

INTERNATIONAL TROPICAL TIMBER ORGANIZATION

ITTO

PROJECT DOCUMENT

TITLE	SUSTAINABLE MANAGEMENT AND UTILIZATION OF SYMPODIAL BAMBOOS IN SOUTH-CHINA
SERIAL NUMBER	PD 10/00 REV. 2 (I, F)
COMMITTEE	FOREST INDUSTRY
SUBMITTED BY	GOVERNMENT OF CHINA
ORIGINAL	ENGLISH

SUMMARY

The aim of this project is to institute the technique system of utilizing and maintaining the abundant sympodial bamboo species in south China so as to ensure the resource and economy development and ecological environment improvement. The project will establish one conservation garden of sympodial bamboo genetic diversity based on the analysis of genetic resource; identify two 1,000-ha experiment and demonstration areas, where the high-yield and high-benefit management models will be implemented based on the studies of ecological management technology of the stands for the maintenance of long-term site productivity, and the activities of genetic improvement of the species; build two pilot processing plants of bamboo timber and bamboo shoots in Guangdong province and Guangxi Autonomous region, respectively. The project results will be spread to the bamboo-growing regions by training courses and propagation for the enhancement of farmer' capability of resource management and utilization.

EXECUTING AGENCY	THE RESEARCH INSTITUTE OF SUBTROPIC FORESTRY, THE CHINESE ACADEMY OF FORESTRY (RISF-CAF)	
DURATION	3 YEARS	
APPROXIMATE STARTING DATE	UPON APPROVAL	
PROPOSED BUDGET AND OTHER FUNDING SOURCES	Source	Contribution in (US\$)
	ITTO	482,452
	Gov't of China	213,600
	TOTAL	696,052

**SUSTAINABLE MANAGEMENT AND UTILIZATION
OF SYMPODIAL BAMBOOS IN SOUTH-CHINA**

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PART I . CONTEXT

A. RELEVANCE TO ITTO

1. Compliance with ITTO objectives

This project is consistent with the following objectives of the International Tropical Timber Agreement (ITTA 1994):

- 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;
- 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;
- 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 interests of local communities dependent on forest resources;
- l. To encourage members to develop national policies aimed at sustainable utilization and conservation of timber producing forests and their genetic resources and at maintaining the ecological balance in the regions concerned, in the context of tropical timber trade;

2. Compliance with ITTO criteria

This project is also consistent with all the criteria established by ITTO as follows:

- a. They should be related to the production and use of industrial tropical timber;
- b. They should yield benefits to the tropical timber economy as a whole and be relevant to both producing and consuming countries;
- c. They should be related to maintaining and expanding the international trade in tropical timber;
- d. They should offer reasonable prospects for positive economic returns in relation to costs;
- e. They shall make maximum use of existing research institutions and avoid duplication of effort to the maximum extent.

3. Relationship to ITTO action plan and priorities

This project is consistent with the priorities established by the Committee on Reforestation and Forest Management, in particular the following:

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

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

2. Establish guidelines for sustainable forest management.

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

- Establish and secure forests (e.g. a Permanent Forest Estate) likely to remain under forest cover in the long-term, including:

- classifying a sufficient proportion of totally protected area for conservation purposes (including tree species conservation, bio-diversity conservation and watershed protection);

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

Goal 2: Improve the tropical timber resource 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.

3. Compile and publish guidelines for the rehabilitation of degraded forests and forest land, including guidance on the management of secondary forests.

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

- Improve the formulation and implementation of forest management plans, which limit harvesting to the sustained yield capacity;

- Apply guidelines on reduced-impact-logging in order to minimize the damage done by timber harvesting to the physical and social environment and the forest ecosystem;

- Expand the productive capacity of natural forests through intensified silvicultural practices such as better utilization of lesser-used species, promotion of Non-Timber Forest Products, guided natural regeneration, enrichment planting and reforestation;

- Intensify and promote research and development activities in the rehabilitation of degraded forests and forest land, mixed timber tree plantations and secondary forest management.

Goal 3: Enhance technical, financial and human capacities to manage the tropical timber resource base.

1. Promote access to, and transfer of, technologies and encourage technical cooperation for sustainable forest management, forest restoration and reforestation.

2. Enhance networking and technology transfers amongst forest education centres, forest owners and managers, in the fields of natural forest management, harvesting and forest restoration.

3. Design and conduct regional training events to enhance technical and human capabilities to manage the resource base.

4. Facilitate exchange of information and experience on natural forest management, forest restoration and timber plantations amongst member countries, Non-Governmental Organizations and industries.

5. Disseminate results and lessons learned from ITTO projects and activities to interested member

countries, Non-Governmental Organizations and industries.

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

- Promote and support research in forest dynamics (growth and yield studies) in different forest types and under various management schemes;
- **Allocate adequate numbers of trained people to implement effectively sustainable forest management;**
- Analyze and apply existing data and knowledge in forestry, in order to ascertain what is, or can be made, relevant to the operational knowledge of forest ecosystem behavior and to incorporate that information into preliminary management prescriptions.

The Project is also consistent with the priorities established by the Committee on Forest Industry particularly the following:

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

3. Assist in the promotion and transfer of new and/or improved techniques and technologies.
5. Assist human resource development and institutional strengthening by designing and conducting regional and international events such as specialist workshops and seminars and by the provision of fellowships.
6. 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, technology and the development, testing and adoption of guidelines;
 - **Undertake sector wide training needs analysis; development of training strategies, training facilities and course curricula; preparation of training manuals and delivery of training courses.**

Goal 2: Improve marketing and standardization of tropical timber exports.

1. Monitor the impact of standards and review the need for action on harmonization in concert with relevant national and international bodies.
3. Encourage and assist Members, as appropriate, to:
 - Prepare and implement Research and Development projects covering marketing trials, marketing methods and opportunities.

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

1. Develop, publish and disseminate guidelines on increasing utilization efficiency and the reduction of losses and waste throughout the production chain.
2. Facilitate and encourage development of demonstrations, which address increased efficiency in the widest sense.
4. Assist in the promotion, transfer and adoption of new and/or improved techniques and technologies through publications and other media, workshops, seminars and fellowships.
5. Encourage and assist Members, as appropriate, to:
 - Develop, test and adopt regional and national guidelines that assist in the efficient conversion of

raw material and help minimize waste and losses at all stages;

Create and publicize demonstration proje **As mentioned above, this project is directly in line with the ITTO Action Plan and Priorities, as well as national policies and strategies towards sustainable forestry management and biodiversity conservation. At same time it also contributes to the commitment of Chinese Government to the International Convention on Biodiversity Conservation.**

By studying the ecological functions of sympodial bamboo stands, the biodiversity state and genetic improvement of priority species and establishing two pilots for ply-bamboo and bamboo shoots production, this project will provide rich information and knowledge for developing and extending the techniques of sustainable management and high-benefit utilization. It will help improve the biodiversity conservation, particularly genetic diversity conservation of bamboo resources, enhance the rehabilitation of degraded land for planting bamboo, develop high-benefit utilization, as well as promote the international exchange and cooperation.

B. RELEVANCE TO NATIONAL POLICIES

1. Relationship to sectoral policies affecting tropical timber

This Project is consistent with the principles stipulated in the following legal instruments:

Forestry Law (1984), and Some Decisions on Forest Protection and Forestry Development (the State Council, 1981)

The aim of the country is to promote forestry productivity and sustainable development of forestry resources. It is indicated in Forestry Law that forest resources include forests land and the wild animals and plant grow on it.

Marketing Policy: Ten Policies Toward Further Stimulate Rural Economy (the State Council, 1985)

The main point of this regulation is to reform the state monopoly for purchase and marketing system of agricultural products, which including forests products. According to the regulation, in 1985, the bamboo timbers and all bamboo products can be purchased and sold free on market needs.

Bamboo Harvest and Transportation Policy:

Forestry Law,

Detailed Rules and Regulations of Forest Law,

Circular on Implement Forest Resource Harvest Quota during the "Eight Five Year Plan" (the State Council)

Those law and regulations indicate that the bamboo harvest quota, harvest and transport permission is carried on to guarantee sustainable use of bamboo resources and reduce resource damage due to market failure.

Wildlife Protection Law.

The main point of this law is to ensure the sustainable use of forest resources and protection of

wildlife.

Decision of the CPC Central Committee on Several Major Issues Concerning Agriculture and Rural Work (Adopted at the Third Plenary Session of the 15 CPC Central Committee on October 14,1998)

There are some policies in related to this Project in this document as follows:

1. Achieving sustainable agricultural (that including forestry) development.

Infrastructure construction and forestry development must be strengthened with the focus on water conservation, the arable land, forest vegetation and water resources be strictly protected, and soil erosion, land desertification and environmental pollution be prevented, so as to improve production conditions and protect the ecological environment.

2. Forest resources should be protected in accordance with the law. The main operation of forest industrial enterprises should be readjusted right away to switch from felling to afforestation. Felling in natural forests should be stopped in a planed way.

3. The principle of poverty relief through production development should be adhered to ensure the work materialized in each household. The input in poverty relief should be increased by a big margin through various channels and the method to provide work as a form of relief program should be improved, with focus on improving basic production and living conditions and the development of cultivation and breeding undertakings.

2. Relationship to subsectoral aims and programs

"Forestry Action Plan in China toward 21 Century" and "the National Report on Sustainable Development of Forestry in China" had been formulated by the State Forestry Administration of China, which indicated that the strategic framework objectives will be realized by the middle of next century. Over 600,000 hectares of bamboo forests will be planted by 2010, among it the sympodial bamboo occupy one third and the elite species occupy 50 percent.

3. Institutional and legal framework

The Research Institute of Subtropical Forestry, the Chinese Academy of Forestry (RISF-CAF) will be responsible to ITTO for the technical and administrative implementation of this Project. RISF-CAF will appoint a Project Director and will establish the policies and strategies to be followed by the Project.

The Research Institute of Subtropical Forestry (RISF) of the Chinese Academy of Forestry (CAF) are introduced as follows:

Being the public welfare forestry institute, RISF aims to identify forestry problems and find solutions to them in the subtropical and tropical area of China.

RISF comprises the China Subtropical Forest Research Laboratory under the Chinese Ministry of Forestry and 6 research divisions, named Forest Genetics and Breeding, Forestry Resources and Utilization, Bamboo Research, Forest Ecology, Forest Protection and, Biotechnology. 180 scientists, technicians and administrators work for RISF now, including 12 research professors.

The central experimental base around the headquarter of RISF occupies 800 hectares in area, in which various experimental trial stands have bee established and formed a subtropical forest specific bank. More than 50 experimental or pilot bases have been established in 11 provinces in the subtropical or tropical areas.

Since its founding, RISF has successfully completed more than 100 research projects and was awarded the national or ministry and provincial prizes for significant achievements in over 40 projects. RISF has achieved great progress in forestry science particularly in the fields of bamboo research, tree genetics and breeding, cash-tree forestry and biotechnology, which have become its advanced research areas.

PART II. THE PROJECT

1. ORIGIN

This Project proposal derives from the need to develop technologies and superior planting materials for the sustainable management and effective utilization of sympodial bamboo resource in the southern region of China so as to ensure the sustainable social and economic development of the region and the preservation of ecosystem and biodiversity.

China is the largest bamboo-growing country in the world, where more than 40% and 30% of the world total bamboo species and growing areas are located. Bamboo stands covers 7 million hectares in 16 provinces of south China, mainly in mountainous areas. The economic development of the region is relatively fast, but is very unbalanced. There are 984 mountainous counties with dense population and less developed economy, about half of the 58 million poverty population of the country live in this area, their main way of development depend on mountainous economy and forestry. The total output of bamboo sector of China valued 2.2 billion US\$ in 1997, bamboo economy played very important role for the life of mountainous farmers since 93% of the managed bamboo area is contracted to farmers.

There are more than 500 bamboo species in 39 genera in China, Moso bamboo (*Phyllostachys heterocycla* var. *Pubescens*), a monopodial species, is the most of economic importance which covers 2.72 million hectares, accounting 70% and 76% of the total managed bamboo stand area and volume respectively. The more than 290 species in 20 genera of sympodial bamboo, widely distributed in the south subtropical and tropical region of southern China, accounts less one third of the total managed bamboo stands, only a few species have been utilized on certain scale in some regions. Compared with moso bamboo, the research activities of sympodial bamboo are less. Although the managed area is increased, but the management and utilization level has no big change, the production effect is lower. At the same time, large areas of natural bamboo stands have been reformed as low-value forests, resulting the increased water and soil erosion, deteriorated living environment of human and biodiversity loss.

Chinese forestry management departments and researchers, understanding the important role of bamboo for the ecological environment and social and economic development, have deep consciousness that it is necessary and urgent to adjust the economic structure of bamboo forestry and change the economic development pattern for the present knowledge of the management technology of sympodial bamboo can't meet the demands and the management pattern is unfavorable for the sustainable forestry development.

This program proposal focuses on the need of sympodial bamboo development, researching and putting up the sustainable management and utilization technologies of the main prior species, and launching the technical demonstration and transfer, so as to promote the economic development and

the improvement of human life of the region, protect the ecological environment and biodiversity.

2. PROJECT OBJECTIVES

2.1 Development objective

To develop the knowledge and technologies on sustainable management and improved utilization of sympodial bamboo resources, so as to contribute the socio-economic development of the rural communities, to ensure the conservation and preservation of southern-subtropical and tropical forest ecosystems and biodiversity in south China.

2.2 Specific objectives

- To understand the ecological function of the bamboo stands and the biodiversity state in order to facilitate sustainable management system of sympodial bamboo.
- To promote efficient utilization of sympodial bamboo resources with the aim of promoting economic development and improving the living standard of rural poverty population.

3. PROJECT JUSTIFICATION

3.1 Problem to be addressed

Sympodial bamboo stands have been managed for timber, shoot, and pulping. There are large area of mixed forests in remote mountains and also vast stands for embankment-protecting along rivers in some regions. The stands play important role for the regional economy and land safe.

In a period of past, bamboo had been considered as low-value non-timber products. Along with the fast decrease of forest area and the valuable timber resources, the management and utilization of bamboo stands have being paid attention popularly. Generally speaking, however, sympodial bamboo resource has not been given reasonable development and protection in China. Among the 290 species, only about ten more species, including *Dendrocalamus latiflorus*, *Bambusa textilis*, *B. pervariabilis*, *Neosinocalamus affinis*, *Dendrocalamopsis oldhami*, *D. hamiltonii*, *Lingnania chungii* etc., have being managed in certain levels. Taking *Bambusa textilis* stands as an example, the annual productions of different sites and management levels are between 3880~33580kg/ha, showing the great potential. It needs to develop researches and technical extension to reform the low-yield stands and increase the productivity.

In some main growing areas, the monopodial bamboo stands are usually managed in high intensity to ensure the high yield, with the treatments such as purified stand culturing, high-intensity harvesting in short rotation, overall land preparation, chemical fertilizer application. However, those treatments just improve the short-term economic outputs, and usually damage the ecological functions and the bases of long-term site productivity of stands. Under such states, the high stand productivity can only be maintained by frequent intensive culture activities. Such kind of management pattern would cause the decrease of site quality, and the harmful effects for the stability and sustainability of ecosystem and social economy.

Due to the special biological characteristics, bamboo plants extend their limits mainly by vegetable propagation. Most of the planting materials are not the superior ones of genetic meaning, so the increases of management effects are mainly depending upon the improvement of culture methods. The knowledge of genetic variation and genetic resource of bamboo are very limited. Although some new raising methods of planting material have been conducted, there are few genetically improved elite materials to be propagated. Finite activities of hybridization breeding are also done unsystematically. So the backward of genetic improvement restricts the increase of production level of bamboo plantations in great extent.

Traditionally sympodial bamboo plants are mainly used for raw culms and shoots. In recent years, the processing industry of bamboo culms has been run rapidly in China, but mainly upon moso bamboo resource. The popular development of village and township enterprises bring certain economic benefits, however, it has the disadvantages of low rate of culm utilization and unstability of product market.

Local governments have had the ideas of reforming the structure of bamboo species resource and developing the local economic species of regional characteristics with certain efforts. It needs to manage the resources in scale and develop new products so that the competition ability of products and economic effect could be increased. Chinese bamboo researchers have been studying the technologies of intensive silviculture and utilization of sympodial bamboo resource in unsystematically, and the results are still not meet the demands of sustainable development of bamboo forestry due to the past limits of science knowledge and research conditions.

3.2 Characteristics of the region

Chinese sympodial bamboo species distributed in the provinces to the south of Yangtze River, of the tropical and south subtropical climate zones. Nearly 2 million hectares stands mainly grow in river beaches, mountainous valleys, and hilly lands below altitude of 600m. The map showing the regions where sympodial bamboos grow in tropic and sub-tropic within the ITTO mandate is shown in the Annex 5.

Two research sites in Guangzhou (N 23° 10' , E 113° 10) and Pingxiang (N 22° 8' , E 106° 42') in southern part of Guangdong and Guangxi province respectively with more than the 210,000 km² of total area, are both located below the Tropic of Cancer. The social economic development in these areas is fast in recent years, but in the mountainous villages, the development is relatively slow due to huge population, limited farming land resource, backward agricultural technology and conditions.

There are more than 110 sympodial bamboo species growing in this region, of which the dominant species, such as *Dendrocalamus giganteus*, *Bambusa textilis*, *D. latiflorus*, *D. membranaceus*, *D. strictus*, *Bambusa arundinacea* and *Bambusa bambos*, will be list as the priority species in the this Project. They are same or similar to those in the South-east Asia countries and widely grown near the China-Viet Nam boundary.

The climate conditions are superior in this area, it is moist and hot in summer and drier in winter. The mean annual temperature is 20~22°C, the mean January temperature is 10~14°C, the minimum and maximum temperatures in most regions are above 0°C and below 38°C, the annual accumulate

temperate is 7000~7500 °C .The annual rainfall ranges from 1500~2000mm. The soils are mountainous lateritic red soil and red soil, and alluvial soil in basin and plain area, the natural fertility is good. But there is serious water and soil erosion in the mountainous areas where the vegetation has been damaged, the soil become poor.

The region has a long farming history, it is the main cultivation area of sympodial bamboo of China. The local governments start to try to develop bamboo industry with great effort for promoting the rural economy. This program is in line with the needs of production to science and technology, and is of benefit to the sustainable development of bamboo industry.

3.3 Other relevant aspects of “ pre-project situation”

According to the pre-studies, it is found that the soil erosion, ecological environment degradation and biodiversity diminution in the project-conducted regions have been accelerated due to the high dense population, low land resources per capita and the decreasing of forest area

There exists a great potential in developing sympodial bamboo industry, which will be beneficial to the protection of environment, the improvement of the employment opportunities and farmer’s living standard.

3.4 Intended situation after project completion

After project completion there will be sufficient information on the structure and function of the ecosystem, the effects of management treatments to the maintenance and recovery of the function and long-term productivity, so that the sustainable management technologies of sympodial bamboo resources can be put forward.

There will be more clear understanding about Chinese sympodial bamboo species resource and the genetic resource of the priority species, the initial protection and utilization strategy of genetic resource will be formulated. By genetic improvement, superior planting materials will be provided for the development of sympodial bamboos.

The demonstration and extension of the technologies of sustainable management and high-efficient utilization, will increase the benefits of bamboo industry, promote the enthusiasm of farmers, fasten the progress of economy development and farmer’ welfare.

The utilization of the program results in the broad production area of sympodial bamboo, will benefits the change of economic development pattern from area expanding to productivity rising. It will promote the sustainable utilization of forest resource and the conservation of biodiversity in south China.

3.5 Target beneficiaries and others affected

The direct beneficiaries of the project will be the farmers of sympodial bamboo areas. The management level and benefits will be increased, and the surplus labors can be employed by the

development of product deep-processing enterprises, so that the farmers can get more income.

The transfer of stand management pattern will benefit the land safeguarding and the sustainable development of south China where there are frequent natural disasters.

The technologies and experiences will also be applicable to the sympodial bamboo production of southeastern Asia.

3.6 Project strategy

3.6.1 Reasons for selection

The essential reason for the project design is based on the following:

- 1) It needs to improve present conditions that the bamboo economy depends mainly upon the expansion of plantation area due to low average productivity of bamboo land, and ensure the conservation of resource by developing technologies.
- 2) It is essential to expand the research results of comprehensive utilization to increase the utilization ratio of sympodial bamboo resource and the product diversity so that the management effects can be enhanced and the resource waste can be decreased.
- 3) The research result extension, demonstration, transaction and technical training are important to increase farmers' income and their capability and enthusiasm of managing sympodial bamboo resource.
- 4) In order to reach the proposed objectives, the project plans to establish one genetic resource conservation garden, two experimental and demonstration areas for the management, and to build two pilot plants for the processing of sympodial bamboo products.

3.6.2 Lessons drawn from past evaluation

The sympodial bamboos, usually taken as low-value culms by local communities, were negligent in many sympodial bamboo growing regions in the past decade years, while the Moso bamboo were paid a great attention. Only few traditional products were produced in few traditional sympodial bamboo-growing regions. Although the area of sympodial bamboos has been raised fast in some regions, it could not obtain the economic benefits due to lack of updated technologies of management and processing. Owing to the irrational measures taken in some intensive management stands, the ecological problems occurred such as serious disease and insect, site environment and losing soil and water, which led to degradation of ecological function and decreasing of long-term productivity.

Up to now, there still is no virtual progress for the genetic study of bamboo plants, hindering the improvement of planting materials. Chinese bamboo researchers had put forward the techniques of vegetation propagation for some sympodial bamboo species, done some hybridization breeding occasionally from which a few superior clones have been obtained. The works show there is a great potential for bamboo improvement, and also indicate that it needs deeply understanding of the genetic

variation patterns and genetic resource for the strategy development of systematic genetic improvement and conservation of genetic resource.

Chinese people have clearly known the importance of science and technology for increasing yield and income, and have a thirst for advanced techniques. Governments of various levels have built more perfect system of technical extension. Those factors would ensure the utilization of the project results and the realization of designed objectives.

3.6.3 Technical and scientific aspects

In order to develop management and utilization technologies for sympodial bamboos, it is essential for the project to carry out research that will provide information on sympodial bamboo species such as the ecological function of different kind of stands, the current bio-diversity states and the conservation techniques, the effects of different management measures on site productivity of priority species, the patterns of genetic variation and methods of genetic improvement, the physical, mechanical and chemical properties and others. Those basic studies will promote the rational development of sympodial bamboo resource.

The great achievements of bamboo sector development have been obtained based on the results of systematic scientific research on important economic monopodial bamboo species, especially for Moso bamboo, which included the rule of growth and development, biological characteristics, ecological habit, structure of bamboo stand etc. The various high-yield cultivation technologies have been developed for directional forests such as bamboo shoot, timber, timber-shoot, pulping and other multiple purpose stands. The effects of culture measures on long-term site productivity have been realized to some extent. The improvement of processing technologies of bamboo timber and shoot has changed traditional methods of bamboo products. All of those knowledge and technology have been laid out a base for carrying on the project.

3.6.4 Economic aspects

Resource potential

The sympodial bamboo distributed wildly in the south China with the favorable natural conditions of warm temperature and rich rainfall and spacious land suitable for sympodial bamboo growth, where is one of the main regions to develop forestry and ecosystem in China.

There are abundant sympodial bamboo resources, more than 290 species have formed various bamboo forest styles. Most of them with economic benefits by exploited rationally, have also played an important role in protecting natural environment.

There are shortages of agriculture lands but abundant hilly lands and labor resources in the southern mountain areas. The development of bamboo sector in both forest management and product processing, can generate income for local community and provide employment opportunities for rural and suburban surplus labors

Potential markets

The total output value of bamboo sector in 1997 reached about 2.2 billions US\$, which include 1.08 billions US\$ of processing industrial output, and the export value reached 400 million US\$. China

has a large population that lead to increased demands of bamboo products. In addition, although China's bamboo resources occupied a third of that in the world, its export value of bamboo products only occupied less than ten percent in international market. Therefore, there are larger potential markets for bamboo products both in domestic and in international market.

Markets for project products

The economic effect of bamboo forestry is significant. According to case survey on the soci-economy of bamboo sector in Anji, Zhejiang province, a moso bamboo abounding county in north subtropical region, it was reported that the demand for the bamboo products is increased steadily both in the national and export markets. The total annual output of bamboo forestry in Anji amounted to 220 million RMB Yuan, which occupied 39.7 percent of total agriculture output in 1993. The farmers' earnings from bamboo forestry-based activities occupied 28.6 percent of the total. The output value of one-hectare bamboo stands averages 3.9 thousand Yuan. Therefor, the bamboo sector has become the important economic mainstay in Anji's.

By developing and extending appropriate technologies of sustainable management to steadily enhance the yield per unit area, and applying advanced processing technologies to increase the addition-value of products as well as decrease the cost of raw materials, this program could significantly improve the economic benefits of sympodial bamboo forestry.

Besides, based on the national plan, 200 thousand hectares of new sympodial bamboo plantations are going to be established where around 50% of superior clones and plantings should be adopted, so one of the project products, result of the genetic improvement, has a big potential market.

3.6.5 Ecological/environmental aspects

Bamboo plants grow and propagate fast. As an important component of the globe vegetation, bamboo forests show good ecological function and play important role in whole natural ecosystem.

The role of forests, especially tropical forests, in sequestering carbon, consequently, to reduce carbon dioxide in the atmosphere and limit the rise in the ambient temperature of the earth has being understood. The great majority of bamboo spreads gregariously in the tropics within the broad band circumscribed by the Tropics of Cancer and Capricorn, mainly in the South and Southeast Asian tropical regions. As the fastest growing plants, the likely contribution to the global accounting of carbon sequestration by bamboo alone could be quite significant.

As evergreen plants, bamboos sprout new culms every year, and are harvested in selection thinning pattern. So bamboo stands are relatively stable population. Its fine mat of fibrous root system is efficient in binding soil particles together, especially in tropics where the soil is most easily lost when exposed to the high-intensity rainfall. The results of studies have showed that bamboo ecosystem have better water and soil conservation function than other plantations.

Bamboo vegetation is also the food resource and habitat for some valuable and dangerous wildlife such as panda.

One of the main project objectives is to ensure the conservation of bamboo forest ecosystem and bio-diversity. The implementation will be beneficial for the resource protection and the improvement of

ecological environment, and ensure the rational exploitation of sympodial bamboo resources.

3.6.6 Social aspects

The achievement of project objectives is based on the active participation of the local farmers, governments and other relevant parties. As a result of recent policy and economic system changes in China, a number of households, organizations and local governments have participated in the bamboo sector. For bamboo project the government and related departments have usually served as the sponsoring agencies and the local forestry bureau, science and technology departments and forestry associations as the executing agencies.

Most of farmers in mountainous area realize that it is a good way to improve the living condition by developing bamboo sector. Bamboo farmers will be organized into the project. Historically Chinese women are also the main effort of agricultural activities, in fact women have being involved in bamboo forestry activities from forest culture to product processing.

The development of bamboo forestry in China has a huge potential and good condition. It can get more profit for local communities in short term with less investment, and provide working opportunities for surplus labors. It has great significance for socio-economic development.

3.6.7 Managerial aspects

The Project implementing agency will be the Research Institute of Subtropical Forestry under the Chinese Academy of Forestry (RISF-CAF) of the State Forestry Administration of China, collaborating with the Forestry Departments of **Guangdong Province and Guangxi Autonomous Region** and the Bamboo Engineering Research Center of Nanjing Forestry University along with technical operation with INBAR which may have a lot of information and knowledge on sustainable management of the sympodial bamboo.

The management structure of the project will comprise a Steering Committee made up of the Director of RISF-CAF, an ITTO representative, and several representatives from the study regions.

3.7 Reasons for ITTO support

3.7.1 ITTO aspects

As stated in Part I of this project proposal, the Project is consistent with ITTO Objectives and Criteria as well as Action Plan and Priorities.

3.7.2 Relationship to relevant actions supported by other donors

There are no other potential donors for the implementation of this project.

3.8 Risks

There will be minimal risks which could hamper the success of the project listed as follows:

- Political instability;
- Lack of forest sub-support for the project;
- Lack of interest of the local rural communities;
- Shortage of raw material supplies;
- Lack of markets for project products;
- Lack of information, skills and labors to develop appropriate technologies;
- Ecological and environment factors; and
- Lack of financial resources to coordinate and implement the project.

The risks can be overcome with following reasons:

- Since 1978 there has been political stability and economic development with high speed in the country.
- The forest sub-sector and local governments fully support the implementation of such kind of project.
- It is also expected that during the project, the local communities would realize the benefits of this project. The local communities, particularly in poor region, are increasingly interesting in development of bamboo sector in order to improve their living standards due to the characteristics of fast propagation and growth and short harvest rotation of sympodial bamboo.
- Existing of over 290 species and over 2 million ha of sympodial bamboo ensures the supply of the raw material for the project.
- Although bamboo sector has made considerable achievements and great contributions to the society, its development in plantation establishment, productivity and processing industry is not meet the increasing domestic and international demands for bamboo products.
- There are a large number of researchers for bamboo sector in China, they are rich of experiences. Bamboo production and processing have a long history in the country, there are rich technological accumulation. In addition, the project will be supported technically for information and knowledge by INBAR.
- There are no ecological or environmental risks. One of the aims of this project is to protect the ecological environment, and the project will be consistent with sustainable harvesting principles.
- The project is consistent with country's industrial and poverty relief policies, and will be fully supported and partly financed by Chinese government and local governments for implementation.

4. OUTPUTS

The following outputs are expected after the three-year project implementation period:

OUTPUT No. 1

The knowledge of the ecological functions of various sympodial bamboo stands and the bio-diversity maintenance of those species.

OUTPUT No. 2

Two demonstration regions for sustainable management models of priority sympodial bamboos with a

total area of 2000 ha in **Guangzhou city of Guangdong province and Pingxiang city of Guangxi Autonomous Region** , which are useful for improving the economic situation of rural areas in south-east Asia.

OUTPUT No. 3

A pilot plant with improved high-value added technology for the production of ply-bamboo in **Guangzhou of Guangdong province**, which will benefit to the poverty alleviation of rural areas in developing tropical countries.

OUTPUT No. 4

A pilot plant for the production of tropical sympodial canned shoots in **Pingxiang city of Guangxi Autonomous Region**, which will give help for promoting the utilization of sympodial bamboo shoot resources in South-east Asian countries where it is usually not paid attention in this area except Thailand.

OUTPUT No. 5

A training and promotion program on the sustainable management and utilization of sympodial bamboos.

5 ACTIVITIES AND INPUTS

Table 1 shows the main inputs required for each activity.

TABLE NO. 1

MAIN INPUTS BY ACTIVITY										
OUTPUTS/ACTIVITIES	Technical team (m/m)	Sub-contracts (units)	Workers (m/m)	Travel (units)	Computer equip. (units)	Vehicles (units)	Plant equip. (units)	Tools	Office materials	Fuel & lubric. (gallons)
Output No.1: The knowledge of the ecological functions of various sympodial bamboo stands and the bio-diversity maintenance of those species.										
Activities										
1.1 Gathering of information and establishment of research strategy	15		60	8	1			1	3	
1.2 Surveying on the ecological functions of sympodial bamboo forest	5		40	2				5	2	500
1.3 Conservation of the genetic diversity of sympodial bamboo	15	1	70	3		1		2	3	1000
Output No.2: Two experimental sustainable management models of sympodial bamboo in total area of 2000 ha in Guangzhou city and Pingxiang city respectively.										
Activities										
2.1 Gathering of information and definition of research plan	25		65	8	1			1	3	
2.2 Demarcation of demonstration areas and research plots	4		25	1				1	2	500
2.3 Implementation of study on sustainable management techniques of sympodial bamboo	4		5	1				2	2	
2.4 Implementation of study on genetic improvement techniques of sympodial bamboo	4		5	1				2	2	
2.5 Implementation of research on vegetative propagation of sympodial bamboo	4		5	1				2	2	
2.6 Implementation of establishing the demonstration model of sympodial bamboo stands.	35	1	280	3		1		5	3	2000

TABLE NO.1 (Continue)

OUTPUTS/ACTIVITIES	MAIN INPUTS BY ACTIVITY									
	Technical team (m/m)	Sub-contracts (units)	Workers (m/m)	Travel (units)	Computer equip. (units)	Vehicles (units)	Plant equip. (units)	Tools	Office materials	Fuel & lubric. (gallons)
Output No.3: A pilot production plant with improved technology for the production of ply-bamboo in Guangzhou of Guangdong province.										
Activities										
3.1 Market survey and marketing strategies	4			2	1				3	
3.2 Identifying new processing technologies for the production of ply-bamboo	6								2	
3.3 Selection and installation of equipment	6	1	10	1			1	2	2	
3.4 Production testing and adjustment	12		60					2	2	5000
Output No.4: A pilot plant for the production of canned shoots in Pingxiang city of Guangxi Autonomous Region										
Activities										
4.1 Market survey and marketing strategies	4			2	1					
4.2 Identifying processing technologies for the production of shoots products	6								3	
4.3 Selection and acquisition of machinery and equipment	5						1		2	
4.4 Building of facilities and installation of equipment	6	1	10	1				2		
4.5 Production testing and adjustment	12		50					2	2	3000
Output No.5: A training and promotion program on the sustainable management and utilization of sympodial bamboos.										
Activities										
5.1 Preparation of technical manual on sympodial bamboo cultivation	5				1				3	
5.2 Preparation of advanced technical manual on utilization of sympodial bamboo	5								3	
5.3 Training courses on sympodial bamboo management and utilization.	15								4	
5.4 Exhibition of sympodial bamboo products	8									
5.5 Promotion of benefits of sympodial bamboo sector in the media	12								2	

5.1 ACTIVITIES RELATED TO OUTPUT No. 1

Activity 1.1

Gathering of information and establishment of research strategy

It needs to formulate the research plan on the ecological function and biodiversity of sympodial bamboos. As the basic work, the information on the stand structure and ecological function as well as genetics will be collected both nationally and outside.

Two research staffs will be sent to outside institutes so that they can become familiar with and grasp the advanced technologies.

Activity 1.2

Surveying on the ecological functions of sympodial bamboo forest

The relevant information such as mechanism and function of soil and water conservation, photosynthesis and its effect on carbonic balance of atmosphere, will be gathered by establishing survey stations in different kinds of sympodial bamboo stands such as natural stand, plantation, mixed stand and agro-bamboo stands.

Activity 1.3

Conservation of the genetic diversity of sympodial bamboo

The genetic diversity of priority species will be surveyed and analyzed, a living collection of the genetic resource will be established.

5.2 ACTIVITIES RELATED TO OUTPUT No. 2

Activity 2.1

Gathering of information and definition of research plan

The relevant information of sympodial bamboo cultivation and genetic improvement will be collected both home and outside, and the current technical problems of those aspects will be analyzed, so as to formulate the working plan.

Activity 2.2

Establishment of demonstration areas and research plots

2000 hectares of demonstration area for *D. latiflorus*, *B. pervariabilis*, *B. textilis* forests will be established in Guangzhou city of Guangdong province and Pingxiang city of Guangxi Autonomous Region. The research plots will be established within those demonstration areas.

Activity 2.3

Implementation of study on sustainable management techniques of sympodial bamboo

The ecosystem management technology for the recovery and maintenance of long-term site productivity for both natural stand and plantation will be studied, which include the evaluation, prediction, adjustment of the productivity, recovery of degraded forests, bio-fertilizer application, diseases and insect control, and orientational cultivation techniques for various end-use.

Activity 2.4

Implementation of study on genetic improvement techniques of sympodial bamboo

The genetic variation pattern of priority species will be studied based on various genetic markers, the

works including selection of superior populations, hybridization and cultivation of superior clones will be carried on.

Activity 2.5

Implementation of research on vegetative propagation of sympodial bamboo

The tissue culture of sympodial bamboo will be studied with various materials in order to propagate superior planting materials.

Activity 2.6

Establishing the sympodial bamboo model stands for demonstration.

The sustainable high-yield and high-efficient management models for priority species will be available for the development of demonstration areas.

5.3 ACTIVITIES RELATED TO OUTPUT No. 3

Activity 3.1

Market survey and marketing strategies

The project will carry out a survey on current status and potential demand for ply-bamboo in domestic and international markets so as to propose relevant marketing strategies.

Activity 3.2

Identifying new processing technologies for the production of sympodial bamboo timbers

The project will identify the appropriate new technology with innovated consideration of the raw material characteristics, social and environment aspects, available energy sources and others. **A pilot production plant with improved technology for the production of ply-bamboo will be established in Guangzhou city of Guangdong province.**

Activity 3.3

Selection and installation of equipment

The building of facilities will be sub-contracted following the requirement designed by the project processing experts.

Activity 3.4

Production testing and adjustment

The production testing will be carried on to find out the best way to produce the products.

5.4 ACTIVITIES RELATED TO OUTPUT No. 4

Activity 4.1

Market survey and marketing strategies

The project will carry out a survey on current status and potential demand for shoots products in domestic and international markets so as to propose relevant marketing strategies.

Activity 4.2

Identifying processing technologies for the production of non-timber bamboo products

The appropriate technology will be identified by considering the raw material characteristics, social and environment aspects, available energy sources and others. **And a pilot plant for the production of**

canned shoots will be established in Pingxiang city of Guangxi Autonomous Region.

Activity 4.3

Selection and acquisition of machinery and equipment

The relevant machinery and equipment will be selected based on the identifying processing technology.

Activity 4.4

Building of facilities and installation of equipment

The building of facilities will be sub-contracted by following the requirement designed by the project processing experts.

Activity 4.5

Production testing and adjustment

The production testing will be carried on to find out the best way to produce the products.

5.5 ACTIVITIES RELATED TO OUTPUT No. 5

Activity 5.1

Preparation of technical manual on sympodial bamboo cultivation

The technical manual of management in plain language will be prepared by the relevant experts based on the information collected from their research and experiences for training bamboo farmers.

Activity 5.2

Preparation of advanced technical manual on utilization of sympodial bamboo

The technical manual on processing for sympodial bamboo products, will be prepared by the relevant bamboo industry experts so as to train staffs of plants.

Activity 5.3

Training courses on sympodial bamboo management and utilization.

The four training courses on management and utilization will be hold respectively in second and third year of the project conducting. There will be over 50 trainees in each course from sympodial bamboo growing areas.

Activity 5.4

Exhibition of sympodial bamboo products

The project will participate in major regional, national and/or international fairs so that the sympodial bamboo products can be introduced into the domestic and international markets.

Activity 5.5

Promotion of benefits of sympodial bamboo sector in the media

The project will prepare relevant materials to be disseminated in the local media such as broadcast, television and newspapers for propagating the results of the project, so as to promote extension of technologies and enhance the local communities activities for avoiding the destruction of resources and degradation of forest land productivity.

6. PROJECT LOGICAL FRAMEWORK WORKSHEETS

The Project Logical Framework appears in the Annex 2.

7. WORKING PLAN

The Project Working Plan is shown in the Annex 1.

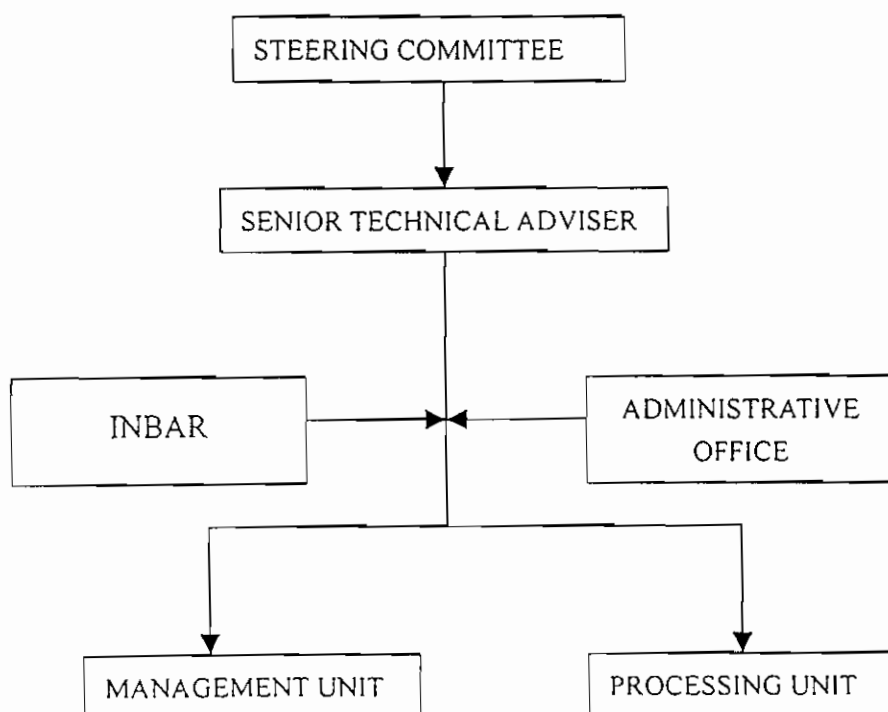
8. INSTITUTIONAL ARRANGEMENTS FOR EXECUTION AND OPERATION

8.1 Management structure

The Project implementing agency will be the Research Institute of Subtropical Forestry under the Chinese Academy of Forestry (RISF-CAF) of the State Forestry Administration cooperated with INBAR which may have a lot of information and knowledge on sustainable management of sympodial bamboo.

A Steering Committee will be made up of a director of CAF and a director of RISF under CAF, an ITTO representative, and several government representatives from the study regions. This Committee will meet at least twice a year to establish the policies and strategies followed by the project, and monitor the project activities.

The Project Management Structure will be as following:



8.2 Future operation and maintenance

The equipment, managed forests, industrial plants and other infrastructure acquired for the implementation of this Project will be under the responsibility of RISF-CAF, that will be in charge of implementing follow-up activities.

RISF-CAF and local government will include provisions in their annual budgets to cover project follow-up costs.

The Government will thus ensure Project sustainability, as it has been established through regulations that the development funds of forests generated through the sale of timber from forests will be re-invested in forests activities. Moreover, local government will give the favorable policies and subsidy to two pilot plants to ensure the follow-up activities.

8.3 Key staff

The Project Team will include three professionals, a National Consultant (Senior Technical Adviser-STA), a Forest Management Expert and a Forest Industry Expert, whose curricula vitae are briefly shown in Annex 4. In addition, the project will be assisted by an International Forest Management Expert and an international Forest Industry Expert.

The minimum qualifications and obligations required for the key staffs are shown below.

Senior Technical Adviser

Forestry Engineer in the field of forest management and utilization with rich experience in the administration of project and being proficient in English Language.

The main responsibilities of the STA will include the overall administration of the project, coordination and monitoring of all components of project, and liaising with all relevant individuals and units outside the project.

The duties of the STA will include:

- Organizing and planning project activities.
- Coordinating with the provincial forestry departments, local governments, research institutes and local communities and others.
- Assessing the working plans to be implemented by the research teams, management and processing units.
- Periodically evaluations of project progress.
- Representing the project in relevant events.

Forest Management Specialist

A Forestry Engineer in the field of bamboo ecology and cultivation and a Forest Engineer in the field of bamboo genetic improvement, with a Master' degree or PHD and over five year experiences in the field and being proficient in English language.

The Forestry management Experts' main responsibilities will be the implement of a sustainable ecosystem management, harvesting planning, genetic resource and improvement of sympodial bamboo species.

His/her duties will include:

- Gathering of information;
- Identification and demarcation of the pilot areas and research plots;
- Formulating the work plan;
- Implementation of work plan;

- Regular analyzing and evaluation of the results obtained;
- Preparation of the reports and manuals;
- Extension activities;
- Propaganda activities in local communities; and
- Training on sympodial bamboo management.

Forest Industry Specialist

Forestry Engineer with a Master's Degree in the field of bamboo industry and 5 years experience in this field, being proficient in English language.

The main responsibilities of the forestry industry experts will be the research on technologies, and design, construction and operation of two pilot plants for the production of bamboo timber and non-timber respectively.

His/her duties will include:

- Gathering information;
- Outlining key techniques, selection of harvesting ways of raw materials and identification of processing technologies;
- Demarcation of pilot area;
- Acquisition of machinery and equipment;
- Design of plants;
- Building of plants and installation of equipment;
- Production tests and adjustments;
- Training of processing plant staffs;
- Preparation of reports and manuals;
- Market survey and implementation of product marketing strategies; and
- Extension activities.

International Forest Management Expert

Forestry Engineer with a PHD in the field of forest management and more than 10-year experience, being proficient in English language.

The main responsibilities of this international expert will be to support and assist the Forest Management Specialist to formulate plan for the management of ecosystem of sympodial bamboo and the genetic improvement as well as utilization of sympodial bamboo.

His/her duties will include:

- Providing technical assistance to the national experts so as to ensure the achievement of expected objectives and Output No. 1 and Output No. 2.
- Training national experts;
- Assisting the national experts to implement the research areas;
- Evaluation of the research results;

International Forest Industry Expert

Forestry Engineer with a PHD in the field of forestry industry and more than 10 years experience in the processing of bamboo products being proficient in English language.

The main responsibilities of the International Forest Industry Experts will be to partake in design, construction and operation of the two plants for the production of bamboo timber and non-timber products respectively.

His/her duties will include:

- Providing technical assistance to the national experts so as to ensure the achievement of expected objectives and Output No. 3 and Output No. 4;
- Assisting national experts to identify/select of technologies and equipment;
- Partaking in training of processing plant staffs; and
- Assisting in Evaluation of the obtained results.

Table No.2 shows project staffs requirements.

TABLE No.2

PERSONNEL BUDGET				
PERSONNEL		US\$/MONTH		TOTAL (US\$)
		SALARY	HONORARIA	
01	Senior Technical Adviser (36 months)	600	250	30,600
01	Forest Management Specialist (36 months)	500	200	25,200
01	Forest Industry specialist (36 months)	500	200	25,200
01	International Forest Management Expert (4 months)	3,500		14,000
01	International Forest Industry Expert (4 months)	3,500		14,000
01	Administrator (36 months)	300		10,800
01	Secretary (36 months)	200		7,200
15	Clerical assistants (36 months)	150	100	135,000
02	Contract officers (36 months)	250		18,000
04	Contract Clerical staffs (36 months)	150		21,600
	Fellowships and training			10,000
GRAND TOTAL (US\$)				311,600

9. PRIOR OBLIGATIONS AND PRE-REQUISITES

RISF-CAF, as the Chinese government representative agency to ITTO, will be responsible for all preliminary activities and for concluding the Project Implementation Agreement. RISF-CAF will appoint the project key and

support staff.

10. POSSIBLE FUTURE ACTIONS

Upon project completion, RISF-CAF will be responsible for dissemination and applying project achievements over the sympodial bamboo growing region in south-China, using their own resources and those allocated by the local government and loaned from the Agriculture Bank with favorable policies.

The Project should provide information on regeneration patterns and cycles, management options, and sympodial bamboo processing and industrialization. It should also provide solutions to the problems encountered and alternatives to meet needs. Furthermore, it should provide market information as well as information on other essential aspects related to sympodial bamboo utilization and marketing.

PART III: MONITORING, REPORTING AND EVALUATION

1. ARRANGEMENTS FOR REPORTING

The project final report and six-monthly progress reports will be prepared in accordance with the provisions of the ITTO Project Manual. These reports will be prepared 4 weeks before each monitoring mission and will contain information on performance for each project element.

The above information will be based on the attached logical framework worksheets. The documents will be submitted following the standard format for progress and final reports as established in the ITTO Manual for Project Formulation (November 1992), Annexes B and C.

2. ARRANGEMENTS FOR ITTO MONITORING AND REVIEW

ITTO participation in both annual meetings is recommended, independently of any monitoring missions sent by ITTO.

The proposed schedule for the meetings as follows:

Year 1

- 1st day of month 6 of project implementation
- 1st day of month 12 of project implementation

Year 2

- 1st day of month 18 of project implementation
- 1st day of month 24 of project implementation

Year 3

- 1st day of month 30 of project implementation
- 1st day of month 36 of project implementation

3. EVALUATION

The project progress reports will be completed and submitted to ITTO 4 weeks in advance of the above dates so as to provide the relevant information in time for the corresponding missions. This will apply to the 3 year of project implementation.

The project final report will be completed by the end of the 3rd year of project implementation.

PART IV: PROJECT BUDGET

- 1. OVERALL PROJECT BUDGET BY COMPONENT**
- 2. PROJECT BUDGET BY FINANCING SOURCE**
- 3. PROJECT BUDGET BY YEAR, FINANCING SOURCE AND COMPONENT**
- 4. OVERALL PROJECT BUDGET BY ACTIVITY**

OVERALL PROJECT BUDGET BY COMPONENT (in US\$)	
10. Project Personnel	
11. Salaries for national experts	39,600
12. Consultant	36,000
14. Other labour	138,000
15. Fellowships and training	10,000
16. International experts	28,000
19. Component Total	251,600
20. sub-contracts	
21. Sub contract-establishing a living collection of the genetic resource	9,000
22. Sub contract- establishing the sympodial bamboo model stands	10,000
23. Sub contract -innovating bamboo timber processing plant	8,000
24. Sub contract -building non-timber bamboo processing plant	8,000
29. Component Total	35,000
30. Duty Travel	
31. Daily subsistence allowance	35,000
32. Transport costs	34,000
39. Component Total	69,000
40. Capital items	
41. Premises	30,000
42. Land	10,000
43. Capital equipment	119,000
49. Components Total	159,000
50. Consumable items	
51. Raw materials	4,000
52. Spares	20,000
53. Utilities	28,300
54. Office supplies	18,000
55. Fuel and lubricants	15,000
59. Component Total	85,300
60. Miscellaneous	
61. Sundry	24,000
62. .Technical reports	6,000
63. Training and promotion program	10,000
64. DSA for participants in training programs	8,000
69. Component Total	48,000
70. ITTO Monitoring, Evaluation, and Administration	
71. Monitoring and evaluation	23,000
72. Administrative costs	25,152
79. Component Total	48,152
99. GRAND TOTALS	696,052

PROJECT BUDGET BY FINANCING SOURCE

(in US\$)

Items	ITTO	NATIONAL
10. Project Personnel		
11. National experts (36 months)		
1 Forest management specialists ---US\$500/month		18,000
1 Senior Technical Adviser--- US\$600/month		21,600
12. Consultant	36,000	
1 wood processing consultant ---US\$1,000X36 months		
14. Other labour		81,000
15 Clerical Assistant us150/month		
1 Administrator---US\$250/month		10,800
1 Secretary---US\$200/month		7,200
Hired administrative officers (2 persons)---US\$250/month	18,000	
Hired unskilled labor (4 persons)---US\$150/month	21,000	
15. Fellowship and training	10,000	
16. International experts (4 months)		
1 International Forest Management Expert---US\$3,500/month	14,000	
1 International Forest Industry Expert --- US\$3,500/month	14,000	
19. Component Total	113,000	138,600
20. sub-contracts		
21. Sub contract-establishing a living collection of the genetic resource	9,000	
22. Sub contract- establishing the sympodial bamboo model stands	10,000	
23. Sub contract -innovating bamboo timber processing plant	8,000	
24. Sub contract -building non-timber bamboo processing plant	8,000	
29. Component Total	35,000	
30. Duty Travel		
31. Daily subsistence allowance		
Domestic---US\$20/day, 8days/time, 5 times/person, 30 persons	24,000	7,000
International --- US\$100/day/20 days/ 2 persons	4,000	
32. Transport costs		
Domestic --- US\$200/time,5 times/person,30 persons	26,000	4,000
International --- US\$2000/person/ 2 persons	4,000	
39. Component Total	58,000	11,000
40. Capital items		
41. Premises		30,000
42. Land		10,000
43. Capital equipment		
2 vehicles--- US\$17,000 for car, US\$8,000 for Jeep	25,000	
2 set of spraying equipment---US\$7,500/set	15,000	
1 set of education equipment---US\$15,300/set	15,300	
5 set of computers---US\$2,000/set	10,000	
1 set of genetic analysis equipment--- US\$12,000/set	12,000	
4 measurement equipment--- US\$500/set	2,000	
1 set of ply-bamboo processing equipment--- US\$14,000/set	10,000	4,000
1 set of canned shoot processing equipment---US\$11,000/set	13,000	
5 set of portable phones ---US\$500/set	2,500	

Items	ITTO	NATIONAL
2 set of fax machines -----US\$600/set	1,200	
20 set of office desks and chairs--- US\$300/set	4,000	
Several tools--- US\$5,000	5,000	
49. Components Total	115,000	44,000
50. Consumable items		
51. Raw materials		4,000
52. Spares	18,000	2,000
53. Utilities		
Communications(postage, fax, telephone, e-mail)	18,000	3,000
Water, electricity, etc.---US\$7,300	6,300	1,000
54. Office supplies		
10 piece of printer inks --- US\$70/piece	700	
Printer paper, toners, films, tapes, diskettes, etc.	11,000	
Other office materials	3,300	3,000
55. Fuel and lubricants---US\$1.25/gallon, 12,000 gallons	12,000	3,000
59. Component Total	69,300	16,000
60. Miscellaneous		
61. Sundry	20,000	4,000
62. Technical reports (300 copies)	6,000	
63. Training and promotion program (reproduction of training materials, texts and visual aids, making of video films etc.)	10,000	
64. DSA for participants in training programs	8,000	
69. Component Total	44,000	4,000
70. ITTO Monitoring, Evaluation, and Administration		
71. Monitoring and evaluation	23,000	
72. Administrative costs	25,152	
79. Component Total	48,152	
99. GRAND TOTALS	482,452	213,600

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

ANNUAL DISBUREMENTS	TOTAL	YEAR 1	YEAR 2	YEAR 3
BUDGET COMPONENTS				
10. Project personnel	113,000	63,000	25,000	25,000
20. Sub-contracts	35,000	19,000	16,000	0
30. Duty travel	58,000	25,000	17,000	16,000
40. Capital items	115,000	82,300	25,000	7,700
50. Consumable items	69,300	20,000	42,000	7,282
60. Miscellaneous	44,000	10,000	10,000	24,000
70. ITTO Monitoring, evaluation, and administration	48,170	16,000	16,000	16,170
99. GRAND TOTAL (ITTO Contribution)	482,452	235,300	151,000	96,152

**CONSOLIDATED YEARLY PROJECT BUDGET (in US\$)
NATIONAL CONTRIBUTION**

ANNUAL DISBUREMENTS	TOTAL	YEAR 1	YEAR 2	YEAR 3
BUDGET COMPONENTS				
10. Project personnel	138,600	42,000	46,000	50,600
20. Sub-contracts				
30. Duty travel	11,000	4,000	4,000	3,000
40. Capital items	44,000	16,500	21,300	6,200
50. Consumable items	16,000	4,120	7,300	4,580
60. Miscellaneous	4,000	1,000	2,000	1,000
70. ITTO Monitoring, evaluation, and administration				
99. GRAND TOTAL (National Contribution)	213,600	67,620	80,600	65,380

OVARRALL PROJECT BUDGET BY ACTIVITY

OUTPUT / ACTIVITIES	BUDGET COMPONENTS										GRAND TOTAL	
	PROJECT PERSONNEL	SUB-CONTRACTS	DUTY TRAVEL	CAPITAL ITEMS	CONSUMABLE ITEMS	MISCEL.	MONITORING & EVALUATION					
Output No.1: The knowledge of the ecological functions of various sympodial bamboo stands and the bio-diversity maintenance of those species. Activities												
1.1 Gathering of information and establishment of research strategy	14,250		4,550	7,850	3,010	1,050				3,170		33,880
1.2 Surveying on the ecological functions of sympodial bamboo forest	14,050		3,260	8,650	3,350	760				1,810		31,880
1.3 Conservation of the genetic diversity of sympodial bamboo	18,800	9,000	5,520	29,560	10,860	1,680				10,270		85,690
Sub-total-Output No.1	47,100	9,000	13,330	46,060	17,220	3,490				15,250		151,450
Output No.2 : Two experimental sustainable management models of sympodial bamboo in total area of 2000 ha. Activities												
2.1 Gathering of information and definition of research plan	8,950		2,350	4,850	2,110	885				3,470		22,615
2.2 Demarcation of demonstration areas and research plots	8,540		1,250	4,860	2,920	660				2,490		20,720
2.3 Implementation of study on sustainable management techniques of sympodial bamboo	7,360		2,350	4,750	2,490	990				820		18,760
2.4 Implementation of study on genetic improvement techniques of sympodial bamboo	7,840		2,530	4,580	2,360	760				820		18,890
2.5 Implementation of research on vegetative propagation of sympodial bamboo	7,550		2,860	4,580	2,670	550				820		19,030
Implementation of establishing the demonstration model of sympodial bamboo stands.	11,980	10,000	7,560	13,590	13,990	1,320				9,885		68,325
Sub-total-Output No. 2	52,220	10,000	18,900	37,210	26,540	5,165				18,305		168,340

ANNEXES

1. WORK PLAN
2. LOGICAL FRAMEWORK MATRIX
3. LIST OF CAPITAL ITEMS
4. CURRICULA VITAE OF THREE KEY STAFF
5. DISTRIBUTION OF SYMPODIAL BAMBOOS IN CHINA
6. A SUMMARY OF THE MODIFICATIONS MADE IN THE REVISED PROPOSAL

ANNEX 1 WORK PLAN

OUTPUTS/ACTIVITIES	RESPONSIBLE PARTY	SCHEDULE (In months)																																										
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36							
OUTPUT No.1 1.1 1.2 1.3		█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█				
OUTPUT No.2 2.1 2.2 2.3 2.4 2.5 2.6		█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█			
OUTPUT No.3 3.1 3.2 3.3 3.4																																												
OUTPUT No.4 4.1 4.2 4.3 4.4 4.5																																												
OUTPUT No.5 5.1 5.2 5.3 5.4 5.5																																												

ANNEX 2 LOGICAL FRAMEWORK MATRIX

PROJECT ELEMENTS	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>DEVELOPMENT OBJECTIVE To develop knowledge and technologies on sustainable management and utilization of sympodial bamboo, so as to improve the living standard of the rural poverty population, to ensure the conservation and preservation of southern-subtropical and tropical forest ecosystems and biodiversity in south China</p>	<ul style="list-style-type: none"> - Increased understanding of sustainable development theory and technologies of sympodial bamboo species in south China. 	<ul style="list-style-type: none"> - Technical documents - Statistical reports on consumption of sympodial bamboo products -The demonstration areas for sympodial bamboo forest under sustainable management 	
<p>SPECIFIC OBJECTIVE To understand the ecological function of the bamboo stands, the biodiversity state, and the theoretical bases of the forest management, protect the biodiversity of sympodial bamboo resource. To sustainably manage and effectively utilize sympodial bamboo resource with the aim of promoting economic development and improving the living standard of the rural poverty population.</p>	<ul style="list-style-type: none"> - Information available on management and utilization of sympodial bamboo - Generation of job and income for local communities based on management and utilization of sympodial bamboo 	<ul style="list-style-type: none"> - Technical reports on management and utilization of sympodial bamboo -Socio-economic reports on participants in bamboo sector - Statistical reports on sympodial bamboo products 	<ul style="list-style-type: none"> - Participants of communities - Supports of government -Existing of over 290 species and over 2 million ha of sympodial bamboo - External financial support
<p>OUTPUT No.1 The knowledge of the ecological functions of different kinds of sympodial bamboo stands and the biodiversity of the species.</p>	<ul style="list-style-type: none"> - A collection area of the genetic resource. 	<ul style="list-style-type: none"> - Technical reports 	<ul style="list-style-type: none"> - Availability of sympodial bamboo forests for experimental management and harvesting - Availability of collection of species - Skill technical personnel
<p>OUTPUT No.2 Two experimental sustainable management models of sympodial bamboo in total area of 2000 ha.</p>	<ul style="list-style-type: none"> - Two experimental sustainable management models of sympodial bamboo in an area of 1000 ha respectively. 	<ul style="list-style-type: none"> -2000 ha area of sympodial bamboo and its plan - Budget and management reports 	<ul style="list-style-type: none"> - Availability of sympodial bamboo forests for experimental management and harvesting - Skill technical personnel
<p>OUTPUT No.3 A pilot production plant with improved technology for the production of ply-bamboo in Guangzhou of Guangdong province.</p>	<ul style="list-style-type: none"> - Operational pilot plant by technical innovation for the production of bamboo timber 	<ul style="list-style-type: none"> - Productions reports 	<ul style="list-style-type: none"> - The demand for bamboo non-timber products - Availability of information on marketing - Availability of technologies
<p>OUTPUT No.4 A pilot plant for the production of canned shoots in Pingxiang city of Guangxi Autonomous Region.</p>	<ul style="list-style-type: none"> - Operational pilot plant for the production of bamboo non-timber 	<ul style="list-style-type: none"> - Production reports 	<ul style="list-style-type: none"> - The demand for bamboo non-timber products - Availability of information on marketing - Availability of technologies
<p>OUTPUT No.5 A training and promotion program on the sustainable management and utilization of sympodial bamboos.</p>	<ul style="list-style-type: none"> - Training courses - Promotion activities on management and use of sympodial bamboo 	<ul style="list-style-type: none"> - Reports by courses - Fair exhibition credentials - Contracts with local media 	<ul style="list-style-type: none"> - Communities interest in training - Existence of regional and national fairs - Existence of communication media
<p>ACTIVITIES RELATED TO OUTPUT No. 1 - Gathering of information and establishment of research strategy - Survey on the ecological functions of sympodial bamboo forest - Conservation of the genetic diversity of sympodial bamboo</p>	<ul style="list-style-type: none"> - Information on the stand structure, ecological function and genetics collected - Information of mechanism, function of soil and water conservation, photosynthesis of bamboo forest and its effect on carbonic balance of atmosphere - A collection area of the genetic resource. 	<ul style="list-style-type: none"> - Research plan - Technical reports - Location maps - Technical reports - Technical reports - conservation maps 	

<p>ACTIVITIES RELATED TO OUTPUT No. 2</p> <ul style="list-style-type: none"> - Gathering of information and definition of research plan - Demarcation of demonstration areas and research plots - Implementation of study on sustainable management techniques of sympodial bamboo - Implementation of study on genetic improvement techniques of sympodial bamboo - Implementation of research on vegetative propagation of sympodial bamboo - Implementation of establishing the demonstration model of sympodial bamboo stands. 	<ul style="list-style-type: none"> - The relevant information of sympodial bamboo cultivation and genetic improvement and the current technical problem - Demonstration areas including research plots - The ecosystem management technology for the recovery and maintenance of long-term site productivity - The genetic variation pattern of priority bamboo species - The tissue culture with various materials - 2000 hectares of sympodial bamboo including research plots 	<ul style="list-style-type: none"> - Technical reports - Research plan - Location maps and markers - Technical reports - Technical reports - Technical reports - Technical reports 	
<p>ACTIVITIES RELATED TO OUTPUT No. 3</p> <ul style="list-style-type: none"> - Market survey and marketing strategies - Identifying new processing technologies for the production of ply-bamboo - Selection and installation of equipment - Production testing and adjustment 	<ul style="list-style-type: none"> - Market research on bamboo timber products - Technology for production of ply-bamboo - Design, selection and test of machinery and equipment for processing ply-bamboo - Production plant test and operational 	<ul style="list-style-type: none"> - Markets reports on ply-bamboo - Technical reports - Invoices - designed reports - Building and installation contracts concluded - Technical reports - production reports 	
<p>ACTIVITIES RELATED TO OUTPUT No. 4</p> <ul style="list-style-type: none"> - Market survey and marketing strategies - Identifying processing technologies for the production of shoots products - Selection and acquisition of machinery and equipment - Building of facilities and installation of equipment - Production testing and adjustment 	<ul style="list-style-type: none"> - Market research on bamboo shoots products - Technology for production of shoots products - Design and selection of machinery and equipment for processing bamboo non-timber - Processing facilities and equipment - Production plant testing, operational and cost analysis 	<ul style="list-style-type: none"> - Markets reports on shoots products - Technical reports - Invoices - designed reports - Building and installation contracts concluded - Delivery records - Technical reports - Production reports - Cost and effect reports 	
<p>OUTPUT No. 5</p> <ul style="list-style-type: none"> - Preparation of technical manual on sympodial bamboo cultivation - Preparation of advanced technical manual on utilization of sympodial bamboo - Training courses on sympodial bamboo management and utilization. - Exhibition of sympodial bamboo products - Promotion of benefits of sympodial bamboo sector in the media 	<ul style="list-style-type: none"> - Bamboo management techniques - Bamboo utilization techniques - 4 courses on bamboo management and utilization - Presentation of bamboo products in 4 major fairs in the country - Radio and television programs broadcast and newspaper reporting 	<ul style="list-style-type: none"> - Manual on bamboo management - Manual on bamboo use - List of the participants - Courses reports - Training programs and materials - Proof of registration - Sales reports - Printed publicity and promotion material - broadcasting and advertisement contract 	

ANNEX 3 LIST OF CAPITAL ITEMS

Quantity	Item	US\$
2	Car (US\$17,000 for car, US\$8,000 for lease)	25,000
2	Spraying equipment	15,000
1	Education equipment	15,300
5	Computer equipment	10,000
Several	Tools	5,000
1	Genetic analysis equipment	12,000
4	Measurement equipment	2,000
1	Ply-bamboo processing equipment	10,000
1	Canned shoots processing equipment	13,000
5	Portable phones	2,500
2	Fax machines	1,200
20	Office desks and chairs	4,000
GRAND TOTAL		115,000

ANNEX 4 CURRICULA VITAE OF THREE KEY STAFF

1. Senior Technical Adviser

Name: Fu Maoyi

Date of birth: 23 November 1944

Citizenship: China

Professional education:

- 1) .Nanjing Forestry University of China, Sept.1963- Sept. 1968
- 2) .Swedish Agricultural University of Science And Technology, Sept.1981-Dec.1983, visiting scholar
- 3) .Toronto University of Canada, Feb. – June 1989, visiting Scholar

Brief resume:

- 1) . Sep. 1968 – Nov. 1978, as a technician and latter executive chief of Guannan County Forestry Service Station in Jiangsu Province.
- 2) . Dec. 1978 up to now, gradually as a research assistant, assistant research professor, associate research professor, research professor, executive director and director in the RISF-CAF.

Research and extension

The main of over 20 research and extension projects engaged are listed as follows:

- a. Study on establishment technology of Anji Bamboo Botanic Garden (1979-1984), as a main member.
- b. Bamboo (China) (1982-1992), an international cooperative project supported by IDRC, as a project leader.
- c. China Bamboo: Utilization of intensive management technology (1989-1994) supported by IDRC.
- d. High yield cultivation model of bamboo pulp stands (1991-1995), "the National Eighth Five-year Plan" key program, as a sub-project leader.
- e. Ecological and economical effects of agroforestry models (1995-2000), partly supported by IDRC & CIFOR as a project leader.
- g. Extension study of agroforestry technology in subtropical areas of China (1995-1999), SSTCC project, project leader.
- h. Maintenance of long-term site productivity in bamboo stands (1996-2000), the national 'ninth 5-year key program', sub-project leader.
- i. Population survey and genetic analysis of *Phyllostachys pubescens* and *Dendrocalamus latiflorous* (1998-1999), an international cooperative project with IPGRI, project leader.
- j. Selection and cultivation of superior sympodial bamboos (1995-1998), project leader.
- k. Since 1988, organized 6 times of international training courses or workshops on bamboos.

Consultant

- a. Consultant of China Bamboo Information Center.
- b. Consultant of Malaysia Bamboo Project supported by IDRC (1989).
- c. Consultant of Netherlands Bamboo Information Center.
- d. Member of INBAR scientific advisory group.

2. Forest management expert

Name: Xiao Jianghua

Date of birth: May 28, 1937

Citizenship: China

Professional education:

- 1). Nanjing Forestry University of China, Sept.1958-Sept. 1962, Bachelor.
- 2). Nanjing Forestry University of China, Sept.1962-Sept. 1965, Master.

Brief resume:

Dec. 1965 up to now, gradually as a research assistant, assistant research professor, associate research professor, research professor, supervisor of Ph. D. Graduate, chief of bamboo research division of the RISF-CAF.

Research and extension:

Prof. Xiao majored in the research of bamboo ecology and cultivation for 36 years, charged over 20 projects from the state, ministry and provinces, and international source. 10 achievements get the ministerial and provincial rewards. "Technical exploitation of high-yielding and comprehensive use of bamboo" is given first class reward of the Ministry of Forestry (now the State Administration of Forestry). The high-benefit management pattern and techniques of timber/shoot bamboo stand innovated by him has being extended over 1 million hectare in China, bring into great economic, ecological and social benefits. More than 40 papers and books have been published.

Consultants:

1. Deputy director, China Bamboo Society.
2. Standard member, Chinese Bamboo Industrial Association.
3. Member of Academy working Committee, Chinese Forestry Society.

3. Forestry Industry-Expert

Name: Zhang Qizeng

Date of Birth: Jan. 18,1939

Citizenship: China

Professional education:

Nanjing Forestry University, Jan. 1957-Jan. 1961, Bachelor

Brief resume:

Professor of the Bamboo Engineering Center of Nanjing Forestry University, Academician of Chinese Academy of Engineer since 1997.

Research and Extension

Prof. Zhang majors in wood processing and plywood technology, is one of the earliest researchers of bamboo timber industrial utilization. He has invented a series of techniques of bamboo timber product processing which have been used for the establishment of bamboo timber industry of China, so was rewarded many times by the State and the Ministry.

ANNEX 5 DISTRIBUTION OF SYMPODIAL BAMBOO IN CHINA

ANNEX 6 SUMMARY OF THE MODIFICATIONS IN THE REVISED PROPOSAL

Based on the comments given by the expert panel of ITTO, some relevant modifications have been made and summarized as follows:

I . On research sites and their relevant geographical information

Based on some comments given by local experts, one of the two research sites (Zhangzhou City of Fujian Province) in the original proposal is replaced by Pingxiang City of Guangxi Autonomous Region which is located below the Tropic of Cancer and near the border of China-Viet Nam. The relevant information on the proposed project sites(Guangzhou and Pingxiang), including geographical position, climate, bamboo resources and social economic situation, are introduced in Section 3.2 "Characteristics of the Region".

II. On Project Budget

The unit cost of the budget allocated for the capital items, duty travel and consumable items are specified and some of the items in the consumable items in the budget, 5 portable phones, 2 fax machines and 20 set of office desks and chairs, are recategorized into the capital items. The salaries of two national experts (Forest Management Specialist and Forest Industry Specialist) and a Senior Technical Adviser are paid by National government instead of ITTO originally, but the subsidy for national personnel (two national experts, one senior technical adviser and 15 clerical assistants) are included in the budget contributed by ITTO.

Following items are also included in the budget of the revised proposal:

- Costs for two Contract officers and 4 Contract Clerical staffs;
- Costs for publication of technical reports resulting from outputs;
- Costs for training and promotion program; and
- DSA for participants in training programs.

III. On Contributions toward achieving relevant Goals of the ITTO Libreville Action Plan

Contributions toward achieving relevant Goals of the ITTO Libreville Action Plan are elaborated in the Section 3 "Relationship to ITTO Action Plan and Priorities", and are helpful to improve the biodiversity conservation, particularly genetic diversity conservation of bamboo resources, to enhance the rehabilitation of degraded land for planting bamboo, to develop high-benefit utilization, and to promote the international exchange and cooperation.

IV. On "Other Relevant Aspects of the Pre-project Situation"

3.3 section on "Other Relevant Aspects of the Pre-project Situation" has been provided, which describes other factors characterizing the pre-project situation such as population, soil resources and forest ecological environment, etc.