

# INTERNATIONAL TROPICAL TIMBER ORGANIZATION

## ITTO

### PROJECT DOCUMENT

TITLE	PROMOTION OF THE UTILIZATION OF BAMBOO FROM SUSTAINABLE SOURCES IN THAILAND
SERIAL NUMBER	PD 56/99 Rev.1 (I)
COMMITTEE	FOREST INDUSTRY
SUBMITTED BY	GOVERNMENT OF THAILAND
ORIGINAL LANGUAGE	ENGLISH

#### Summary:

The objective of this project is to develop and disseminate the knowledge on sustainable management of bamboo and technologies to promote efficient and diversified utilization of bamboo in Thailand, in order to contribute to the socio-economic development of the rural communities. It will also contribute to the conservation of the tropical forest resources in Thailand.

This project proposal is based on the recommendations derived from pre-project PPD 4/98 Rev.1 (I) Promotion of Tropical Non-Wood Forest Products (NWFPs) in Thailand.

#### Specific objectives:

- (1) To study sustainable management of bamboo with a view to developing guidelines for improving sustainable management of bamboo
- (2) To promote efficient and diversified utilization of bamboo with a view to generating income sources for the rural communities

EXECUTING AGENCY	FOREST RESEARCH OFFICE ROYAL FOREST DEPARTMENT GOVERNMENT OF THAILAND	
DURATION	36 MONTHS	
APPROXIMATE STARTING DATE	UPON APPROVAL	
BUDGET AND PROPOSED SOURCES OF FINANCE	Source	Contribution (US \$)
	ITTO	452,996
	Gov't of Thailand	322,200
	<b>TOTAL</b>	<b>775,196</b>

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## PART I. CONTEXT

### A. RELEVANCE TO ITTO

#### 1. Compliance with ITTO Objectives

The project is consistent with the objectives, established in Article 1 of the ITTA 1994: To promote and support research and development with a view to improving forest management and efficiency of wood utilization as well as increasing capacity to conserve and enhance NWFPs\* values in timber producing tropical forest. It will also have peripheral beneficial effects on the attainment of other objectives listed in the ITTO as the project will promote the collection, processing, utilization and marketing of NWFPs on a sustainable basis and therefore become an integral part of sustainable forest management in Thailand

- (a) To provide an effective framework for consultation, international cooperation and policy development among all members with regard to all relevant aspects of the world timber economy.
- (c) To contribute to the process of sustainable development
- (f) To promote and support research and development with a view to improving forest management and efficiency of wood utilization as well as increasing the capacity to conserve and enhance other forest values in timber producing tropical forests.
- (g) To develop and contribute towards mechanisms for the provision of new and additional financial resources and expertise needed to enhance the capacity of producing members to attain the objectives of this agreement.
- (i) To promote increased and further processing of tropical timber from sustainable sources in producing member countries with a view to promoting their industrialization and thereby increasing their employment opportunities and export earnings.

#### 2. Compliance with ITTO Criteria

The project is submitted in accordance with the criteria set in Article 23 of ITTA as follow:

- (a) The project is related to the production and use of industrial forest products.
- (b) It should yield benefits to the tropical timber economy as a whole and be relevant to both producing and consuming countries.
- (c) It should be related to maintaining and expanding the international trade in tropical timber.
- (d) It should offer reasonable prospects for positive economic returns in relation to cost.

#### 3. Relation to ITTO Action Plan and Priorities

The project is consistent with the Organization's priorities in the field of Reforestation and Forest Management in the ITTO Libreville Action Plan.

**Goal 1:** Support activities to secure the tropical timber resource base

2. Review current and potential productivity of major, tropical forest types

7. Encourage and assist Members, as appropriate, to :

- Establish and manage forests for multiple-use in close cooperation with local forest owners and communities living in forest areas.

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\*NWFPs mean the products from the forest except wood. These products are bamboo, rattan, gum and resins, medicinal plant, spices, edible products, industrial insects, agar wood and bark including fuel wood and charcoal.

**Goal 2: Improve the tropical timber resources base**

1. Develop the concept of forest biological health and sustainable production potential, particularly at forest stand and landscape levels, and incorporate this in guidelines for forest management plans.

The project is also consistent with the Organization's priorities in the field of Forest Industry in the ITTO Libreville Action Plan.

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

1. Assist in the promotion and transfer of new and /or improved techniques and technologies.
2. Assist human resource development and institutional strengthening by designing and consulting national and international events such as specialist workshops and seminars and by the provision of fellowships.
3. Encourage and assist Members , as appropriate, to :
  - Formulate research and development proposals which assist with the piloting and commercialization of new processing and manufacturing technologies
  - Organize workshops/seminars on the use of new and/or improved techniques, technologies and the development, testing and adoption of guidelines;

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

3. Commission and publish analytical studies that identify critical knowledge and information gaps as a precursor to research and development activities on improved efficiency at all stages.
4. Assist in the promotion, transfer and adoption of new and/or improved techniques and technologies through publication and other media, workshops, seminars and fellowship.

**B. RELEVANCE TO NATIONAL POLICIES**

**1. Relevance to National Policy**

Forest conservation is a national policy being currently implemented vigorously by the Government. There were a number of measures adopted in recent year designed to address the issue. Among them the following could be highlighted:

- (a) The logging were banned since 1989 until present.
- (b) The banning of export of logs and timber.
- (c) The launching of the national forestation program.
- (d) 15% of the country shall be design as production forest.
- (e) Generate income for the urban area.

This project also conforms with the current national policies of the Thai Government which relate to:-

The 8<sup>th</sup> National Economic and Social Development Plan (1997 - 2001): Objectives of the Plan (3) & (4) to enhance about sustainable use and development of the remained natural resources, economy, high-potential and better life quality.

The Thai Forest Sector Master Plan: Forestry sector policy objectives (1.3) & (1.4) to meet the national need from domestic sources and to help to increase the income of the local communities and strengthen the national economy.

## **2. Relevance to NESDP VIII**

The project will support the National Economic and Social Development Plan VIII in increasing extra income for the rural people by interpolating NWFPs sources in forest plantation, in farm and in community forest or in the tree farming program which was launched in 1996.

## **3. Institutional and Legal Framework**

The Non-Wood Forest Products Research Sub-Division, Forest Products Research Division (FPRD), Forest Research Office, Royal Forest Department (RFD) will be the implementing agency and will report directly to ITTO. RFD shall nominate Project Leader and shall appoint Assistant Project Leader, Study Leader and Support personnel in consultation with ITTO. The implementing agency shall provide the salaries and medicare of regular project personnel (technical, administrative and support) amounting to about US\$ 322,200 and contribute in kind as shown in Table 1. ITTO shall assign a representative during the periodic monitoring and review of the project. It shall also provide the necessary budgets/funds amounting to US\$ 452,996 to cover the costs for project Leader and hired contractual personnel, duty travels, consumable items, capital items, miscellaneous, monitoring and evaluation, and ITTO administration cost as presented in Tables 2, 3 and 4.

## PART II. THE PROJECT

### 1. Origin

As Thailand has banned logging since 1989, products from the forest are at present mainly NWFPs. One of the important NWFPs in Thailand is bamboo because it has generated employment, extra income subsistence for the rural people. Bamboo had been the traditional sources of construction materials, weaving, furniture and fuel wood. It had been used in the making houses, furniture, carbines, musical instrument, utensils and many other uses. However, its use had been limited mostly in the rural areas by the people of the lowest economic level. The reason for this is that it had been used in the form, which does not last long and in a relatively low quality material. There is therefore a need to develop high quality products from bamboo to make it appeal not only to lower economic levels but also to the middle class and the higher levels of society.

This project proposal is based on the recommendations derived from pre-project PPD 4/98 Rev. 1(I) "Promotion of Tropical Non-Wood Forest Products (NWFPs) in Thailand", which financed by ITTO and implemented by the Royal Forest Department (RFD) during the fourth quarter of 1998 and first quarter of 1999.

As part of the pre-project activities, the pre-project team, with a local consultant, carried out a field survey over four community forest areas in the northern, northeastern, western and southern parts with cooperation of the local forest authorities. The team interviewed local community members, technicians and authorities and carried out a preliminary assessment of the utilization of tropical non-wood forest products. It was concluded that, in the northern and northeastern regions, bamboo should be better utilized for value-added production of bamboo furniture parts and charcoal for the rural communities and that appropriate technology should be introduced for the preservation of bamboo shoots as is currently done in China. Experts from various private sectors and farmers in the regions also saw great potential in the utilization of bamboo to enhance rural incomes through small-scale industry development

The experts recommended follow-up of the pre-project activities, taking into account that the information and knowledge available on bamboo is limited and that the rural communities are not aware of appropriate technologies for the efficient and diversified utilization of bamboo which can lead to the creation of new job opportunities for the communities and complement to the conservation of the tropical forests in Thailand.

### 2. Project Objectives

#### 2.1 Development objectives:

The objective of this project is to develop and disseminate the knowledge on sustainable management of bamboo and technologies to promote efficient and diversified utilization of bamboo in Thailand, in order to contribute to the socio-economic development of the rural communities. It will also contribute to the conservation of the tropical forest resources in Thailand.

#### 2.2 Specific objectives:

##### Specific objective 1:

To study sustainable management of bamboo with a view to developing guidelines for improving sustainable harvesting of bamboo

##### Specific objective 2:

To promote efficient and diversified utilization of bamboo with a view to generating income sources for the rural communities

### **3. Project Justification**

#### **3.1. Problem to be addressed**

Bamboo resources that used to be adequate and sustainable in the past have been fast decline due to over cutting, improper harvesting method and lack of technical know how on efficient utilization of bamboo materials. illegal cutting of bamboo in forest areas has also become more restricted. In the last decade, a number of public and private enterprises interesting in the establishment of bamboo plantations on their own lands have been substantially increased. However, many farmers are non-technical people and lack of knowledge in cultivating and managing bamboo farms. They also lack of methodology to develop means to produce bamboo products in a value-added way.

Information on the basic properties of Thai bamboos particularly in relation to their industrial application is also limited. There are difficulties faced by the users in processing and mechanically fabricating bamboos due to their physical characteristics. These are the variation in dimensions, crookedness of the culms, non-uniformity of internodes and unevenness of taper. Since many bamboo species remain unutilized, research effort is needed to determine the properties of such species and develop their appropriate utilization technology.

The processing of bamboo shoots has not yet been developed as the Chinese bamboo shoot industry has produced annually a total output of 250,000 tones of caned bamboo shoots in 700 bamboo shoot factories.

There is also a need to provide a short-term training in the production of popular bamboo products. The treatment of bamboos is an example. The procedures are relatively labor intensive on traditional devices, which are of low technology and production capacities. Usage of jigs and efficient mechanism are still limited and most of local manufacturers have to rely on existing ethnic designs or copying from other sources. Extension services of the current technology should be provided via workshops, dialogue or demonstrations. These should be periodically upgraded to improve existing skills with a view to promoting both the quality of the products and diversified utilization of bamboo

Given the fact that bamboo has proven to be a vital resource in terms of its contribution to particularly the rural economies and ecological stability of Thailand, its utilization must be sustainably reached because the scio-economic and environmental conditions of the people with the forest lands are weak and unsustainable. Further improvement of sustainable management of bamboo and the production of bamboo products in both quality and quantity can be obtained by immediate attention, solutions and practical suggestions to the several problems associated to the sustainable utilization of bamboo.

#### **3.2. Characteristics of the region /area where project is located**

The studies on the basis properties of selected bamboo species will be conducted at the Forest Products Research Division of the Royal Forest Department located in Bangkok. There are laboratories that can facilitate the project. The numbers of individuals including staff are 100 persons.

The training courses will be held in the north and west (Chiang Mai and Karnjanaburi province) where are abundant natural bamboo resources. A total bamboo forest in Thailand is 810,000 hectare, of which 250,000 ha are in the west and 450,000 ha in the north.

The demonstration plots of sustainable bamboo management will be in Chiangmai, the northern part of Thailand, and the other will be in the NWFPs experiment station, Nakornrachasima province where training facilities and extension services are available to disseminate the project results.

#### **3.3. Other relevant aspects of "pre-project situation"**

##### **(a) Deforestation:**

Despite Thailand's long history of forest management, deforestation remains a serious problem. At the beginning of the Twentieth century, over 75 percent of Thailand was covered with forest. By the time of the First Plan, 53 percent of the country had forest cover. Since then the forest

cover has shrunk at an annual average rate of roughly 2.5 percent, with higher rates in the decade of the 1970s. RFD calculations derived from LANDSAT images indicate that only 26.02% of the country remains as forest (RFD, 1994), with many independent estimates suggesting that the actual figure is realistically only 19%. In the past 30 years, over 130,000 square kilometers have been lost, with government intervention failing to produce significant reforestation. In 1989 the forest area remaining, 143,417 square kilometers, was roughly equivalent to the total area lost in the last 30 years.

**(b) Thailand's reliance upon the tropical timber industry:**

In the past, Thailand was one of the world's major tropical timber exporters. Data from the FAO for 1989 has Thailand as the fifth largest exporter of round logs in the Asia-Pacific region. Even after the logging ban, according to the Tropical Timber Trends Report 1995, produced by ITTO, Thailand was the fourth largest log importer and the largest tropical sawn wood importer (ITTO, 1995). According to 1996 data the country is still the fourth largest importer of tropical logs (ITTO, 1996). A situation that will continue until Thailand can efficiently produce timber from forests or plantations. Output from this project will indicate to the RFD that sustainable local production of NWFPs is feasible without destroying important tropical forest areas. It will also contribute to watershed protection, erosion control and bio-diversity conservation.

**(c) Rural poverty:**

Thailand is an agricultural based society with over 70% of the population, with the crops produced being rice, sugarcane, maize, fruit and cassava. Thirty years of agricultural development chiefly based around diversification into production of export crops such as cassava and sugarcane, and intensification of production through the use of modern inputs, have resulted in only limited inroads into poverty. In many cases, it has actually left farmers with less than before. Unstable markets for export crops, the dramatic fall in agricultural commodity prices, and the rising costs of inputs such as fertilizer and pesticides all add to the problem. Debt is reaching epidemic proportions in many villages with many farmers having little chance to pay it off through current forms of agriculture. Therefore villagers in close proximity to forested areas have relied excessively eliminating this traditional food and natural resource supply. Therefore there is an urgent need to move towards sustainable agricultural practices combined with reforestation and community forestry implementation particularly in the buffer areas of the few remaining natural forests.

**(d) Resource depletion, degradation, conflict of interest and bio-diversity loss:**

Every protected area in the country suffers from natural resources depletion, whether it be conversion of forested land to agriculture, selective logging or poaching of animals. Most protected area managers view their roles as protectors of their designated areas, and the villagers as the primary cause of natural resources degradation. Often there is a high level of antipathy between the two groups, leading to conflict and occasionally loss of life.

**(e) Lack of knowledge:**

The baseline assessment of the current situation in Thailand regarding reforestation techniques, and utilization technology suggested that there is an almost total lack of knowledge of what techniques should be used. The majority of available information is for exotic species and is the result of research undertaken in other countries. Almost all nursery techniques utilized in Thailand are copied directly from tree nurseries in developed temperate countries or get utilization technology only from some species. This is especially true of germination methods, nursery procedure, sapling planting and forest restoration techniques. Thailand has a predicted tree flora of around 3,000 species, current data for phenology, germination requirements and growth statistics is available for less than 20 native species. Therefore the country urgently needs to implement reforestation and utilization technology projects which not only plant trees but also evaluate these planting in a systematic way and utilize it efficiently so that future plantings can be made effectively and efficiently.

**3.4. Intended situation after project completion**

The project will demonstrate the sustainable management practices of five economically important bamboo species. It will provide guidelines on how the selected bamboo species can be sustainably harvested. It will also provide information on bamboo shoots production and the silvicultural treatments necessary in order to produce shoots suitable for processing purposes.



The project will also study the properties of important bamboo species. It will provide information on how bamboo raw materials can be processed into high quality products suitable in making furniture, handicrafts and other useful things. The project will transfer technology to the rural communities that will have an opportunity to improve their income generation through bamboo production and utilization. It will also demonstrate a feasibility of the establishment of a bamboo shoot factory in Chiang Mai.

### **3.5. Target Beneficiaries**

The direct beneficiaries of the project will be the rural communities engaged in collection, processing, storage and sale of bamboo products in Thailand. The rural communities will benefit with better income opportunities through bamboo production and utilization. Also the forest department authorities will have practical guidelines for sustainable management and utilization of bamboo. The project will generate greater awareness among the planners, policy makers and especially among the bamboo workers and their organizations. Besides, bamboo being an industry spread out in the country as whole, the findings arrived at in the context of Chiang Mai are likely have wider applications in other parts of the country as well. The attainment of the project objective will ease the pressure on the forest resources thereby benefiting the whole country. Furthermore, other member countries of ITTO, facing similar problems, will be benefited from the outputs of this project.

### **3.6. Project Strategy**

#### **(a) Reason for selection:**

The essential reason for the project design is based on the need to develop and disseminate appropriate technologies of management and utilization of bamboo in order to facilitate the sustainable management practices and utilization of bamboo resources.

This need was identified by pre-project PPD 4/98. Experts from the various private sectors and farmers in the regions saw great potential in the utilization of bamboo to enhance rural incomes through the development of a small-scale bamboo industry. Their views were that bamboo resources in the northern and northeastern regions should be better utilized for value-added production of bamboo furniture parts and charcoal for the rural communities. Appropriate technology on the preservation of bamboo shoots should also be introduced to the project sites through a study tour to south China and a feasibility study on the establishment of a bamboo shoot factory.

From the past evaluation of pre-project, it revealed that two community forests in the north and northeast regions have a different kind of economic bamboo species. In order to reach the proposed objectives, the project also plans to establish two small-scale demonstration plots in the north and northeast regions for sustainable management practices of bamboo.

#### **(b) Lessons drawn from past evaluation:**

This project was developed after carrying out an analysis and evaluation of the selected community forests, taking into account the misutilization of bamboo resources at various stages such as harvesting, extraction, handling and processing of bamboo, the possibility of utilizing the resources and the need of the rural communities to have an economic alternative that will help them to improve their living standard.

Available studies on bamboo in Thailand do not provide concrete recommendations in sustainable management practices and utilization of bamboo resources which could be taken up by the regional or central government and all who are concerned with sustainable utilization of the resources.

#### **(c) Technical and scientific aspect:**

Practical guidelines for improving management of bamboo shall be developed. These guidelines will include prescriptions on plantation, silviculture and harvesting for commercially important bamboo species.

The laboratory work will focus on the basic properties on physical, chemical, mechanical properties, preservation and drying of five commercial bamboo species for commercialization of furniture parts, weaving and charcoal making. A study of physical and chemical treatment of selected bamboo species for strength and durability will also be conducted. Further, utilization techniques of bamboo charcoal and processing techniques of bamboo shoots shall be studied. No study of this kind was not conducted in Thailand.

A study on weaving techniques and improvements will also be conducted because technical aspects have not received adequate attention in the case of handicrafts although many studies have focused on the socio-economic aspects of bamboo development.

In order to develop guidelines and conduct the proposed project activities, it will be essential for the project to search the previous research results of and to cooperate with INBAR in China. The Chinese bamboo industry is famous for its quality, variety and efficiency in material-use. The project needs to learn significantly from the Chinese experience. Further, it will be important for the project to learn the advanced research methods in modification and preservation of bamboo and bamboo charcoal techniques from the Forestry and Forest Products Research Institute (Wood Technology and Chemistry Divisions) and the Wood Research Institute, Kyoto University in Japan.

#### **(d) Economic aspects**

Taking into account the vast areas of bamboo in Thailand, it is obvious that major economic, social and environmental benefits could be derived through the appropriate utilization of this resource. For example, in 1994 an area of about 60,000 ha of bamboo forest (*Phyllostachys heterocycla var pubescens (Mazel) Ohwi*) situated in the Anji county of China generated a total production of about US\$110 million from around 1,200 bamboo culm and shoot processing factories.

This project will help the rural communities to earn a subsidiary income from their activities. It is also likely to help the cooperators in the bamboo industry, as their income levels are likely to go up. By developing appropriate techniques for bamboo charcoal, Chiang Mai could satisfy the regional demand for bamboo charcoal and the surplus production could be sold in the national market.

#### **(e) Environmental aspects**

With the realization of the project objectives, less timber is expected to be extracted from the forest. In addition, the communities close to the forest resources will have better environmental opportunities through improved management practices of bamboo resources and bamboo charcoal utilization. Since these local communities depend so much on the forest resources for their livelihood, the pressure on the forest will be considerably eased. All of these will have positive environmental impact.

#### **(f) Social aspects**

The local communities will be major participants in the realization of the Project objectives. They shall be taught the practical methods of bamboo farming and utilization. They are expected to be the main suppliers of bamboo culms to the bamboo industry (furniture, weaving products and handicrafts), a women dominated industry. This traditional industry has an important role in terms of overall employment as well as of the larger proportion of women employment in the rural communities. The project will assist the establishment of a bamboo village through a bamboo village cooperative in Chiang Mai for the production of bamboo furniture parts, weaving products and handicrafts. Technical reports resulted from the project will include a documentation on women in the unorganized sector relating to bamboo production and utilization in Chiang Mai.

#### **(g) Managerial aspects**

The Project Leader and Assistant Project Leader will manage the implementation of the Project. The Project Leader will manage and administer all activities and set objectives. He shall coordinate with relevant government and private offices/organizations to insure the efficient implementation of the project. He shall prepare and submit pertinent reports/documents to ITTO. The Assistant Project Leader shall coordinate the activities and see to it that such activities are implemented based on established time frame and standards. He shall maintain records of data and information gathered by the project. He shall assist the Project Leader in the preparation of the project report and other relevant documents. RFD shall assign and nominate the Project Leader, Assistant Project Leader, and support personnel to ITTO. Based on the estimated duration of the activities, the project implementation will have a duration of 36 months.

### 3.7. Reasons for ITTO Support

#### (a) ITTO aspects

As stated in Part I of this document, the objectives of the project are consistent with ITTO objectives and the priorities of the ITTO Action Plan. Since the success of the project will also benefit the other ITTO member countries, it is requested that appropriate funding be provided through the Special Account of ITTO.

#### (b) Relationship to Relevant Actions supported by Other Donors

The project as proposed will be implemented by RFD with funding from ITTO and the government of Thailand. There are no other donors funding similar projects.

### 3.8. Risks

There will only be some minimal risks that could hamper the success of the project. One is the possible non-cooperation of bamboo farmers in the introduction of sustainable management in their plantations and the technology of processing bamboo products. This can be handled by explaining to the farmers the likely outcome of the project and the possible benefits that they can get.

The other risk is lack of information and skills to develop appropriate technologies for efficient and diversified utilization of bamboo raw materials. This can be solved by adopting the technologies developed by other countries through well-prepared study tours to China and Japan.

### 3.9. Overall capacity of RFD to undertake the project

RFD has a specific section which deals on research on tropical NWFPs and two specific section deal with wood properties and wood preservation the staff of unit is composed of 30 staffs and one expert of Forest Research Office. Mostly of B.Sc. some have advance degrees in M.Sc. and Ph.D. with situation and existing manpower, the implementing agency has the capacity to undertake the project.

## 4. Outputs

Specific Objectives	Outputs	
<b>Specific Objective 1</b> To study sustainable management of bamboo with a view to developing guidelines for improving sustainable harvesting of bamboo.	<b>Output 1.1</b>	Establishment of two demonstration plots for sustainable management of bamboo. Areas: 5 ha / 5 species / plot Location: North (in Chiangmai) and Northeast (in Nakornrachasima)
	<b>Output 1.2</b>	Development of guidelines for sustainable management of bamboo, including plantation and harvesting
	<b>Output 1.3</b>	Technology transfer on bamboo plantation, management and utilization.
<b>Specific Objective 2</b> To promote efficient and diversified utilization of bamboo with a view to generating income sources for the rural communities	<b>Output 2.1</b>	Study on mechanical, chemical and wood working properties of five bamboo species
	<b>Output 2.2</b>	Development of techniques for natural dying of bamboo handicrafts
	<b>Output 2.3</b>	Establishment of a cottage industry for the production of bamboo furniture parts, including handicrafts in Chiang Mai
	<b>Output 2.4</b>	Development of bamboo charcoal techniques
	<b>Output 2.5</b>	Development of processing techniques for bamboo shoots

## 5. Activities and Inputs

Specific Objectives/ Outputs	Activities	Inputs
<p><b>Specific Objective 1</b> <b>Output 1.1 :</b> Establishment of two demonstration plots for sustainable management of bamboo. Areas: 5 ha / 5 species / plot Location: – North (in Chiangmai) – Northeast (in Nakornrachasima)</p>	<p>Activity 1.1.1: Identification of two demonstration plots in the north and northeast in Thailand Activity 1.1.2: Establishment of two demonstration plots for sustainable management of bamboo: site preparation Activity 1.1.3: Selection of 5 suitable bamboo species for each plantation site : by surveying of markets to find out local and national (as well as international) needs for basic consumption, production and marketing</p>	<p>-Project staff RFD</p>
<p><b>Output 1.2:</b> Development of guidelines for sustainable management of bamboo, including plantation and harvesting</p>	<p>Activity 1.2.1: A literature review on sustainable management of bamboo from INBAR, FAO and other sources Activity 1.2.2: Conduct research on sustainable management of bamboo (plantation, management, silviculture, harvesting) – to identify proper spacing for each commercial bamboo species – to demonstrate proper silvicultural systems that are basically needed for planting bamboo – to find out suitable ratio of shoot and culm cutting to gain sustainable high yield – to study on edible insects rearing in bamboo plantation which may increase value added products Activity 1.2.3: Publication of guidelines on sustainable management of bamboo (in Thai)</p>	<p>-Project staff  -National Consultant (6 months)  -Unskilled labour</p>
<p><b>Output 1.3 :</b> Technology transfer on bamboo plantation, management and utilization.</p>	<p>Activity 1.3.1: To conduct a training workshop on sustainable management and utilization of bamboo in Thailand</p>	<p>-Project staff Training equipment</p>

Specific Objectives/ Outputs	Activities	Inputs
<p><b>Specific Objective 2</b></p> <p><b>Output 2.1:</b> Study on mechanical, chemical and wood working properties of five bamboo species</p>	<p>Activity 2.1.1: Literature review on basic properties of bamboo from INBAR and other sources</p> <p>Activity 2.1.2: To collect sample specimen for potential bamboo species for commercialization</p> <p>Activity 2.1.3: To conduct research on bamboo properties in terms of mechanical, chemical, physical, preservation, drying and seasoning</p> <p>Activity 2.1.4: To prepare a report on bamboo properties in terms of mechanical, chemical, physical, preservation, drying and seasoning.</p>	<p>-Project staff -Unskilled labour -Project staff -Laboratory equipment  -Consumable items</p>
<p><b>Output 2.2 :</b> Development of techniques for natural dyeing of bamboo handicrafts</p>	<p>Activity 2.2.1: To develop on natural dyeing techniques of bamboo handicraft parts</p> <p>Activity 2.2.2: To prepare a report on natural dyeing techniques of bamboo handicraft parts</p>	<p>-Project staff -Consumable items</p>
<p><b>Output 2.3:</b> Establishment of a cottage industry for the production of bamboo furniture parts, including handicrafts in Chiang Mai</p>	<p>Activity 2.3.1 To organize short training courses on bamboo furniture parts and handicrafts</p> <p>Activity 2.3.2 To conduct short training courses on bamboo furniture parts and handicrafts</p> <p>Activity 2.3.3 To establish a small bamboo cooperative in Chiang Mai</p> <p><u>Activity 2.3.4 To set up a housewife organization for bamboo handicrafts in Chiang Mai</u></p>	<p>-International consultant -National consultant (4 months) -Set of weaving machinery -Training equipment -Machinery for bamboo Activity</p>
<p><b>Output 2.4:</b> Development of bamboo charcoal techniques</p>	<p>Activity 2.4.1: To conduct a literature survey</p> <p>Activity 2.4.2: Study tour to the Forestry and Forest Products Research institute and Kyoto University on charcoal techniques including furniture, weaving and management in Japan ( 4 people)</p> <p>Activity 2.4.3: To develop bamboo charcoal techniques</p> <p>Activity 2.4.4: To conduct short training courses on bamboo charcoal techniques in 2 project sites (1week)</p>	<p>-Project staff   -International consultant -Equipment for bamboo charcoal</p>
<p><b>Output 2.5 :</b> Development of processing techniques for bamboo shoots</p>	<p>Activity 2.5.1: Study tour to China on processing techniques of bamboo shoots and packaging of bamboo shoot products including furniture, weaving and management (4 people), in corporation with INBAR</p> <p>Activity 2.5.2: To conduct a feasibility study on establishment of a bamboo shoot factory in Chiang Mai</p>	<p>-Project staff   -National consultant (2 months) -Bamboo shoot machinery</p>

## **6. Logical Framework Worksheets**

The logical framework worksheet is appended.

## **7. Work Plan**

The work plan is appended.

## **8. Institutional Arrangements for Execution and Operation**

### **8.1. Management structures**

RFD, as executing agency of the project, shall appoint the Assistant Project Leader, study leader, hire the Project Leader and the consultant, and support personnel in consultation with ITTO. The management, implementation, evaluation and reporting of project will be under the responsibility of the project Leader and Assistant Project Leader. The staff who will be the implementers of different studies will assist them.

The Project Leader shall administer and manage the disbursement of funds, supervise the procurement of supplies, materials and equipment. He shall program the activities of the project implementers.

The management structure of the project will also establish a Project Steering Committee composing of the head of the Forest Research Office, an ITTO representative, a representative of the RFD and a representative from the Chiang Mai region. The Committee will meet twice a year to review and facilitate the implementation of the project activities in accordance with ITTO guidelines.

### **8.2. Key staff**

The key staff who will implement the project are given below. Their respective curriculum vitae are given in the appendix.

Assistant Project Leaders: Ms. Pannee Denrungruang  
Ms. Nuchanart Nilkamhaeng

Study Leaders: Mr. Suchart Thaipet  
Mr. Winai Panyathanya  
Ms. Leela Kayikananta  
Mr. Prachoen Sroithongkam  
Mr. Yanyong Kangkarn  
Mr. Sakolsak Wachiranuwat

## **9. Prior Obligations and Prerequisites**

Currently, there are no prior obligations to start the project. Once the project proposal is approved by ITTO, RFD will start preparations for the implementation of the project.

## **10. Possible Future Actions**

After the completion of the project, RFD will be responsible for disseminating and applying project achievements. The project should provide information on sustainable management practices and utilization of bamboo. Furthermore, RFD and the regional forest authorities will assist the further development of a bamboo village cooperative established by the project through follow-up activities, including the community forest program, to ensure the sustainability of the project.

## PART III. MONITORING, REPORTING AND EVALUATION

### 1. Reporting

A bi-annual progress report on the project activities and output shall be prepared and submitted to ITTO every six months after the start of the project and as such other times as required by ITTO in accordance with the provisions of the ITTO Project Manual. These reports will be prepared four weeks before each monitoring mission and will contain information on project performance for each project element.

### 2. Project Completion Report

A project completion report shall be prepared and submitted to ITTO not later than three months after the completion of the project as established in the ITTO Manual for Project Formulation.

### 3. Monitoring, Review and Steering Committee Visits

The project steering committee can visit the project for monitoring and review purposes at least once every year.

### 4. Evaluation

The project can be subjected to mid-term evaluation, if necessary. The date of such evaluation shall be agreed upon between ITTO and the Project Leader.

## PART IV. BUDGET

The project's annual budget by component requested from ITTO is presented in Table 2 and the overall budget by activity in Table 4. The government of Thailand contribution in kind is presented in Table 1.

TABLE 1. GOVERNMENT OF THE THAILAND CONTRIBUTION IN KIND (US\$)

COMPONENTS	Year 1	Year 2	Year 3	Total
Project Personnel				
1. Salaries				
– Asst. Project Leader (2)	17,000	18,000	19,000	54,000
– Staff (9)	57,500	59,000	60,500	177,000
– Admin. Support (4)	8,000	8,200	8,400	24,600
– Assistant Research(2)	7,200	7,200	7,200	21,600
Sub-total	89,700	92,400	95,100	277,200
2. Laboratory Equipment and Facilities				
– Laboratory Equipment machinery	10,000	10,000	10,000	30,000
– Plantation Equipment	5,000	5,000	5,000	15,000
Sub-total	15,000	15,000	15,000	45,000
<b>GRAND TOTAL</b>	<b>104,700</b>	<b>107,400</b>	<b>110,100</b>	<b>322,200</b>

**TABLE 2 PROJECT BUDGET**

ITEM	DESCRIPTION	ITTO (US \$)
<b>10</b>	<b>Project Personnel</b>	
11	1 National Expert (Project Leader) @1,300 US\$ x 36 months	46,800
12	2 National consultants 1 Processing consultant 6 month @1,500 US\$ 1 Management consultant 6 months @1,500 US\$	18,000
13	International Consultant: 1 Charcoal Consultant 1 month @ 10,000 US\$ 1 Weaving Consultant 1 month @ 10,000 US\$	20,000
14	Fellowship for two study tour groups, 4 persons/group (Japan, China)	<u>16,000</u>
15	Other Labors :	14,850
	Unskilled person for demonstration plots 2 sites x 2 men x 150 US\$ x 12 months (1 <sup>st</sup> year) 2 sites x 1 man x 150 US\$ x 24 months (2 <sup>nd</sup> and 3 <sup>rd</sup> year)	7,200 7,200
	Unskilled person for development of bamboo charcoal technique 1 man x 3 months x 150 US\$	450
<b>19</b>	<b>Component Total</b>	<b><u>115,650</u></b>
<b>20</b>	<b>Sub-contracts</b>	
21	Publication of Technical reports	10,000
22	Workshop organization and proceedings	31,800
29	<b>Component Total</b>	<b>41,800</b>
<b>30</b>	<b>Duty Travel</b>	
31	DSA staffs for surveying, interview, workshop and collecting data	<u>31,090</u>
32	Transport cost : vehicle, daily travel, air ticket, staff, participants	10,440
39	<b>Component Total</b>	<b><u>41,530</u></b>
<b>40</b>	<b>Capital Items (Annex IV)</b>	
41	Project vehicle (1 ton, 4x4 double cab pickup, benzene engine)	25,000
42	Machinery and Laboratory Equipment	<u>51,200</u>
43	Training equipment	<u>15,800</u>
49	<b>Component Total</b>	<b><u>92,000</u></b>
<b>50</b>	<b>Consumable items</b>	
51	Office supplies	5,000
52	Sample specimens	7,000
53	Chemical reagent, fertilizer, soil, etc.	13,200
54	Stationary	3,000
55	Fuel	5,000
59	<b>Component Total</b>	<b>33,200</b>



**TABLE 2 PROJECT BUDGET (cont.)**

ITEM	DESCRIPTION	ITTO (US \$)
<b>60</b>	<b>Miscellaneous</b>	
61	Sundry	10,000
<b>69</b>	<b>Component Total</b>	<b><u>10,000</u></b>
<b>70</b>	<b>ITTO Monitoring, Evaluation &amp; Administration</b>	
71	Monitoring & Evaluation	10,000
72	Administration	<u>18,930</u>
<b>79</b>	<b>Component Total</b>	<b><u>28,930</u></b>
<b>80</b>	<b><i>Refund of Pre-project costs</i></b>	
81	<i>Refund of Pre-project costs :PPD 4/98 Rev.1 (I)</i>	<u>89,886</u>
<b>89</b>	<b><i>Component Total</i></b>	<b><u>89,886</u></b>
	<b>GRAND TOTALS</b>	<b><u>452,996</u></b>

**TABLE 3. CONSOLIDATED YEARLY PROJECT BUDGET (in US\$)  
ITTO CONTRIBUTION**

ANNUAL DISBURSEMENTS		YEAR 1	YEAR 2	YEAR 3	TOTAL
<b>BUDGET COMPONENTS</b>					
10	Project personnel	31,800	<u>44,200</u>	39,650	<u>115,650</u>
20	Sub-contracts	5,000	16,000	20,800	41,800
30	Duty travel	<u>13,000</u>	<u>15,530</u>	<u>13,000</u>	<u>41,530</u>
40	Capital items	<u>42,500</u>	<u>49,500</u>		<u>92,000</u>
50	Consumable items	10,000	11,000	12,200	33,200
60	Miscellaneous	<u>2,000</u>	4,000	4,000	<u>10,000</u>
70	ITTO Admin. Monitoring & evaluation	8,930	10,000	10,000	28,930
80	<i>Refund of Pre-project costs</i>	<u>89,886</u>	-	-	<u>89,886</u>
	<b>GRAND TOTAL</b>	<b><u>203,116</u></b>	<b>150,230</b>	<b>99,650</b>	<b><u>452,996</u></b>

**TABLE 4 OVERALL BUDGET BY ACTIVITY & COMPONENT**

Output & Activities	Budget component (USD)									
	Project Personnel	Sub Contracts	Duty Travel	Capital items	Consumable Items	Misc. and Contingency	ITTO Monitoring Evaluation & Administration	Refund of Pre-project costs	Grand total	
Specific objectives 1: To study sustainable management of bamboo										
Output 1.1										
Activity 1.1.1: Identification of two demonstration plots in the north and northeast in Thailand	<u>2,000</u>		<u>2,600</u>			150			<u>4,750</u>	
Activity 1.1.2: Establishment of two demonstration plots for sustainable management of bamboo: site preparation	<u>6,600</u>		<u>9,060</u>	25,000	3,300	900	5,000		<u>49,860</u>	
Activity 1.1.3: Selection of 5 suitable bamboo species for each plantation site : by surveying of markets to find out local and national (as well as international) needs for basic consumption, production and marketing	<u>2,500</u>		8,800		300	300			<u>11,900</u>	
Output 1.1 sub-total	<u>11,100</u>	-	<u>20,460</u>	25,000	3,600	1,350	5,000		<u>66,510</u>	
Output 1.2										
Activity 1.2.1: A literature review on sustainable management of INBAR, FAO and other source	<u>1,000</u>					150			<u>1,150</u>	
Activity 1.2.2: Conduct research on sustainable management of bamboo (plantation, management, silviculture, harvesting)	<u>20,500</u>		<u>5,540</u>		18,000		3,500		<u>47,540</u>	
Activity 1.2.3: Publication of guidelines on sustainable management of bamboo (in Thai)	<u>2,000</u>	4,000				1,000			<u>7,000</u>	
Output 1.2 sub-total	<u>23,500</u>	4,000	<u>5,540</u>	-	18,000	1,150	3,500		<u>55,690</u>	

**TABLE 4 OVERALL BUDGET BY ACTIVITY & COMPONENT (cont.)**

Output & Activities	Budget component (USD)										Grand total	
	Project Personnel	Sub Contracts	Duty Travel	Capital items	Consumable Items	Misc. and Contingency	ITTO Monitoring Evaluation & Administration	Refund of Pre-project costs				
Output 1.3												
Activity 1.3.1: To conduct a training workshop on sustainable management and utilization of bamboo in Thailand	<u>2,500</u>	5,700	2,040	<u>15,800</u>	500	500	3,000					<u>30,040</u>
Output 1.3 sub-total	<u>2,500</u>	5,700	2,040	<u>15,800</u>	500	500	3,000					<u>30,040</u>
Specific objectives 2:												
To promote efficient utilization of bamboo												
Output 2.1												
Activity 2.1.1: Literature review on basic properties of bamboo from INBAR	<u>1,000</u>							150				<u>1,150</u>
Activity 2.1.2: To collect sample specimen for potential bamboo species for commercialization	<u>2,000</u>		900		600							<u>3,500</u>
Activity 2.1.3: To conduct research on bamboo properties in terms of mechanical, chemical, physical, preservation, drying and seasoning	<u>2,500</u>		5,520	<u>2,500</u>	1,000			500				<u>12,020</u>
Activity 2.1.4: To prepare a report on bamboo properties in terms of mechanical, chemical, physical, preservation, drying and seasoning.	<u>3,000</u>	3,000					1,500					<u>7,500</u>
Output 2.1 sub-total	<u>8,500</u>	3,000	6,420	<u>2,500</u>	1,600	650	1,500					<u>24,170</u>

TABLE 4 OVERALL BUDGET BY ACTIVITY & COMPONENT (cont.)

Output & Activities	Budget component (USD)								Grand total	
	Project Personnel	Sub Contracts	Duty Travel	Capital items	Consumable Items	Misc. and Contingency	ITTO Monitoring Evaluation & Administration	Refund of Pre-project costs		
Output 2.2										
Activity 2.2.1: To develop on natural dying technique of bamboo handicraft parts	<u>2,000</u>				2,500	500				<u>5,000</u>
Activity 2.2.2: To prepare a report on natural dying technique of bamboo handicraft parts	<u>2,000</u>	3,000				1,000		<u>1,000</u>		<u>7,000</u>
Output 2.2 sub-total	<u>4,000</u>	3,000	-		2,500	1,500		<u>1,000</u>		<u>12,000</u>
Output 2.3										
Activity 2.3.1: To organize short training courses on bamboo furniture parts and handicrafts.	<u>3,000</u>		<u>950</u>	<u>20,500</u>	1,500	500		2,500		<u>28,950</u>
Activity 2.3.2: To conduct short training courses on bamboo furniture parts and handicrafts.	<u>19,000</u>	17,250	<u>3,000</u>		1,000	1,000		4,000		<u>45,250</u>
Activity 2.3.3: To establish a small bamboo cooperative in Chiang Mai	<u>3,000</u>			<u>10,000</u>	500			1,000		<u>15,000</u>
Activity 2.3.4: To set up a housewife organization for bamboo handicrafts in Chiang Mai	<u>3,000</u>					<u>500</u>		<u>1,000</u>		<u>4,500</u>
Output 2.3 sub-total	<u>28,000</u>	17,250	3,950	30,500	3,000	2,500		<u>8,500</u>		<u>93,700</u>
Output 2.4										
Activity 2.4.1: To conduct a literature survey	<u>1,000</u>								150	<u>1,150</u>

Activity 2.4.2: Study tour to the Forestry and Forest Products Research Institute and Kyoto University in Japan (4 people)	<u>10,000</u>						<u>500</u>			<u>10,500</u>
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**TABLE 4 OVERALL BUDGET BY ACTIVITY & COMPONENT (cont.)**

Output & Activities	Budget component (USD)										Grand total
	Project Personnel	Sub Contracts	Duty Travel	Capital items	Consumable items	Misc. and Contingency	ITTO Monitoring Evaluation & Administration	Refund of Pre-project costs			
Activity 2.4.3: To develop bamboo charcoal techniques	<u>12,450</u>			<u>1,200</u>	<u>2,000</u>	<u>200</u>	<u>430</u>				<u>16,280</u>
Activity 2.4.4: To conduct short training courses on bamboo charcoal techniques in 2 project sites (1week)	<u>2,600</u>	<u>8,850</u>	<u>3,120</u>		<u>1,000</u>	<u>400</u>	<u>3,000</u>				<u>18,970</u>
Output 2.4 sub-total	<u>26,050</u>	<u>8,850</u>	<u>3,120</u>	<u>1,200</u>	<u>3,000</u>	<u>1,250</u>	<u>3,430</u>				<u>46,900</u>
Output 2.5											
Activity 2.5.1: Study tour to South China on processing techniques for bamboo shoots and packaging of bamboo shoot products (4 people), in corporation with INBAR	<u>6,000</u>					<u>500</u>					<u>6,500</u>
Activity 2.5.2: To conduct a feasibility study on the establishment of a bamboo shoot plant in Chiangmai	<u>6,000</u>			<u>17,000</u>	<u>1,000</u>	<u>600</u>	<u>3,000</u>				<u>27,600</u>
Output 2.5 sub-total	<u>12,000</u>	-	-	<u>17,000</u>	<u>1,000</u>	<u>1,100</u>	<u>3,000</u>				<u>34,100</u>
Refund of Pre-project costs								<u>89,886</u>			<u>89,886</u>
<b>GRAND TOTALS</b>	<u>115,650</u>	<u>41,800</u>	<u>41,530</u>	<u>92,000</u>	<u>33,200</u>	<u>10,000</u>	<u>28,930</u>	<u>89,886</u>		<u>89,886</u>	<u>452,996</u>

## ANNEX I. LOGICAL FRAMEWORK MATRIX

PROJECT ELEMENTS	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p><b>DEVELOPMENT OBJECTIVE</b></p> <p>The objective of this project is to develop and demonstrate knowledge on sustainable management of bamboo and technologies to promote efficient and diversified utilization of bamboo in Thailand in order to contribute to the socio-economic development of the rural communities.</p>	<p>Increased understanding of sustainable management and utilization of important bamboo species</p> <p>Increased socio-economic situations of the project sites concerned</p>	<p>Technical reports</p> <p>Efficient and diversified utilization of bamboo</p> <p>Evaluation report of project activities and outputs</p>	<p>Government willingness to manage and utilize bamboo</p> <p>The communities need and participation to have alternative income generating sources</p>
<p><b>Specific objectives 1:</b></p> <p>To study sustainable management of bamboo with a view to developing guidelines for improving sustainable harvesting of bamboo.</p> <p><b>Specific objectives 2:</b></p> <p>To promote efficient and diversified utilization of bamboo with a view to generating income sources for the rural communities</p>	<p>Information available on sustainable management (plantation, silviculture and harvesting) of bamboo</p> <p>Information on the basic properties of the selected bamboo species</p> <p>Information on the efficient uses of bamboo in handicrafts and furniture</p> <p>Information on the manufacturing techniques of bamboo charcoal</p>	<p>Guidelines for improving sustainable management of bamboo</p> <p>Technical reports on bamboo species</p> <p>Technical reports on the basic properties of the selected bamboo species</p> <p>Technical reports relating to improvement of efficiency in bamboo furniture and handicrafts</p> <p>Technical reports on bamboo charcoal</p>	<p>Effective implementation of all project components.</p> <p>Skilled technical personnel</p> <p>Effective use of study results in the utilization of bamboo</p>
<p><b>Output 1.1 :</b></p> <p>Establishment of two demonstration plots for sustainable management of bamboo.</p>	<p>Bamboo forest area under management and experimental harvesting</p>	<p>A certain area of bamboo forests located, demarcated and brought under management and harvesting plans</p>	<p>Availability of bamboo forests for experimental harvesting and management</p>
<p><b>Output 1.2:</b></p> <p>Development of guidelines for sustainable management of bamboo, including plantation and harvesting</p>	<p>Guidelines for improving sustainable management of bamboo</p>	<p>Publication of guidelines for improving sustainable management of bamboo</p>	<p>Wise use of guidelines developed by the project to be effective</p>
<p><b>Output 1.3:</b></p> <p>Technology transfer on bamboo plantation, management and utilization.</p>	<p>Training courses on bamboo management</p> <p>Promotion activities on bamboo management and utilization</p>	<p>Training materials</p> <p>Course reports by participants</p>	<p>Participants willingness to adopt appropriate techniques on bamboo management</p> <p>Effective information, education and communication programme</p>
<p><b>Output 2.1:</b></p> <p>Study on mechanical, chemical and wood working properties of five bamboo species</p>	<p>Available information on the properties of bamboo needed in the production of furniture and handicrafts</p>	<p>Technical reports on the basic properties of selected bamboo species</p>	<p>Skilled manpower</p> <p>Effective implementation of all proposed research activities</p>

## ANNEX I. LOGICAL FRAMEWORK MATRIX (CONT.)

PROJECT ELEMENTS	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p><b>Output 2.2:</b></p> <p>Development of techniques for natural dyeing of bamboo handicrafts</p>	<p>Available information on the techniques needed to increase natural dyeing of bamboo handicrafts</p>	<p>Technical reports on the natural dyeing techniques of bamboo handicrafts</p>	<p>There is a demand for bamboo handicrafts</p>
<p><b>Output 2.3:</b></p> <p>Establishment of a cottage industry for the production of bamboo furniture parts, including handicrafts in Chiang Mai</p>	<p>Selection of an appropriate cottage scale industry in Chiang Mai for the production of bamboo furniture parts and handicrafts</p> <p><i>Through the women organization</i></p>	<p>Survey results on the communities need for a cottage bamboo industry</p> <p>Technical reports on the production of bamboo furniture parts and handicrafts</p> <p><i>Women organization established</i></p>	<p>The communities need to develop a cottage industry</p> <p>Availability of raw materials</p> <p><i>Bamboo handicraft women dominant cottage industry</i></p>
<p><b>Output 2.4:</b></p> <p>Development of bamboo charcoal techniques</p>	<p>Availability of information on the efficient processing techniques for bamboo charcoal</p> <p>Training courses on bamboo charcoal</p>	<p>A study tour report to the Forestry and Forest Products Research Institute and Kyoto Univ. in Japan</p> <p>Reports by participants in the training courses on bamboo charcoal</p>	<p>There is a demand for bamboo charcoal</p> <p>Availability of techniques</p>
<p><b>Output 2.5:</b></p> <p>Development of processing techniques for bamboo shoots</p>	<p>Available information on the efficient processing techniques for bamboo shoots</p>	<p>A study tour report to south China</p> <p>Feasibility study report of the establishment of a bamboo shoot plant in Chiang Mai</p>	<p>Cooperation from INBAR</p> <p>There is a demand for bamboo shoots</p> <p>Availability of information of marketing</p>

## ANNEX II. WORK PLAN

Output/Activities	Responsible Party	Schedule (in quarter) 3 years											
		1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th
<b>Specific Objectives 1</b>	RFD												
<b>Output 1.1</b>	NWFPs Experimental research station												
Activity 1.1.1: Identification of two demonstration plots in the north and northeast in Thailand		■											
Activity 1.1.2: Establishment of two demonstration plots for sustainable management of bamboo: site preparation		■	■	■	■								
Activity 1.1.3: Selection of 5 suitable bamboo species for each plantation site : by surveying of markets to find out local and national (as well as international) needs for basic consumption, production and marketing		■	■	■	■								
<b>Output 1.2</b>													
Activity 1.2.1: A literature review on sustainable management of bamboo INBAR, FAO and other sources		■	■										
Activity 1.2.2: Conduct research on sustainable management of bamboo (plantation, management, silviculture, harvesting)		■	■	■	■	■	■	■	■	■	■	■	■
Activity 1.2.3: Publication of guidelines on sustainable management of bamboo (in Thai)												■	■
<b>Output 1.3</b>													
Activity 1.3.1: To conduct a training workshop on sustainable management and utilization of bamboo in Thailand												■	■
<b>Specific objectives 2</b>	RFD												
<b>Output 2.1</b>	NWFPs Utilization Research												
Activity 2.1.1: Literature review on basic properties of bamboo from INBAR and other sources		■	■										
Activity 2.1.2: To collect sample specimen for potential bamboo species for commercialization		■	■										
Activity 2.1.3: To conduct research on bamboo properties in terms of mechanical, chemical, physical, preservation, drying and seasoning		■	■	■	■	■	■	■	■	■	■	■	■





### ANNEX III. CURRICULUM VITAE

**Family Name** DENRUNGRUANG  
**First Name** PANNEE  
**Date of Birth** 14 June 1957, Bangkok, Thailand.  
**Sex** Female **Nationality** Thai  
**Marital Status** Single **Region** Buddhism  
**Education** B.Sc. (Chemistry), 1981, Ramkhamhaeng University, Bangkok, Thailand  
M.Sc. (Organic Chemistry), 1988, Kasetsart University, Bangkok, Thailand

#### Other training

1. Chemical Processing and Utilization of *A. catechu*, India, 1989.
2. Statistics in Forest Research, Royal Forest Department, Thailand, 1989.
3. Forestry and Forest Products Research, Japan, 1991
4. Chemistry of Natural Products and their Biological Activity, Japan, 1994.
5. Marketing of Non-timber Tree and Forest Products, RECOFTC, Kasetsart University, Bangkok, Thailand, 1996.
6. Chemistry of Natural Products Research, Japan, 1998

**Languages** Thai/ English

#### Membership of Organization

1. Member of National Research Council of Thailand.
2. Member of South East Asia Sustainable Forest Management Network.

**Present** Scientist, Non-Wood Forest Products Development Sub-Division  
Forest Products Research Division, Royal Forest Department, Bangkok, Thailand.

#### Previous Experience

- 1988 to 1989 Co-ordinator on Chemical Processing and Utilization of *Acacia catechu* Willd, FAO Project.
- 1994 to present Co-ordinator on RETROF Project.
- 1996 Member of Organizing Committee in The International Conference on Forest Products, Royal Forest Department, Bangkok, Thailand.
- 1998 Lecturer on Organic Chemistry in Kasetsart University
- 1998-1999 Key Staff of PPD 4/98 Rev. 1(l) : Promotion of Tropical Non-Wood Forest Products (NWFPs) in Thailand

#### Publications

1. Properties of Benzoin. 1997
2. Germination and Growth-Regulation Effects on Seed of Plants from Sa-dao-thiam Extractives. 1997
3. Lignans From The Bark of *Persea Kurzii* Kosterm. 1996
4. The Composition of Fatty Acid From *Azadirachta excelsa* Seed. 1995
5. Gum and Resin in Thailand, 1995
6. The Composition of *Pinus merkusii* Jungh. Leaf Oil. 1993.
7. Analysis of Olearesin in *Pinus merkusii* Jungh. 1990.
8. Chemical Processing and Utilization of *Acacia catechu*. 1992.

**Family Name** NILKAMHAENG  
**First Name** NUCHANART  
**Date of Birth** 18 July 1959  
**Sex** Female  
**Marital Status** Married **Nationality** Thai  
**Education** B.Sc. (Chemistry), Thailand

**Other Training** Training in Chemical Processing and Utilization of *A. catechu.*,  
1 month in Forest Research Institute, Dehradune, India, 1989.  
Workshop on Community Management of Forest Lands,  
45 days in East-West Center, Hawaii, USA, 1995.

**Languages** Thai, English

**Present** Scientist, Non-Wood Forest Products Development Sub-division,  
Forest Products Research Division, Royal Forest Department.

**Previous Experience**

1996-1997 The Thailand Research Fund Project.  
Chief, The Study on Natural Dying Database in Northeastern of Thailand

1996 Membership of organizing committee in the International Conference of  
Forest Products, Thailand.

1998-1999 Key Staff of PPD 4/98 Rev. 1(l) : Promotion of Tropical Non-Wood  
Forest Products (NWFPs) in Thailand

**Publications**

1. The Study on Natural Dying Database in Northeastern of Thailand, 1997.
2. Lac: Promising Forest and Agroforestry Product in Thailand, 1995.
3. Chemical Processing and Utilization of *Acacia catechu* Willd., 1992.
4. Utilization of *Eucalyptus camaldulensis*, 1985.

**Family Name** THAIPETCH

**First Name** SUCHART

**Date of Birth** 3 July 1947

**Sex** Male **Nationality** Thai

**Marital Status** Married **Region** Buddhism

**Education** 1970 : B.Sc. (Forestry) Kasetsart University, Bangkok. Thailand.

**Languages** Thai/ English

**Present** The Senior Forest Officer at Forest Products Research and Development  
Division.

**Previous Experience**

- 1970 : The Forest Technical Officer joined in Forest Products Research Division,  
Royal Forest Department
- 1974 : Worked as the Officer in Phare regional forest Office.
- 1985 : Representative from RFD as the National Project Deputy Director of FAO  
project on Coconutwood Training Programme Up to present :

**Work experience :** Testing on mechanical properties and durability of rubberwood.  
Present the paper on Rubberwood Production and Utilization in Thailand on The  
International Forum on Investment Opportunities in the Rubberwood Industry.  
Kuala Lumpur, Malaysia.

**Family Name** PANYATHANYA

**First Name** WINAI

**Date of Birth** 6 June 1947, Pathumthani, Thailand.

**Sex** Male **Nationality** Thai

**Marital Status** Married **Region** Buddhism

**Education** B.Sc. in Forestry, Kasetsart University, Bangkok, Thailand

**Other training**

- 1 Rural Energy Planning, Netherland.
- 2 Wood Energy Activity in China, Malaysia, Srilanka, Myanmar, Philippines and USA.

**Languages** Thai/ English  
**Present** Head, Wood Energy Research and Development Sub-Division.  
Forest Products Research Division, Royal Forest Department, Bangkok, Thailand.

**Previous Experience**

1969 : Researcher  
: Head, Minor Forest Products Research Section.  
: Head, Wood Drying and Kiln Drying Section.  
: Head, Wood Energy Research and Development Section.

**Publications**

1. Rural Energy Planning Improvement for Rural Development in Thailand. 1984. (USAID)
2. A Survey on Industrial Fuel Wood Consumption in Thailand. 1993.
3. Emission from Charcoal Kilns in Thailand. (not finish yet)

**Family Name** KAYIKANANTA  
**First Name** LEELA  
**Date of Birth** 25 June 1949, Bangkok, Thailand.  
**Sex** Female **Nationality** Thai  
**Marital Status** Married **Region** Buddhism  
**Education** B.Sc. (Biology), Kasetsart University, Bangkok, Thailand  
Certification of Wood Entomology (Germany)

**Other training**

1. Training on Wood Entomology one year in Germany.
2. Study research in Forest Entomology and Bee keeping one year in Austria.
3. Study tour to Lac Cultivation and Utilization in People's Republic of China.
4. Study tour ten days in Wood Technology, Wood Utilization, Lac Cultivation and Insects Museum in Japan.

**Languages** Thai/ English

**Present** Non-Wood Forest Products Utilization Junior Expert of the Royal Forest Department, Thailand.  
Scientist, Non-Wood Forest Products Development Sub-Division  
Forest Products Research Division, Royal Forest Department, Bangkok, Thailand.

**Previous Experience**

1972 –1979 Research on Wood Entomology, Wood Protection Sub – Division.  
1980 – dated Chief, Economic Forest Insects Section, Non-Wood Forest Products Development Sub-Division, Forest Products Division.  
1994 – dated Deputy Director, RETROF Project in Thailand.  
1995 – date Lecturer on Non-Wood Forest Products and Sustainable Utilization.

**Publications**

1. Mass Rearing of Bamboo Caterpillar, *Omphispa* sp., a New Profitable Job for Extra Incomes. 1996.
2. Biological Study and Rearing Techniques on Bamboo Caterpillar, *Omphispa fuscidentails* Hampson. 1996.

**Family Name** SROITHONGKHAM  
**First Name** PRACHOEN  
**Date of Birth** 7 July 1960, Pathum Thani, Thailand  
**Sex** Male **Nationality** Thai



**Present** Technical Forest Officer, Chief of Sakon Nakhon  
Non-Wood Forest Products Experiment Station,  
Non-Wood Forest Products Development Sub-Division,  
Forest Products Research Division, Royal Forest Department

**Previous Experience**

1996 Lecturer and Trainer on Non Wood Forest Products Management, Thai-German Highland Developing Programme  
1988 to date Lecturer on Forest Product and Forest Conservation, Forest Fire Control Project, Sakon-Nakhon Province  
1984-1985 Chief Assistant, Royal King's Project  
Pangmapa Subdistrict, Maehongson Province  
1998-1999 Key Staff of PPD 4/98 Rev. 1(I) : Promotion of Tropical Non-Wood Forest Products (NWFPs) in Thailand

**Consultancies**

1. National Forest Products and Marketing Consultant in Ecodevelopment and Bufferzone Management Planning, Consultancies (TCP/THA/4453) Assisted the report on "potential for Non-Wood Forest Products in Buffer Zone Management"
2. Consultant for FAO. Project TCP/LAO/6611 "Improved Benzoin Production." in Laos.

**Publications**

1. The Growth and Resin Tapping of Lacquer Tree (*Melanorrhoea usitata*).
2. Yield and Tapping on Yang-Oil (*Dipterocarpus alatus*).
3. Yield and Bark Collecting of *Persea* sp.
4. Gum and Resin in Thailand
5. Case study "Rattan for Edible Shoot in Sakon-Nakhon"
6. Growth and Products of Rattan's Shoot, Planted in Various Intense of Light

**Family Name** WACHIRANUWAT  
**First Name** SAKOLSAK  
**Date of Birth** 1 June 1950, Pattani, Thailand.  
**Sex** Male **Nationality** Thai  
**Marital Status** Married **Region** Buddhism  
**Education** B.Sc. (Forestry), 1971, Kasetsart University, Bangkok, Thailand  
**Languages** Thai/ English  
**Present** Technical Forest Officer, Head of the Watershed Management Center  
Chiang Mai Forest District.

**Previous Experience**

1964 Head of the Watershed management Unit in Amphoe Proa, Chiang Mai, Thailand.  
1977- 1978 Head of the Watershed management Center in Amphoe Mae Tang, Amphoe Chiang Doa, Chiang Mai, Thailand.

**Main Activity** Planning, consulting and supervision of watershed management activity in eight Watershed Management Centers in terms of soil erosion control, forest fire control and community development.

## ANNEX IV. TERMS OF REFERENCE

### Project Leader

1. Manages and administers all activities of the project to attain set objectives. Control the disbursements of project funds to insure that they are spent in items in which they are intended.
2. Develops strategies for the effective implementation of the project.
3. Coordinates and classify the national and international consultants are requested for the project.
4. Coordinates with the community's forest, forest dwellers and with concerned individuals and organizations with respect to the use of bamboo plantations for experimental purposes as well as the collection of studies materials.
5. Makes presentations of project accomplishments during review, monitoring and evaluation of the project.
6. Prepare and submit project reports to ITTO.

### Qualification

1. Managerial experience-a proven track records in Managing program staff and finance.
2. International experience-deals with project of international organization-preferably project leader.
3. At least B. Sc. Biology, Forestry or related field.
4. Thai Nationality.
5. Both oral and written communication in English.
6. Experience in Non Wood Forest Products at least 10 years.

### International Consultants

International Consultants are requested as processing consultants for developing of bamboo products, such as high quality furniture, weaving and charcoal making. The consultant will:

1. Review of bamboo utilization based on existing literature consultations and field visits.
2. Carry out the analysis method of the bamboo products obtained from local traders and the pilot plant of the project to obtain necessary data for development on production method.
3. Review the existing commercial grading system in national or international market and propose possible new grading system to be introduced in the country.
4. Design a research method to develop the sustainable utilization of bamboo and train the project staff by actually carrying out.
5. Design practical procedures on 1) harvesting; 2) storage; and 3) post-harvesting treatment and 4) production processing
6. Assist in the development and implementation of a training program for the rural communities.
7. Prepare the technical report at the end of each mission including finding and recommendations and submit it to the project leader.

### Qualification

1. *At least B. Sc. in related field.*
2. *Both oral and written communication in English.*
3. *Experience in bamboo weaving and/or bamboo technology at least 5 years.*

## **National Consultants**

National consultants are requested as processing and management consultants. The processing consultants conduct for developing of bamboo furniture, weaving and shoot production. The management consultants conduct in term of development of bamboo plantation, cultivation, silvicultural method and sustainable harvesting system.

The processing consultant will:

1. Review of bamboo utilization in term of furniture, weaving and shoot production in present situation based on existing literature consultations and field visits.
2. Design and develop methodology for sustainable utilization both on many derivation of bamboo products and cottage machinery and train the project staff by actually carrying out.
3. Establish a pilot plant in the project site of demonstration and training activity.
4. Review the progress and problems encountered in the maintenance and development of the pilot plant and provide advice on problem solving.
5. Design practical procedures on 1) harvesting and storage technique; 2) products processing; 3) packaging; and 4) quality control and grading.
6. Assist in the development and implementation of a training program for the rural communities.
7. Prepare the technical report at the end of each mission including finding and recommendations and submit it to the project leader.

The management consultant will:

1. Review of bamboo ecosystem, silvicultural management based on existing literature consultations and field visits.
2. Design a research method to develop the sustainable management of bamboo plantation and train the project staff by actually carrying out.
3. Establish a research trial plot in the field to test different silvicultural method to obtain the sustainable management for quick return and long-term utilization and for demonstration.
4. Trial a suitable agroforestry model in the bamboo plantation for quick return.
5. Review the progress and problems encountered in the maintenance of the bamboo plantation in the project and provide advice on problem solving.
6. Design practical procedures on 1) propagation techniques; 2) thinning; 3) weeding management; 4) agroforestry model; 5) harvesting rotation and 6) post harvesting management.
7. Assist in the development and implementation of a training program for the rural communities.
8. Prepare the technical report at the end of each mission including finding and recommendations and submit it to the project leader.

### **Qualification**

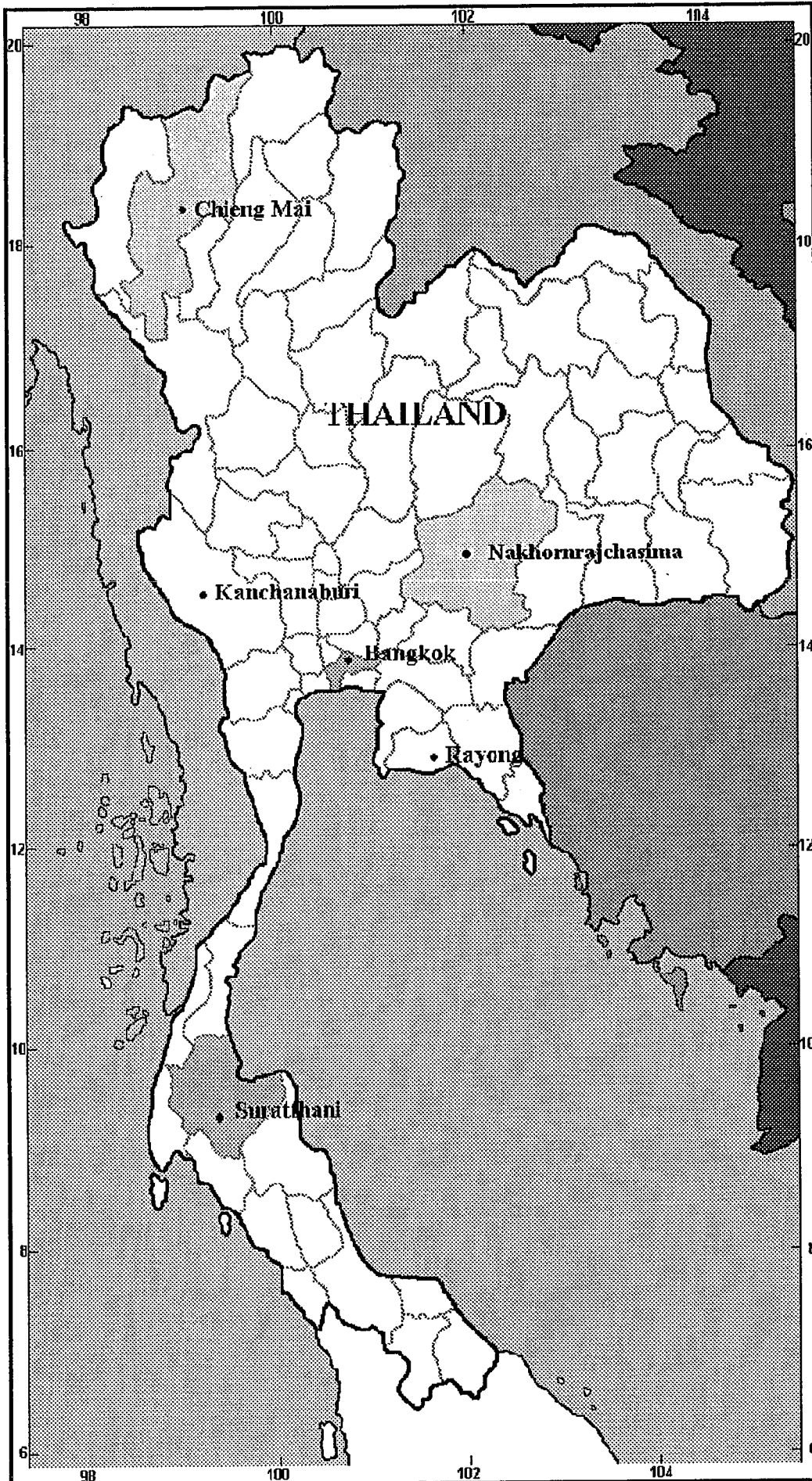
1. *At least B. Sc. in related field.*
2. *Both oral and written communication in English.*
3. *Thai Nationality*
4. *Experience in forest management for management consultant and bamboo technology for processing consultant at least 5 years.*



**ANNEX V. LIST OF CAPITAL ITEMS (US\$)**

<b>NO.</b>	<b>ITEM</b>	<b>QUANTITY</b>	<b>UNIT COST</b>	<b>TOTAL</b>
1	Project vehicle ( <i>1 ton, 4x4 double cab pickup, benzene engine</i> )	1	25,000	25,000
2	Bamboo Splitting Machine	2	2,000	4,000
3	Bamboo Slicing & inside knot removing Machine	2	3,000	6,000
4	Bamboo Stick Making Machine	2	3,000	6,000
5	Bamboo Sander Machine	2	2,000	4,000
6	Bamboo Laminating Machine	1	7,000	7,000
7	Bamboo Jointing Machine	1	3,500	3,500
8	Bamboo Shoot Processing and Canning Machine	1	17,000	17,000
9	Heating Mental Equipment	1	2,500	2,500
10	Charcoal Kiln (Brick) (productivity 2 m <sup>3</sup> )	2	600	1,200
11	Slide Projector	1	800	800
12	Camera set	1	3,000	3,000
13	Digital Duplicator (Riso Graph)	1	12,000	12,000
	<b>Total</b>			<b>92,000</b>

ANNEX VI. A MAP OF THE PROJECT SITES



## **ANNEX VII. INFORMATION ON THE PROPOSED TRAINING WORKSHOP**

### **A training workshop on bamboo plantation, management and utilization**

To organize a 4 days training workshop on bamboo plantation, management and utilization in Chiang Mai, 30 participants from rural people to be attended.

### **A training course on bamboo furniture part and handicraft**

To organize a 30 days training course on bamboo furniture parts and handicrafts in Chiang Mai, 15 participants from rural people to be attended.

### **A training course on bamboo charcoal techniques**

To organize a 7 days training course on bamboo charcoal techniques in Chiang Mai and Nakhornrajchasma, 15 participants from rural people to be attended.

## **ANNEX VIII. CLARIFICATION/JUSTIFICATION OF CAPITAL ITEMS**

### **Project Vehicle (Items 41)**

The **project vehicle** use in the project site, which is on the high mountain and quite terrible transportation especially in the rainy season. The type of vehicle is 1 ton, 4x4 double cab pickup, benzene engine.

### **Training equipment (Items 43)**

**Digital Duplicator(a copy machine)** is necessary to make document copies for organizing the training workshops and transfer knowledge and technology to the rural people which is the project objectives. This equipment is as following :

1. High efficiency and quality of copy.
2. Convenience and rapid for copying in a large amount of copies.
3. Save budget and time to make copies.
4. Independence and reliable document.
5. Very useful now and in the future.

**Camera set** use for taking photographes of the training workshops, monitoring and evaluation, including research work.

**Slide Projector** use for presentation in the organization of the training workshops, monitoring and evaluation of the project.

**ANNEX IX SUMMARY OF THE MODIFICATIONS MADE IN PD5 6/99 REV.1 (I)**

Recommendations of the 18 <sup>th</sup> Panel	Modifications
i. Improve the proposal by correcting spelling.	Spelling corrections were made.
ii. Include an activity to cover documentation on women in the unorganized sector relating to bamboo production and utilization in Chiang Mai.	An activity 2.3.4 : <u>To set up a housewife organization for bamboo handicrafts in Chiang Mai</u> is included as a new activity in the Section 5 "Activities and Inputs".
iii. Provide detailed information on the proposed training workshop with venue, target audience and topic.	The details are provided in Annex VII (page 33).
iv. Provide qualifications for the intended international and national consultants in the term of reference.	The qualifications are added in the terms of reference on pages 29 and 30.
v. Reduce the budget, in particular in relation to the two study tours and duty travel.	Amount of US\$ 4,000 in the study tour to China was reduced. Amount of US\$ 6,000 in the DSA was reduced. Amount of US\$ 8,000 in the capital items was reduced. (Tables 2, 3 and 4, on pages 14-19)
vi. Provide clarification/justification for the purchase of the training equipment (e.g. Digital Duplicator) and clarify the type of the project vehicle to be purchased (e.g. 4x4 jeep or truck).	Clarification is provided on Annex VIII page 33.
vii. Rework Table 3. "Overall Budget by Activity and Component" to reflect correctly the budget for the project personnel by each activity.	The corrections are in form <i>italics</i> in the Tables 3 and 4 on pages 16-19.