality : Indonesian

   Office address : Department of Forest Products Technology,
   Faculty of Forestry, P.O. Box 168
   Bogor Agricultural University, Bogor, Indonesia.
   Tel. 62-251-621285
   Fax: 62-251-621256
   e-mail: yshadi@indo.net.id

3. Education :

   1991 : Doctor, Wood Science and Technology, IPB. Indonesia.
   1983 : Master of Agricultural Science, Wood Physics. Nagoya University. Japan.
   1977 : Bachelor. Forestry Science. IPB. Indonesia.

4. Working Experience :

1999 - 2003	:	Dean of Faculty of Forestry IPB.
1997 - 1999	:	Vice-Dean for Student Affairs Faculty of Forestry IPB.
1993 - 1997	:	Vice-Dean for Academic Affairs Faculty of Forestry IPB.
1993 - 1994	:	Curriculum Development Expert at Tanjungpura University. West Kalimantan, by ADB
1991 - 1993	:	Deputy of Forest Products Technology Department Faculty of Forestry, IPB.
1987 - 1992	:	Curriculum Development Expert at Ministry of Manpower, Sponsored by World Bank.
1978 - now	:	Teaching staff of Faculty of Forestry, IPB.

5. Professional experience :

1999. Presenting paper entitled Man made forest in Indonesia at Wood Machinery Affairs in Nagoya, Japan.
1999. Delegate and presenting paper at International Association of Wood Products Societies, International Conference on Effective Utilization of Plantation Timber, Chi-Tou City, Taiwan ROC.
1998. Director and Program Committee Member of the Fourth Pacific Rim Bio-Based Composites Symposium.
1998. Delegate and presenting paper at International Association of Wood Products Society, International Conference, Tokyo, Japan.
1998. Presenting paper at Annual Meeting of Japan Wood Research Society. Shizuoka. Japan.
1998. Presenting paper at Second International Wood Science Seminar. Serpong. Indonesia.

Annex B.3.
CURRICULUM VITAE
Dr. Ir. SUPRIYANTO, DEA

1. Name : Dr. Ir. Supriyanto, DEA
2. Personal Circumstances

Place and Date of Birth	:	Gombong. May 10, 1955
Nationality	:	Indonesian
Office Address	:	Laboratory of Silviculture, Department of Forest Management, Faculty of Forestry Bogor Agricultural University, Bogor, Indonesia.Tel: 62-251-624.065.

3. Education :

1980 : Graduated from Department of Forest Management, Faculty of Forestry, Gadjah Mada University, Yogyakarta.
1989 : Doctorate Degree on Plant Physiology and Forest Biotechnology, Faculty of Sciences, University Nancy I, Nancy, France.

4. Professional Experience :

1990 – Now	:	Head Laboratory of Silviculture, SEAMEO BIOTROP, Bogor, Indonesia.
1998	:	Reviewer of ACIAR Projects on Mycorrhiza for reforestation in P.R. China and Australia.
1997- 1999	:	Chairman of the ITTO Project PD 16/95 Rev. 2 (F): Forest Health Monitoring to Monitor the Sustainability of Indonesian Tropical Rain Forest.
1998	:	National Consultant for APFC-JIFPRO-MOFEC.
1985 – 1998	:	To give lecture in several Regional Training Courses on Biological Aspects of Silviculture at SEAMEO BIOTROP.

4. Publications :

2001 Supriyanto. Improved Forest Harvesting and Reduced Impact Logging in Asia Pacific Region. ITTO – MOF. PPD 19/99 Rev.1 (F).

1999 Supriyanto. The Effectiveness of Some Ectomycorrhizal Fungi in Alginate Beads in Promoting the Growth of Several Dipteocarp Seedlings. BIOTROPIA No.: 12: 59-77.

1998 1. Supriyanto, Mycorrhizae and Forest Plantation in Indonesia. International Workshop on Mycorrhizae, GuangZhou, China, 29 September-3 October 1998.

2. **Supriyanto** and Ujang S. Irawan, Fruiting-Body Induction of Some Ectomycorrhizal Fungi for Planting Stock Production of Some Industrial Forest Plantation Species (Submitted to BIOTROPIA, in press).

1997 1. Arum S. Wulandari, **Supriyanto,** E. Guhardja, M.A. Rifai, Y. Fakuara, N. Sukarno, Effect of thermal-schock on fruiting-body induction of *Scleroderma sinnamariense* associated with *Gnetum gnemon* seedlings.International Conference on Mycorrhizas in Sustainable Tropical Agriculture and Forest Ecosystems, Bogor, Indonesia, 26-30 October 1997.

2. **Supriyanto** and Ujang S. Irawan, Inoculation Techniques of Ectomycorrhizae. Seminar of Mycorrhizae, Ministry of Forestry - Overseas Development Administration/United kingdom, 28 - 29 February 1996, Balikpapan, East Kalimantan.

1996 Supriyanto, Conservation and utilization of mycorrhizal fungi genetic resources. SEAMEO FORUM Vol.3 No.2.

1995

1. **Supriyanto** and I. Setiawan, Application of mycorrhizae for improvement of Sungkai and Matoa growth . Proc. Int. Workshop on Biotechnology and Development Species for Industrial Timber Estates. LIPI.
2. Lukiwati, D.R. and **Supriyanto**, Performance of three VAM species from India for inoculum production in Centro and Puero. Proc. Int. Workshop on Biotechnology and Development Species for Industrial Timber Estates. LIPI.
3. Kusmiati and **Supriyanto**, Spore production of Glomus sp using dripped irrigation system. Proc. Int. Workshop on Biotechnology and Development Species for Industrial Timber Estates. LIPI.
4. **Supriyanto** , I. Setiawan and Kusmiati , **Manual** : Isolation, propagation and inoculation method of Vesicular - Arbuscular Mycorrhiza in Sungkai (*Peronema canescens*) and Matoa (*Pometia pinnata*). Published by LIPI - UNESCO.

1994

1. **Supriyanto**, I. Setiawan , M. Omom and H.Santoso. Effects of *Scleroderma Sp.* Obtained by protoplast culture on the growth of *S.selanica* and *S.leprosula* cuttings. Workshop of BIO-REFOF Expert Meeting, Kangar, Malaysia, 28 Nov. – 1 Dec.
2. **Supriyanto** and Sri Wilarso. Biotechnological input for seedling quality enhancement. Communication Forum on the Forest Research Results. Directorat of Higher Education. Bogor, 3-6 October.
3. **Supriyanto** and I. Setiawan. Ecological requirements for fruiting body induction of *Scleroderma columnare* mycorrhizal fungi. Second Symposium on Biology and Biotechnology of mycorrhizae and the Third Asian Conference on Mycorrhizae (ACOM III), Yogyakarta, 19 - 24 April.

1993

1. **Supriyanto**, I.Setiawan and M. Omon. Effects of *Scleroderma sp* and fertilizer on the growth of *Shorea mexistopteryx* Ridl. Seedling. Int. Workshop on Bio-Re/afforestation in the Asian - Pacific Region, BIO-REFOR / IUFRO SPDC- JAPAN. Yogyakarta, 20 - 23 Sept.1993.
2. Supriyanto. Utilization of paper sludge for culture medium and organic fertilizer. Agrotek. Vol. 1, No. 1

1992

1. Tjitrosemito , S. And **Supriyanto**. The Establishement of timber estate - transmigration scheme on areas of *Imperata cylindrica.* National Seminar on Status of Silviculture in Indonesia. Yogyakarta, 27 -29 April.
2. **Supriyanto**, I. Setiawan and M. Harahap. Quality enhancement of forest tree seedlings through mycorrhizal fungi inoculation. National Seminar on Status of Silviculture in Indonesia. Yogyakarta, 27 -29 April.

1991 **Supriyanto**, M. Turjaman, Suciatmih and S. Prajadinata. Status of mycorrhizal research in Indonesia . Second Asian Conference on Mycorrhiza (ACOM II), Chiang Mai, Thailand.

1991 Setiawan , S. , M.I. Umboh and **Supriyanto**. Growth of Accacia mangium obtained by tissue culture. BIOTROPIA no. 4. Pp. 1-8.

1989. **Supriyanto**. Micropropagation of Pinus nigra and Pinus silvestris : application to their hybride interspecific. PhD disertation on Plant Physiology and Forest Biotechnology. Faculty of Science , University of Nancy I, Nancy, France.

1988 **Supriyanto** and R.Rohr. Use of selected mycorrhizal fungi to facilitate the transfer to soil of Scots pine axenic plantlets. Int. Symp. On Forest Tree Physiology. Nancy. France.

Annexed B.4.
CURRICULUM VITAE
Prof. Dr. ELIAS

1. Name : Prof. Dr. Elias
2. Personal Circumstances

   Place and Date of Birth : Ketapang Indonesia, September 2, 1956.

   Nationality : Indonesian.

   Office Address : Department of Forest Products Technology, Faculty of Forestry , P.O. Box 168 Bogor Agricultural University,Bogor,Indonesia. Phone : 62-251-621285 E-mail : el-ros@bogor.wasantara.net.id

3. Education :

   1980 – Graduated from faculty of Forestry Bogor Agricultural University, Bogor Indonesia.

   1989 : PhD on Forest Harvesting and Opening Up Forest, faculty of Forestry, Munich University, Germany.

4. Professional Experience :

   2002 - now : Professor at the Faculty of Forestry, Bogor Agricultural University, specialized in forest harvesting and opening up forest.

   1990 - now : Lecturer of Post-Graduate Study in the Bogor Agricultural University

   1990 - now : International consultant in Forest Harvesting and Forest Management

5. Publications :

Elias, 2002. Reduced-Impact Logging. Book 1 & 2. IPB Press, Bogor, Indonesia, 350 p.

Elias, G. Applegate, K. Kartawinata, Machfudh and A. Klassen.2001. Reduced-Impact Logging Guidelines for Indonesia. CIFOR, ITTO, Mac Arthur Foundation, Dept. of Forestry of Indonesia and PT. Inhutani I, Bogor, Indonesia 144 p.

Elias, 1999. Reduced-Impact Timber Harvesting in the Indonesian Selective Cutting and Planting System. IPB Press, Bogor, Indonesia, 76 p.

Elias, 1998. Reduced-Impact Timber Harvesting in the Tropical Natural Forest in Indonesia. Forest Harvesting Case Study 11, Food and Agricultural Organization of the United Nation, Rome, Italy, 40 p.

Elias, R.A. Ulbricht and Setyopranarko, 1997. Reduced-Impact Tractor Logging Guideline for East Kalimanatan. German Technical Cooperation and Ministry of Forestry of the Republic of Indonesia, 73 p.

Elias, 1997. Mode of Water Transportation of Timber in the Tropical Natural Forest in Indonesia. IPB Press, Bogor, Indonesia. 34 p.

Elias and R.A. Ulbricht, 1997. Reduced-Impact Wood Harvesting in the Frame of FAO-Code: A Concept for East Kalimantan, Indonesia. A paper presented in International IUFRO/FAO Seminar, Thimphu , Bhutan, 20 – 28 Oct., 7 p.

Elias, 1997. Conventional Versus Reduced-Impact Timber Harvesting in Tropical Natural Forest in Indonesia. A paper submitted to XI World Forestry Congress, 13-20 Oct., Antalya, Turkey, 6 p.

Elias, 1996. Field Research Technique and Permanent plot Establishment in Tropical Natural Forest. Paper presented in the International Research Training-Seminar on Reduced-Impact Wood Harvesting and Natural Forest Management, 15-27 July, Bogor and Balikpapan, Indonesia. 24 p.

Annex B.5.
CURRICULUM VITAE
Mr. BEDYAMAN TAMBUNAN

1. Name : Mr. Bedyaman Tambunan
2. Personal Circumstances

   Place and Date of Birth : Balige, 30 Nopember 1942

   Nationality : Indonesia

   Office Address : Department of Forest Products Technology, Faculty of Forestry , P.O. Box 168 Bogor Agricultural University, Bogor, Indonesia.
   Tel. 62-251-621285
   Fax: 62-251-621256
   e-mail: jthh-ipb@indo.net.id

3. Education :

   1969 graduated from Department of Forest Products Technology, Faculty of Forestry, Bogor Agricultural University

5. Publications :

B. Tambunan. 1998. The Effect of Biodelignification of Wood Chips on MDF Properties. The Fourth Pacific Rim Bio-Based Composites Symposium Proceedings, November 2-5, 1998. Bogor. Indonesia.

M.Y.Massijaya, **B.Tambunan**, Y.S.Hadi, E.S.Bakar. 1999. Development of Composite Boards Made from Wood Waste and Plastics. 2nd Annual Meeting of Indonesian Wood Research Society. Jogjakarta.

5. Professional experience :

1969 - now : National consultant of Forest Industry and Forest Concession.
1983 - 1987 : Vice-Dean of Faculty of Forestry, Bogor Agricultural University.
1999 - now : Adviser of PT. PERUM PERHUTANI.

Annexe B.6.
CURRICULUM VITAE
Dr. Ir. MUH. YUSRAM MASSIJAYA, MS

1. Name : Dr. Ir. Muh. Yusram Massijaya, MS
2. Personal Circumstances

   Place and Date of Birth : Ujung Pandang, November 24, 1964.

   Nationality : Indonesian

   Office Address : Bio-Composite Laboratory, Forest Products Technology Department, Faculty of Forestry, Bogor Agricultural University. , Bogor, P.O. Box 168 Indonesia.
   Tel. 62-251-621285 Fax: 62-251-621256
   e-mail: jthh-ipb@indo.net.id
3. Education :

   1987: Graduated from Forest Products Technology Department, Faculty of Forestry, Bogor Agricultural University.
   1992: Master Degree on Wood Science, The Graduate School of Bogor Agricultural University.
   1997: PhD on Bio-Material Science, Faculty of Agriculture, The University of Tokyo, Japan.
4. Professional Experience :

   1997- now : Project Leader on Development of Composite - board made of wood-waste and plastics.
   1997- now : Research Team Member on utilization of oil-palm tree.
   1987- now : Lecturer in Bio-composite, wood physics, wood mechanics, sawn timber technology, at Faculty of Forestry Bogor Agricultural University, Bogor, Indonesia.
   1987- now : Lecturer in Bio-composite, wood physics, wood mechanics, Faculty of Forestry, Winaya Mukti University, Bandung, Indonesia.
   1997- now : National Consultant on Wood technology.
5. Publications and Research Experience (Last 3 years):

Massijaya, M.Y. 1999. Development of Composite Boards Made from Office-waste Paper and Wood Particles. Abstract. The 49 th Annual Meeting of Japan Wood Research Society. Tokyo, Japan.

Massijaya, M.Y. and M. Okuma, 1998. Development of Composite Boards Made from Waste Newspaper and Wood Particles (II): Optimization of Resin Level. Proc. The Fourth Pacific Rim Bio-Based Composites Symposium. Bogor, Indonesia. Nov.2-5.

Massijaya, M.Y. and M. Okuma,1998. Development of Composite Boards Made from waste Newspaper and Wood Particles (III): Resin Distribution between Waste Newspaper and Wood Particles. Proc. Int. Wood Sci. Seminar. Serpong, Indonesia. Nov.6-7.

Massijaya, M.Y. and M. Okuma, 1996. Development of Board Made from Waste Newspaper (I): Production and fundamental properties of waste Newspaper boards. Journal of the Japan Wood Research Society. Vol. 42, No. 42, p.123-1249.

Annex B.7.
CURRICULUM VITAE
Dr. MASATOSHI SATO

1. Name : Dr. Masatoshi Sato
2. Personal Circumstances

   Place and Date of Birth : Tokyo, March 24, 1952.

   Nationality : Japanese

   Office Address : Department of Global Agricultural Science,
   Graduate School of Agricultural and Life Sciences
   The Tokyo University
   1-1-1, Jayoi, Bunkyo-ku, Tokyo, 113-8657, Japan
   Tel.: + 81-03-5841-7507, Fax.: + 81-03-5684-0299
   e-mail: amsato@hongo.ecc.u-tokyo.ac.jp

3. Education :

   1972 – 1976: Graduated from Faculty of Agriculture, Department of Forest Products, Tokyo University of Agriculture and Technology.
   1976 – 1978: Finished the Post- Graduate Course at Tokyo University,Receiving the Degree of Master of Agriculture (Faculty of Agriculture, Department of Forest Products).
   March 1987: Took the Doctor degree of Agriculture at Tokyo University.

4. Work Experience :

   April 1978- March 1989 : Research Scientist, Building Research Institute, Ministry of Construction, Japan
   March 1989- December 1996 : Senior Research Scientist, Building Research Institute, Ministry of Construction, Japan.
   December 1996 – March 1998 : Head of Division, The Tokyo University, Japan.
   March 1998 – Now : Associate Professor, The Tokyo University, Japan.

5. Publications :

Masatoshi Sato, 1993. Non-Destructive Evaluation of Timber in United States, The 6 th Durability of Building Materials and Components. Vol.2: 1229-1235.

Masatoshi Sato, *et.al.*,1993. Principle Guide for Construction Survey, Diagnosis and repair of Buildings, AIJ.

Masatoshi Sato, 1990. Guideline of Designing the Service Life -Time of Wooden dwellings, International Timber Engineering Conference, Vol. 3: 760-764.

Masatoshi Sato, 1989. Nailed-Glued Joints and Strength Property of Plywood Box Beam. Wood Industry, Vol.:38 – 11, 13-19.

Masatoshi Sato, *et.al.*,1988. Principle Guide for service Life Planning of Buildings, AIJ.

Masatoshi Sato, *et.al.*, 1988. Standard for Structural Calculation of Timber Structure. AIJ.

Masatoshi Sato, 1986. Study on Biological Deterioration for Wooden Construction Dwelling. Wood Preservation, Vol.: 12-2, 21-30.

Masatoshi Sato, 1986. Strength of Beam-Column Connection for Glued-Laminated Timber. Report of Ann. Con. of AIJ, Aug.

Annex B.8.
CURRICULUM VITAE
Ir. BANJAR YULIANTO LABAN, MM

1. Name : Ir. Banjar Yulianto Laban, MM
2. Personal Circumstances

Place and Date of Birth	:	Banjarmasin. July 20, 1953
Nationality	:	Indonesian
Office Address	:	Director of Forest Product and Marketing, Director General of Forest Product Development Manggala Wanabhakti Building, Gatot Subroto road Jakarta

3. Education :

1979 : Graduated from Department of Forest Management, Faculty of Forestry, Gadjah Mada University, Yogyakarta.
1997 : Magister Management, University of Satyagama, Jakarta

4. Professional Experience :

2002 - Now	: Director of Forest Product and Marketing, Ministry of Forestry Republic of Indonesia
1999 - 2002	: Head of Lore Lindu National Park, Sulawesi
1998	: Head of National Resource Conservation Region VI of Sulawesi, Palu

6. Publications :

2000	Potential illegal logging in Lore Lindu National Park
2000	Implementation of environmental protection and conservation of biodiversity in Lore Lindu National Park based on community-based management

Annex B.9.
TERMS OF REFERENCE FOR THE NATIONAL EXPERTS AND TECHNICIANS

1. Project Manager

1.1. Qualifications and experience

a. MSc on wood processing with 15 years experience, or Bachelor on wood processing with 20 years experience.
b. Experience in planning in managing forest concession holder
c. Experience in forestry consultant

1. 2. Responsibilities

a. To organize the meeting for the smoothness of project execution (to develop the work plan, to organize the Project Executing Agency meetings, Scientist meetings, to organize the fieldwork)
b. To monitor the project execution, program and budget implementation.
c. To conduct and to implement the networking among the institutional concerned.
d. Period of assignment will be 3 (three) years.

2. Assistant Project Manager on Bio-composite

2.1. Qualifications and experience

a. PhD on Bio-composite or M.Sc with 5 years experience on Wood technology and Wood Processing
b. Three years experience in research management
c. Experience to be a project leader.

2.2. Responsibilities

a. To assist the project manager for the project execution, program development and implementation on Bio-composite and Wood processing aspects.
b. To co-ordinate the scientists for fieldwork and laboratory work.
c. To co-ordinate scientist in preparing reports and publications
d. Period of Assignment 3 years.

3. Assistant Project Manager in Logging System

3.1. Qualifications and experience

a. PhD on forest harvesting and opening-up forest , or M.Sc with 15 years experience in forest harvesting
b. Experience in implementing Reduced-Impact Logging System.
c. Experience to be a project leader.

3.2. Responsibilities

a. To assist the project manager for the project execution, program development and implementation on logging system of small –diameter logs.
b. To co-ordinate the scientists for fieldwork and laboratory work.
c. To co-ordinate scientists in preparing reports and publications
d. Period of assignment 3 years.

4. Assistant Project Manager in Silviculture and Biodiversity

4.1. Qualifications and experience

a. PhD on Silviculture or Plant Physiology
b. 15 years experience in research management
c. Experience to be a project leader

4.2. Responsibilities

a. To assist the project manager for the project execution, program development and implementation on silviculture aspects.
b. To co-ordinate the scientists for fieldwork and laboratory work.
c. To co-ordinate scientists in preparing reports and publications
d. Period of assignment 3 years.

5. Dendrologist / Tree Taxonomist

5.1. Qualifications and experience

a. PhD on dendrology 2 years experience, or M.Sc on plant taxonomy with 5 years experience, or Undergraduate degree with 15 years experience in taxonomy or dendrology.
b. Experience in publishing books on flora of Indonesia is preferable.

5.2. Responsibilities

a. To collect and to identify the herbarium specimens.
b. To produce reports and publications on list of species, species diversity.
c. Responsible to the Assistant Project Manager in silviculture.
d. Period of assignment be 9 months

6. Computer Scientist.

6.1. Qualifications and experience

a. PhD on computer science with 2 years experience in computer programming, or
b. MSc on Forest Biometrics and experience in programming and database or Management Information system.

6.2. Responsibilities

a. To produce an assessable database of small-diameter logs.
b. To assist the scientist in producing the analyzed data for reports and publications.
c. Responsible to the Assistant Project Manager on Silviculture.
d. Period of Assignment will be 13 months.

7. Wood Technologist

7.1. Qualifications and experience

a. PhD. on wood technologist with minimum 2 years experience.
b. M.Sc on wood technologist with 5 years experience.

7.2. Responsibilities

a. To conduct the research and to compile the fundamental wood properties of small-diameter logs.
b. To produce the report and publications.
c. Responsible to Assistant Project Manager on Bio-composite.
d. Period of Assignment will be 16 months.

8. Bio-composite Specialist

8.1. Qualifications and experience

PhD on bio-composite technology, 5 years experience on bio-composite technology.

8.2. Responsibilities

a. To conduct the research on bio-composite product
b. To produce reports and publications.
c. To assist the training course.
d. Responsible to Assistant Project Manager in Bio-composite and Processing Technology
e. Period of assignment will be 16 months.

9. Logging Specialist

9.1. Qualifications and experience

a. PhD on logging with 2 years experience, or
b. M.Sc on logging operation with 5 years experience.

9.2. Responsibilities

a. Responsible to Assistant Project Manager in Logging.
b. To produce planning map for logging operation.
c. To plan an alternative logging system.
d. To conduct the selected logging system.
e. To monitor the logging operation and to determine the appropriate logging system for Small diameter logs.
f. To produce reports and publications.
g. Period of assignment 16 months.

10. Forest Engineering Specialist

10.1. Qualification and Experience

MSc on forest engineering, 5 years experience in opening-up forest operation

10.2. Responsibilities

a. To plan and to implement the forest infrastructure (road, building, etc.)
b. To produce reports and publications.
c. Responsible to Assistant Project Manager in Logging.
d. Period of assignment will be for 2 months.

11. Wood Adhesive Specialist

11.1. Qualification and Experience

a. Ph.D. on adhesion and adhesive, 2 years experience.
b. M.Sc on adhesion and adhesive, 5 years experience.

11.2.Responsibilities

a. To conduct research on adhesive properties on various product components.
b. To produce reports and publications.
c. Responsible to Assistant Project Manager in Bio-composite .
d. Period of assignment will be for 16 months.

12. Technician on log grading (Log Grader)
12.1. Qualification and Experience

Five years experience in log grading

12.2. Responsibility

a. To evaluate the log grade.
b. To produce report data of log grade.

13. Technician on log scaling (Log Scaler)
13.1. Qualification and Experience

Five years experience in log scaling

13.2. Responsibility

a. To scale and to determine log volume
b. To produce report data of log scale and volume.

14. Technician on sawn timber grading (Sawn Timber Grader)
14.1.Qualification and Experience

Five years experience in sawn timber grading

14.2.Responsibility

a. To evaluate the sawn timber grade
b. To produce report data on sawn timber grade.

15. Technician on sawn timber drying (Sawn Timber Drier)
15.1.Qualification and Experience

Five years experience in sawn timber drying.

15.2.Responsibility

a. To dry and evaluate the quality of dried sawn-timber
b. To produce report data on quality of dried sawn-timber

Annex B.10.
TERMS OF REFERENCE FOR THE INTERNATIONAL EXPERT

1. Expert in Wood Science.
1.1. Qualification and Experience

PhD in Wood Science, 5 years experience.

1.2. Responsibility

a. To assist the training course.
b. To assist the Project manager and Assistant Project Manager in Wood Sciences (Wood Physics, Wood Chemistry, Wood Mechanics)
c. Period of assignment will be during the period of one training course (10 days).

2. Logging Specialist
2.1. Qualification and Experience

PhD on logging with 5 years experience

2.2. Responsibility

a. To assist the training course.
b. To assist the project manager and the Assistant Project Manager in Logging.
c. Period of assignment will be during the period of one training course (10 days).

3. Bio-composite Specialist
3.1. Qualification and Experience

PhD on bio-composite technology, 5 years experience on bio-composite technology.

3.2. Responsibilities

a. To assist the training course.
b. To assist the Project Manager and the Assistant Project Manager on Bio-composite.
c. Period of technical assistance will be during the period of one training course (10days).

4. Wood Adhesive Specialist
4.1. Qualification and Experience

PhD in adhesion and adhesive, 5 years experience.

4.2.Responsibilities

a. To assist the training course
b. To assist the Project Manager and the Assistant Project Manager in Bio-composite.
c. Period of technical assistance will be during the period of one training course (10 days)

5. Expert on Wood technology: Wood Properties related to Wood Processing
5.1. Qualification and Experience

PhD in Wood Technology, 5 years experience.

5.2.Responsibility

a. To assist the training course
b. To assist the Project Manager and the Assistant Project Manager in Bio-composite.
c. Period of technical assistance will be during the period of one training course (10 days).

Annex C
LETTER OF INTENT

Annex C.1.
LETTER OF INTENT OF THE UNIVERSITY OF TOKYO

THE UNIVERSITY OF TOKYO
1-1-1 Yayoi, Bunkyo-ku, Tokyo, 113-8657, JAPAN
FAX: +81-3-5684-0299, E-mail: amsato@hongo.ecc.u-tokyo.ac.jp

LETTER OF INTENT

This letter serves to indicate the intention of the Department of Global Agriculture and Agricultural Life Science, the University of Tokyo, Japan, hereby aggress to provide support to the project and will do necessary efforts to seek the funds for possible technical and financial assistance from the Government of Japan, to establish a joint cooperation with Faculty of Forestry, Bogor Agricultural University, Bogor Indonesia on the research concerning UTILIZATION OF SMALL-DIAMETER LOGS FROM SUSTAINABLE SOURCES FOR BIO-COMPOSITE INDUSTRY.

Faculty of Forestry, Bogor Agricultural University, Bogor Indonesia will submit the research project proposal to the International Tropical Timber Organization (ITTO), for the additional funding, through the Indonesia Authority.

The project is expected to enhance the mutual cooperation between Tokyo University and Bogor Agricultural University on wood technology and wood industry in view of promoting Sustainable Forest Management. Therefore, the Department of Global Agriculture and Agricultural Life Science, the University of Tokyo, Japan, will explore all possibilities to support the implementation of the above mention research project.

Tokyo, July 9, 1999

佐藤雅俊

Dr. Masatoshi Sato

Annex C.2.
LETTER OF INTENT OF THE ALAS KUSUMA GROUP

Alas Kusuma Group
Jln. Balikpapan Raya 14
Jakarta

Phone : 3459421 (7 Lir
Fax : 361675
Telex : 45304 ALS JK

LETTER OF INTENT

This letter serves to indicate the intention of Alas Kusuma Group, Indonesia, hereby aggress to provide support to the project and will do necessary efforts to establish a joint cooperation with Faculty of Forestry, Bogor Agricultural University. Bogor Indonesia on the research concerning UTILIZATION OF SMALL-DIAMETER LOGS FROM SUSTAINABLE SOURCES FOR BIO-COMPOSITE INDUSTRY.

Faculty of Forestry, Bogor Agricultural University, Bogor Indonesia will submit the research project proposal to the Internasional Tropical Timber Organization (ITTO).

The project is expected to enhance the mutual cooperation between Alas Kusuma Group and Faculty of Foresty, Bogor Agricultural University on promoting Sustainable Forest Management. Therefore Alas Kusuma Group, Indonesia, will explore all possibilities to support the implementation of the above mention research project.

Jakarta, August 18, 1999

Forest General Manager

Alas Kusuma Group
JAKARTA-INDONESIA

Annex C.3.
LETTER OF INTENT OF THE BUMI RAYA UTAMA GROUP

BUMI RAYA UTAMA GROUP

Forestry ■ Wood-based Industry ■ Agro Business ■ Trading ■ Mining ■ Chemical ■ Real Estates ■ Shipping

LETTER OF INTENT

This letter serves to indicate the intention of Bumi Raya Utama Group, Indonesia, hereby aggress to provide support to the project and will do necessary efforts to establish a joint cooperation with Faculty of Forestry, Bogor Agricultural University. Bogor Indonesia on the research concerning UTILIZATION OF SMALL-DIAMETER LOGS FROM SUSTAINABLE SOURCES FOR BIO-COMPOSITE INDUSTRY.

Faculty of Forestry, Bogor Agricultural University, Bogor Indonesia will submit the research project proposal to the Internasional Tropical Timber Organization (ITTO).

The project is expected to enhance the mutual cooperation between Bumi Raya Utama Group and Faculty of Foresty, Bogor Agricultural University on promoting Sustainable Forest Management. Therefore Bumi Raya Utama Group, Indonesia, will explore all possibilities to support the implementation of the above mention research project.

Jakarta, 9th August 1999

Pintarso Adijanto
Director

Annex C.4.
ELEMENT FOR CALCULATING BUDGET

1. International experts; The Japanese scientist (5 expertise) will be invited to give lecture for the Indonesian scientist. The duration of the service will be 10 days for each training course, with proposed DSA at the amount of US $ 142/day/scientist for Jakarta and US $ 40/day/scientist for Bogor and field study. Round trip ticket (Tokyo-Jakarta-Tokyo) will be at the amount of US $ 1,350/Scientist.

2. The project key staffs will be consisted of project manager (1 person), assistance project managers (3 persons), treasurer and secretary (1 person). The project manager and assistance project manager does not received any monthly salary, but they will be paid for their DSA in Jakarta and in the field based on UN DSA for Jakarta is US $ 142/day and for fieldwork is US$ 40/day. They will work for 36 months. The secretary or treasurer will be recruited from non-faculty members; his/her proposed salary will be US $ 500/month.

3. Indonesian scientists; The Indonesian scientist will be recruited by the project to conduct the proposed activities of the project. They are consisting of sylviculturist, logging specialist, wood technologist, bio-composite specialist, computer scientist, forest engineering specialist, adhesion specialist. All scientists will be paid based on the UN DSA rate in the field, US $ 40/day. They will work in certain period of time determined by the project activities.

4. A public accountant will be invited for financial auditing every 12 months (at the end of fiscal year). The proposed salary of public accountant will be at the amount of US $ 3,500/auditing.

5. Air ticket :
   Tokyo - Jakarta – Tokyo = US $ 1,350/person.
   Jakarta - Pontianak – Jakarta = US $ 350/person

6. DSA (perdiem) for field work = US $ 40/day.

Annex D
BRIEF HISTORY
PROJECT PD 40/00 REV.4 (I)
UTILIZATION ON SMALL – DIAMETER LOGS
FROM SUSTAINABLE SOURCE FOR BIO-COMPOSITE PRODUCTS

Project proposal entitled Utilization on Small-diameter Logs from Sustainable Source for Bio-composite Products is submitted by the Faculty of Forestry, Bogor Agricultural University, Indonesia. The project was revised in considering all the recommendations of Indonesian Expert Meetings, the ITTO Expert Panel Meetings and ITTC Meetings. Intensive consultation to DR. Hwan Ok Ma was also done in every chance of his visit to Indonesia or by e-mail. Finally the Project was approved by the ITTC meeting. One and half year (18 months) after approval, there was no budget come from the ITTO.

During the 32th ITTC meeting in Bali (2002), Faculty of Forestry, Bogor Agricultural University, sent DR. Yusram Massijaya, to participate in the meetings. He met DR. Douglas Pattie and CFC Representative. During the meetings, They recommended to hire an international consultant to improve the proposal regarding the CFC requirements.

Finally, the CFC sent DR. Ron Anthony (CFC Consultant) to Bogor Agricultural University to discuss about the project proposal improvement. One of the important CFC's requirements is the regionalist project basis. It means the enrolment of the Malaysia, Philippines, Papua New Guinea might be considered. During the project consultation, DR. Ron Anthony visited also the FRIM (Malaysia), STA (Sarawak Timber Association), FPRDI (Forest Product Research and Development Institute) Philippines's, and FIA (Forest Industries Association) of Papua New Guinea, in order to improve the proposal quality.

The Thirty–Sixth Meeting of the Executive Board, in Amsterdam 13 to 15 October 2003, the CFC approved that Project on Utilization of Small Diameter -Logs from Sustainable Source for Bio-composite Product to be financed under the Second Account of the CFC amounting to USD 600,000, under the Project code CFC/ITTO/62. Appraisal and recommendation of the Managing Director to the Executive Board was made.

The project components consists of 9 components, in which the CFC would like to finance component 1, 4, 5, 6, 7, 8 and 9, while component 2, and 3 is recommended to be finance by the PEA or ITTO.

To finance the component 2 and 3, Dr. Hwan Ok Ma suggested to ask the ITTO through the Government of Indonesia. Therefore the proposal must be submitted as soon as possible and proposed to the ITTO in December 2004, using the ITTO format. Faculty of Forestry Bogor Agricultural University made two proposal formats, those are the CFC format, and the ITTO format.

Prior to the first disbursement of the fund from the CFC, it is recommended that the project implementation agreements be signed between the Faculty of Forestry (PEA) and each collaborating institution (Malaysia, Sarawak, Philippines, and Papua New Guinea).

Agreement with the Philippines was signed, while with the other institution is being processed in 30 November 2004, The Ambassador Ali Mchumo (Managing Director of The CFC) and Mr. Caleb Dengu (Project Manager of The CFC), accompanied by Mr. Meri B. Simorangkir (The Representative of The Ministry of Foreign Affairs Republic of Indonesia) visited the Faculty of Forestry Bogor Agricultural University to discus about The Project Progress.

The meeting conclude that :

1. The Faculty of Forestry has to arrange as soon as possible all the necessary administrative matter including the proposal to the ITTO for the ITTO contribution regarding the project component 2 and 3.
2. In case of the difficulty in getting the partnership research from Malaysia, Sarawak, Philippines, and Papua New Guinea, then Faculty of Forestry Bogor Agricultural University is authorized to find out the other institution from those countries.

The meeting with Dr. Hwan Ok Ma, the ITTO Assistant Project Manager, on Monday

11 April 2005 at Bogor, recommended the following points :

1. Project should be implemented as soon as possible only with the CFC funding, without the ITTO fund.
2. Faculty of Forestry needs to modify the project document by focusing on the project component number 1,4,5,6,7,8,9 to be sponsored by the CFC, and the Faculty of Forestry submit to this revised project document (Rev.4). The revision of proposal is submit to the ITTO by 20 April 2005.
3. Faculty of Forestry should send this revised proposal to the KLN, Ministry of Forestry, and prepare simple Power Point presentation (about 7 min) presented at the up coming session of the CFC in June 2005 by the Indonesia delegation.

Project Secretary,

Dr. Supriyanto

Annex : D1

SYNTHESIZE OF BIO-COMPOSITE RESEARCHES CONDUCTED AT BIO-COMPOSITE LABORATORY FACULTY OF FORESTRY, BOGOR AGRICULTURAL UNIVERSITY UNDER SUPERVISION Mr. BEDYAMAN TAMBUNAN PERIOD : 1997 - 2001

A. Oriented Strand Board (OSB)
   1. Steam treatment increased the fundamental properties of OSB. At longer time of steam treatment decreased moisture content, thickness swelling and water absorption. Moreover, improved Modulus of Rupture (MOR), Modulus of Elasticity (MOE), internal bond, and screw holding.
   2. The optimum steam treatment was 2 hours for OSB made of Weru wood (*Albizia procera* Benth.).
   3. Strand slenderness ratio of 117 produced the best fundamental properties of OSB.
   4. Face and core layers orientation influenced significantly MOR and MOE of OSB made of *Pinus merkusii* Jungh et de Vries, *Hevea brasiliensis* Muell. Arg, *Acacia mangium* Willd. However, face and core layers orientation did not influence moisture content, thickness swelling and internal bond.
   5. OSB made of *Hevea brasiliensis* Muell. Arg, performed better fundamental properties compared to those of *Acacia mangium* Willd. and *Pinus merkusii* Jungh et de Vries.

B. Medium Density Fiberboard (MDF)
   1. Resin treatments to MDF influenced significantly MOE, MOR, thickness swelling, internal bond, and moisture content. However, it did not influence face screw withdrawal strength.
   2. Energy consumption of pulp production for MDF made of *Acacia mangium* Willd were lower compared to those of *Gmelina arborea*. However, the yield were relatively same.
   3. Increasing of mold incubation time to the chips for MDF decreased significantly energy consumption and the yield of the pulp.
   4. Fundamental properties of MDF made of *Acacia mangium* Willd were higher compared to those of *Gmelina arborea*.
   5. Increasing of mold incubation time to the chips for MDF increasing tensile strength parallel to surface, MOR, MOE. However, it did not influence water absorption, thickness swelling, and internal bond.

C. Laminated Veneer Lumber (LVL)
   1. Number of plies and veneer joint type influenced significantly to the fundamental properties of LVL.
   2. LVL made of *Paraserianthes falcataria L. Nielsen* was able to fulfill Japanese Standard JAS 1494 – 1991.

Annex : D2

SYNTHESIZE OF BIO-COMPOSITE RESEARCHES CONDUCTED AT BIO-COMPOSITE LABORATORY FACULTY OF FORESTRY, BOGOR AGRICULTURAL UNIVERSITY

BY Dr. YUSRAM MASSIJAYA

PERIOD : 1993 - 2001

Bio-composite is including a wide range of products. The research results concerning composite products made of paper waste, wood waste and plastics, Com-ply, and LVL are listed below. These researches were conducted in The University of Tokyo Japan and in The Faculty of Forestry, Bogor Agricultural University, from 1993 – 2001.

A. Composite products made of paper waste
   1. Urea formaldehyde (UF), phenol formaldehyde (PF), and Isocyanine (IC) resins are suitable for waste paper (newspaper, office paper, advertisement paper) board production. However, IC resin performs the best results compared with PF and UF resins. Because of the determination of dimensional stability, these kind of boards only suitable for interior application.
   2. Particleboard waste newspaper were sufficiently strong in bending properties (MOR, MOE). However, the internal bond and dimensional stability (thickness swelling and water absorption) should be improved.
   3. Relationship between mixing waste newspaper particles with wood particles in bending properties performed maximum curve. Wood particle core type boards yielded superior bending properties compared with other type boards. The optimum wood particle mixing level was in a range of 40% - 60%. Evaluated to the standard value for 18-type set forth by JIS A 5908, all the samples proved superior.
   4. Newspaper Waste boards and composite boards very potential to substitute the commercial wood particleboard.

B. Com-ply made of small diameter fast growing tree species
   1. Com-ply made of small diameter of fast growing tree species (*Acacia mangium* Willd, *Eucalyptus* sp, and *Paraserianthes falcataria* L. Nielsen) performed satisfy the physical properties.
   2. Better quality of com-ply if was resulted its core made of *Acacia mangium* Willd, *Eucalyptus* sp, and *Paraserianthes falcataria* L. Nielsen, respectively.
   3. Increase of veneer thickness improved internal bond of com-ply significantly.
   4. Utilization of thicker veneer improved significantly MOR in length direction. However, it decreased significantly MOR in width direction.
   5. Better quality com-ply was resulted from com-ply bonded by MF, PF, and UF, respectively.
   6. Board structure influenced significantly the fundamental properties of com-ply.

C. Composite boards made of wood waste and plastics
   1. The fundamental properties of composite boards made of wood waste and plastics (polyethylene, polystyrene, and polypropylene) were good enough for interior application.
   2. The optimum composition of wood and plastics were 90 % wood and 10%.
   3. Utilization of plastics improved the dimensional stability of composite boards.
   4. Flake type wood particle which mixed with polystyrene and bonded by MF performed the best results.
   5. Overlaying with veneer improved the fundamental properties of the composite.

D. Laminated Veneer Lumber (LVL)
   1. LVL made of thin veneer performed better dimensional stability compare to those of thicker veneer.

2. Utilization of jointed veneer by scarf joint performed better LVL as compared to the those of lap joints and butt joints.
3. Utilization of jointed veneer will reduce the bending properties. Scarf joint, lap joint, and butt joint reduced 3%, 9%, and 15% bending properties, respectively.

Annex : D3

SYNTHESIZE OF REDUCED IMPACT LOGGING RESEARCH AT FOREST HARVESTING LABORATORY DEPARTMENT OF FOREST PRODUCTS TECHNOLOGY FACULTY OF FORESTRY, BOGOR AGRICULTURAL UNIVERSITY UNDER SUPERVISION OF Dr. ELIAS. PERIOD : 1992 – 2000

In order to minimize the negative impact during the harvest of SDL, RIL will be implemented. Many RIL methods and technologies have been developed in Asia Pacific tropical natural forests since 1990 through the implementation of RIL studies and projects.

Faculty of Forestry, Bogor Agricultural University have been conducted several researches an reduced Impact Logging (RIL).

The research results indicated that :

1. Conventional logging caused severe damage on residual stand (35 – 60 %), and opened areas (15 –35 %). The research was conducted in residual stand at Dipterocarp Forest in East Kalimantan (1992 – 1995).
2. Reduced Impact Logging was able to decrease the damage until 50 %, namely residual stand from 30 % to 15 %, opened area from 15 % to 7 %, without significant decrease of the Forest Productivity the research was conducted at East Kalimantan (1992 – 1996).
3. After RIL implementation, the regeneration stock is considered inefficient, therefore the enrichment planting is not necessary, the research was conducted at East and West Kalimantan, in 1998 – 2000 after the implementation of RIL method in Indonesian selective cutting and replanting system.
4. The RIL technology is economically profitable in term of the future Forest Production, since the RIL is able to reduce the stand damage.

Annex E1
TRAINING COURSE ON BIO-COMPOSITE FOR THE INDONESIAN, MALAYSIAN, AND PNG SCIENTISTS

Background :

Transfer technology on utilization of small-diameter logs (SDL) for bio-composite to the Indonesian, Malaysian, and PNG scientists will be important activities to disseminate and develop the technique and invention on bio-composite technology using small-diameter logs.

The training course will be conducted in Bogor, Indonesia for ten (10) days. Invited trainers consists of Japanese scientists and others related field studies.

Objective :

a. To develop the new concept and application of bio-composite technology in producing countries.
b. To discuss new aspects of bio-composite industry coming from sustainable sources.
c. To disseminate the research results of silviculture, Reduced Impact Logging (RIL), and Bio-Composite technology in national and regional levels.

Participants :

Twenty (20) participants will be invited from different institutions coming from Indonesia (10 persons), Malaysia (5 persons), and PNG (5 persons). Prominent trainers will be invited from The University of Tokyo, Japan and other Indonesian scientists.

Annex E2
TRAINING COURSE ON BIO-COMPOSITE FOR INDONESIAN, MALAYSIAN, AND PNG CREWS

Background :

Transfer technology on utilization of small-diameter logs (SDL) for bio-composite to the Indonesian, Malaysian, and PNG crews will be important activities to disseminate and develop the technique and invention on bio-composite technology using small-diameter logs.

The training course will be conducted in Bogor, Indonesia for ten (10) days. The trainers come from Indonesian scientists.

Objective :

a. Transfer technology on silviculture, Reduced Impact Logging (RIL), Bio-Composite.
b. Dissemination of the research results to national and regional (Malaysia, PNG) crew.

Participants :

Twenty (20) crews will be invited from different institutions. They came from Indonesia 16 persons, Malaysia 2 persons, and PNG 2 persons. The trainer will be invited from The University of Tokyo, Japan.

Annex E3
WORKSHOP ON BIO-COMPOSITE MADE OF SMALL DIAMETER LOGS

Background :

Transfer technology on utilization of small-diameter logs (SDL) for bio-composite to the Indonesian, Malaysian, and PNG are very important to foster the application of the research results.

The workshop will be conducted in Bogor, Indonesia for three days. Decision makers, experts, businessmen, forest manager, scientists, lecturers from national and international will be invited.

Objective :

a. Exchange information on silviculture, Reduced Impact Logging (RIL), and Bio-Composite.
b. Dissemination of the research results on USDL for Bio-composite.

Participants :

Sixty (60) persons coming from various institutions will be invited. One (1) participant from Malaysia and one (1) participant from PNG will be supported to attend the workshop.