

INTERNATIONAL TROPICAL TIMBER ORGANIZATION

ITTO

PROJECT PROPOSAL

TITLE	DEVELOPMENT AND EXTENSION OF RUBBERWOOD PROCESSING AND UTILIZATION TECHNOLOGY
SERIAL NUMBER	PD 3/96 Rev.2 (I)
PERMANENT COMMITTEE	FOREST INDUSTRY
SUBMITTED BY	GOVERNMENT OF CHINA
ORIGINAL LANGUAGE	ENGLISH

SUMMARY

This project proposal intends to further develop rubberwood processing and utilization technology by adopting the existing mature processing technology, especially from Malaysia. This is a follow-up of ITTO funded pre-project PPD 6/94 Rev.1 (I) and the output of this project will benefit other ITTO members.

EXECUTING AGENCY	RESEARCH INSTITUTE OF WOOD INDUSTRY (CRIWI) CHINESE ACADEMY OF FORESTRY (CAF)
COOPERATING GOVERNMENTS	GOVERNMENT OF CHINA
DURATION	2 YEARS
APPROXIMATE STARTING DATE	JANUARY 1997

BUDGET AND PROPOSED SOURCES OF FINANCE	Source	Contribution in US\$	Local Currency Equivalent
	ITTO	214,798	
	Gov't of China	193,600	
	TOTAL	408,398	

PART I - CONTEXT

A. Relevance to ITTO

1. Compliance with ITTO Objectives

This project meets the International Tropical Timber Agreement (ITTA) specific objective:

- c. To help research and development which will improve forest management and wood use;
- e. To encourage more and further processing of tropical timber in producer countries;

2. Compliance with ITTO Criteria

This project is related to the following working areas of ITTA (1983), article 23 para. 5:

- 5(a) Wood utilization including the utilization of less-known and less used species.
- 5(d) Harvesting, logging infrastructure, training of technical personnel;
- 5(e) Institutional framework, national planning.

This project meets the criteria stated in ITTO par 6 which reads:

- 6(a) Be related to the production and utilization of industrial tropical timber.
- 6(b) Yield benefits to the tropical timber economy and be relevant to producing as well as consuming members.
- 6(c) Be related to the maintenance and expansion of the international tropical timber trade.
- 6(d) Offer reasonable prospects for positive economic returns in relation to costs.
- 6(e) Make possible to avoid duplication efforts.

3. Relationship to ITTO Action Plan and Priorities

This project conforms to ITTO Action plan and Priorities, such as:

- Studies on supply and demand, including the availability and market acceptance of lesser-known species;
- The flow of technology to improve the use of tropical timber and the value of tropical timber production.

B. Relevance to national policies

1. Relationship to sectional policies affecting tropical timber

This project conforms to the Chinese policies about forestry and forest product industry.

--The Ninth-Five-Year Plan for Forestry and the General Ideology of the Long-term Planning to the Year 2010.

--China's Agenda 21, Forestry Action Plan.

--The Regulation on Management and Protection of Forests in Hainan Province.

--Sustainable development policy of forest industry.

--Policies and Measures to Improve Wood Utilization Efficiency and Output Value of Forest Industry.

--Policies and Measures Affecting Trade in Timber.

--The Action Plan on China's conservation of Biological Diversity: Forestry Report.

2. Relationship to subsectoral aims and programs

--Developing wood drying schedule, wood preservation technology and low toxic preservative.

--Research on properties, strength and fire retardant(FR) of wood-based panels, establish relevant standards and specifications.

3. Institutional and legal framework

The Chinese Research Institute of Wood Industry, Chinese Academy of Forestry (CRIWI), which is the R&D center of wood industry in China, is a part of Chinese Academy of Forestry and is subordinate to the Ministry of Forestry. The Ministry of Foreign Trade and Economic Cooperation and the Ministry of Forestry will instruct the Institute, manage the project and provide personnel, wage, material and financial resource necessary for the successful implementation of the project.

PART II - THE PROJECT

1. Origin

This is an extension to the pre-project ITTO PPD 6/94 Rev. 1 (I): Development and Extension of Rubberwood Processing Technology.

Summary of outputs in the pre-project:

Available literature on rubberwood preservation and drying has been thoroughly reviewed, surveys of the current situation of

the rubberwood industry were conducted with visits to the main rubberwood processing plants in Hainan and Yunnan Provinces, and also the plants of the Agricultural Farm Bureau in Zhejiang and Guangdong Provinces. Information on the current situation of research and status of rubberwood processing and utilization was gathered through a study tour of the rubberwood industry in Malaysia.

Following outputs have been achieved in the pre-project:

--Current situation of rubberwood processing and utilization in China.

--Report on the study tour of the rubberwood industry in Malaysia.

--Consult report for ITTO project: Development and Extension on Rubberwood Processing Technology in China.

CRIWI drafted the formal project document assisted by experts from HNGAFB and Forest Research Institute of Malaysia (FRIM).

2. Objectives

2.1 The development objectives

The development objective of this project is to further improve rubberwood processing and utilization technology by adopting the mature processing technology so as to make contribution for better utilization of rubberwood resources in the world.

2.2 The specific objectives

The specific objective is to upgrade the efficiency and competitiveness of the rubberwood processing industry in China.

3. Justification

3.1 Problem to be addressed

--The pre-project had revealed that the huge potential of the rubberwood resources is still largely untapped or under-exploited in China. As there exists a severe shortage of wood resources in China, the further development of the rubberwood industry is of paramount importance for the future economic development of the southern provinces, and China as a whole. It is an important route by adopting mature technology of Malaysia and training program to improve rubberwood processing technology in China.

--The surveys and study tours conducted during the pre-project revealed that, although great progress had been achieved in recent years, the rubberwood industry in China still lags behind

those in some countries such as Malaysia, in terms of efficiency and competitiveness.

--At present, rubber trees are usually felled, sawn into lumber, then the lumber is impregnated and dried within about 7 to 10 days in China. As Hainan Island and coastal southern regions of China are prone to hurricane which could further delay delivery of logs to processing facilities, temporary protection of logs using cost-effective preservatives should be promoted.

--The common used preservative is a mixture of boric acid, borax and sodium pentachlorophenol(BBP). BBP is used by all the plants in Hainan and most plants of Guangdong province. The pentachlorophenol in BBP is highly toxic and it has been strictly restricted or prohibited in some countries. BBP is highly corrosive to the inner surface of the impregnating tank as well as the components of seasoning kilns. Furthermore, BBP also discolors the wood, thus lowering the acceptability and value of treated rubberwood. Pentachlorophenol -free preservative for rubberwood will therefore minimize many of the problems encountered at present. The procedures of treating rubberwood with preservative containing only boric and boric acid followed by kiln drying, commonly practiced in Malaysia, should be studied for possible adaptation for the industry in China.

--Most of the kilns used for drying rubberwood are the conventional steam-heated ones. The drying period for rubberwood is fairly long resulting in high energy consumption, and discoloration of sawn timber is often serious.

--Sawn timber is mainly used for the manufacture of furniture. There are 15 rubberwood furniture factories in Hainan Agricultural Reclamation System with a yearly output value of RMB 100 million (USD12.5 million). In view of the huge population and fast economic growth, China has a very large market for furniture. Hainan Island, being a Special Economic Region, is rich in timber resources and has great potential to further develop and expand furniture industry.

--A number of treatments of fire retardant of wood-based panel products had been developed, these treatments, if adopted and adapted for rubberwood veneer and thin plywood, would enable these products to be accepted as interior decorative panels, door skins, as well as material for cabinet and other joinery items, further enhance the marketability of these products and promote trade of rubberwood products.

Awareness of technology and product development as well as production management techniques will need to be instilled to increase value-adding and upgrade the industrial competitiveness. These could be achieved through having regular training courses for the operators and supervisory staff, which will be an important component of this project. Opportunities to visit and/or participate in regional rubberwood processing industries or international conference, would be beneficial to the researchers and industrialists.

So, it is important to improve rubberwood processing and utilization technology in China by establishing preservation and drying techniques upon adapting mature procedure and guidelines for manufacturing of fire retardant rubberwood plywood, training programs for operators and supervisory staff.

3.2 Characteristics of the region or area where the project will be located

Rubber tree is an important plantation tree crop in the sub-tropical southern region of China. Rubber trees are mainly grown on the Hainan Island, in Xishuangbana of Yunnan Province and the western part of Guangdong Province. In 1993, the total growing area was recorded as 616,000 ha. which ranked China as the fourth largest rubber growing country after Indonesia, Malaysia and Thailand. 377,100 ha. rubber planting area in Hainan Island, accounting for over 61% of the total in China. With an economic life of 30 years, 8,000 ha. of rubber plantations should be fell for replanting annually. With an average yield of 30 to 45 m³ of round logs and 60 to 75m³ of branch wood per hectare, the potential annual yield of rubberwood in China is about 0.9 to 1.2 million m³. This rather huge potential resource, if utilize efficiently, will ease China's dependence on the ever escalating imports of wood and wood-based materials to satisfy the growing demands resulted from the fast economic growth and promote trade of rubberwood products.

Distribution map of rubberwood resource in China is shown in Appendix 2.

3.3 Other relevant aspects of the pre-project situation

- Preservative of pentachlorophenol is toxicity and have serious pollution to the environment;
- The rubberwood plywood has little market share and the industries have no competitiveness;

-- The management of the rubberwood processing industries is poor.

3.4 Intended situation after project completion

-- Improving sawntimber quality and extending products market by adopting environment-friendly rubberwood preservative;
-- Extending plywood market by developing fire retardant plywood;
-- Improving management of industries by training course.
The output of this project will benefit other ITTO members to improve rubberwood processing and utilization technology.

3.5 Target beneficiaries

The target beneficiaries of this project are the rubberwood processing plants, agricultural reclamation and other administrative agencies of several provinces in southern China. During the implementation of the pre-project the target beneficiaries had cooperated and offered much effective assistance towards the successful achievement of the objectives.

The implementing agency and the beneficiaries will extend the cooperation for executing the activities in the following-up project such as:

-- Organizing regular training courses;
-- Conducting production trials or pilot and on-site testing of research outputs.

3.6 Project strategy

3.6.1 Reason for selection

The project is designed on the foundation of pre-project. Experts engaged in the pre-project collected comprehensive information and analyzed the current situation of enterprises of rubberwood in China and the advanced production techniques of Malaysia. The prior work suggested an effective way to improve the technology for processing and utilizing rubberwood in China by extending mature technology for processing rubberwood from south-east Asia (such as Malaysia). According to the suggestion and requirement of ITTO 11th. expert panel on 26, February to 1, March, 1996, this formal project document and detailed work plan are drafted and presented.

3.6.2 Lessons drawn from past evaluation.

Following evaluation materials are used in designing this project:

- The recommendations of ITTO expert panel;
- Report on the consultancy for ITTO project: Development and Extension on Rubberwood Processing and utilization Technology in China;

Through by experiences and lessons learned from the pre-project: The pre-project closer relationship of cooperation has been established. Among the research institute, the administrative agencies, and the various plants in the rubberwood industry in China. The study tour to Malaysia has further strengthened the relationship between CRIWI and FRIM, and also provided a much needed in-sight into the development of the rubberwood industry outside and inside China. All these have resulted in a better understanding of the needs of the industry in China.

3.6.3 Technical and scientific aspects.

Following materials are used in designing this project:

- Rubberwood processing & utilization, FRIM, Malaysia, 1995;
- International Forum on Investment Opportunities in the Rubberwood Industry, Kuala Lumpur, 1993;
- ITTO pre-project PPD 6/94 Rev(1): Currently situation of rubberwood processing and utilization in China;
- ITTO pre-project PPD 6/94 Rev(1): Report on the study tour of the rubberwood industry in Malaysia;
- Report on the consultancy for ITTO pre-project: Development and Extension on Rubberwood Processing Technology in China.

3.6.4 Economic aspects

The outputs from this project will extend plywood and sawntimber market. The cost of the project compared with similar project is reasonable.

- The logs of rubberwood damaged by typhoon annually is about 100,000 m³, 5 million US Dollars can be saved annually if temporary protection techniques save 50% lost;
- 200,000 m³ rubberwood sawntimber will be impregnated by borax/boric acid. After this project is completed and applied in China; furniture made of sawntimber treated with this technique will reach the specification of export product. Compared with similar projects, this on reasonable in financial inputs.
- If 30% output of plywood in 10 rubberwood plants in Hainan Island is fire retardant treated, 6000m³ value-adding product of fire retardant plywood will bring about 600,000 US Dollars benefit.

3.6.5 Environmental aspects

Integrated utilization of rather huge potential resource of rubberwood will ease China's dependence on imports of wood and wood-based materials and other domestic tree species.

This project will develop environment-friendly technology including sodium pentachlorophenol free preservative.

--Since preservative is free of sodium pentachlorophenol, 600 Tones of sodium pentachlorophenol, which can cause heavy environmental pollution, will not be used in the vacuum pressure treatment;

--Fire retardant agent (LD₅₀ 5000 mg/kg, mice oral) is low poison and there is no environmental problem, such as wastage dust or waste water, the output of this project is compliance with policies of environment protection. In processing fire retardant plywood.

3.6.6 Social aspects

--Some regulations will be formulated to prohibit from using sodium pentachlorophenol after this project is completed;

--The development and application of fire retardant plywood will meet the code of internal decorator materials of China, it is of very importance to economic development and social security, and could provide 200 employment opportunity.

Development of fire retardant of plywood will benefit other ITTO members;

--This project will improve management, efficiency and combativeness of industries;

--This project will enhance the cooperation of research and development of rubberwood processing technology between China and rubberwood planted countries in Southeast Asia, and can provide successful experience to those countries with backward of rubberwood processing technology.

3.6.7 Managerial aspects

This project will be implemented by CRIWI. Hainan General Agricultural Farm Bureau(HNGAFB) will assist in the implementation of the project by providing facilities for on-site and pilot tests at the bureau's Xilian and Sanya wood processing plants. The training courses will be implemented at Hainan Province. The close relationship established with FRIM through the pre-project will be extended into collaboration in carrying out some of the activities under this project, which could include joint research, consultancy and assistance in the organizing of the proposed training courses.

3.7 Reasons for ITTO support

--Rubberwood processing and utilization has been a important subject in ITTO activities;

--This is a follow-up project of ITTO funded pre-project PPD 6/94 Rev(1) and the results from the project will also benefit other ITTO members. It can further promote the processing of rubberwood and the trade of rubberwood products.

3.8 Risks

No.

4. Outputs

Output 1: Establish preservation and drying techniques upon adapting mature procedure based on borax and boric acid preservative and guidelines for manufacturing of fire retardant (FR) rubberwood plywood.

Output 2: Training courses for operators, technicians and supervisory staff; Participation / visits to regional / international fairs, seminars; Workshop / seminar to disseminate the outputs of this project.

5. Activities and inputs

5.1 Output 1: Establish preservation and drying techniques upon adapting mature procedure based on borax and boric acid preservative and guidelines for manufacturing of fire retardant (FR) rubberwood plywood

Activity 1.1: Based on the exiting log protection technique of CRIWI and the mature rubberwood preservation technique of Malaysia, 4 CRIWI scientists will attend the research work to select the temporary protection agents, formulation and to develop a treatment technique. Pilot production experiment is going to be carried out in 1 2 mills subordinate to the Agriculture Farm bureaus of Hainan and Yunna provinces.

--Conduct a survey on insect and fungal infection of rubberwood logs and sawntimber in Hainan and Yunnan Province; discover principle of the insect

and fungal infection occurrence in that area, provide basis for preservation procedure treatment;

- Laboratory evaluation of temporary preservative for anti-mold, anti blue stain and insecticidal effect, pilot evaluation of temporary protection at project site at Hainan Island, establish efficient temporary protection techniques for logs damaged by typhoon and sawntimber which can not be dried promptly;
- Pilot test of vacuum-pressure treatment procedure based on borax and boric acid according to different sizes of sawntimber.

Activity 1.2: 1 CRIWI scientist will do experiment on the drying schedules of rubberwood sawntimber treated with borax and boric acid preservative in the laboratory at CRIWI, then selecting one or two plants in Hainan province to do production-scale experiment.

- Studying and evaluating the drying cost, properties, etc., find the best way to reduce discoloration and improve the insecticidal effect so as to prevent insects from re-invasion as well as possible.
- Formulate the optimum standard drying schedules.

Activity 1.3: 1 CRIWI scientist will attend to the research on treatment technique of fire retardant (FR) rubberwood veneer and decorative plywood.

- Laboratory test of processing procedure of FR Plywood at CRIWI, in 1997;
- Pilot test of producing 5 m³. FR plywood at Xilian wood plant or other project site at Hainan Island.
- Workout a product standard for rubberwood fire retardant plywood.

5.2 Output 2: Training courses for operators, technicians and supervisory staff; Participation / visit regional / international fairs, seminars; Workshop/seminar to disseminate the research outputs of this project

Activity 2.1: 3 training courses(10 days/course) will be presented on preservation, drying of rubberwood,

fire retardant of plywood, marketing as well as production management etc. by 4 CRIWI scientists, 2 international experts.

--90 participants from about 90 rubberwood processing plants of Hainan General Agricultural Farm Bureau (HNGAFB) and 4 plants of Yunnan General Agricultural Farm Bureau will participate the course.

--Staff input:

Item	CRIWI staff	FRIM staff
Preservation techniques	2	
Drying techniques	1	
FR plywood	1	
Sawntimber marketing & production management		2

Activity 2.2: Participating/visiting regional/international trade fairs, conferences or seminars(study tour).

--Study tour to Indonesia, Thailand for survey rubberwood industry will be attended by 2 CRIWI and 1 HNGAFB's staff.

--International Conference on Wood Preservation will be attended by 1 CRIWI staff, in May, 1998.

--International Union on Forestry Research Organization (IUFRO) seminar on wood drying technology will be attended by 1 CRIWI staff, in May, 1997.

Activity 2.3: The workshop/seminar to disseminate the outputs of this project will be organized by 4 CRIWI staff.

--Participants: participants on wood preservation, drying, plywood manufacture, product marketing as well as production management from rubberwood processing plants of Hainan General Agricultural Farm Bureau (HNGAFB) and Yunnan General Agricultural Farm Bureau;

--Attend the 3rd International Fire Retardant Fair (Beijing), the sample of FR plywood will be presented to this Fair, the paper of processing technology of FR plywood will be reported on the seminar, 1997, Beijing.

6. Logical framework worksheets

The detailed logical framework worksheets is list as follow:

Title: Development and Extension of Rubberwood Processing and Utilization Technology.

Project element	Objectively verifiable indicators	Means of verification	Important assumptions
<p>Development Objective: Further develop rubberwood processing and utilization technology so as to make contribution for better utilization of rubberwood resources in the world</p>	<p>The technique reports of this project will be disseminated to ITTO members to improve the rubberwood processing and utilization technology</p>		
<p>Specific Objective: To upgrade the efficiency and competitiveness of the rubberwood processing industry</p>	<p>--The technique procedure achieved will be employed in 2-3 plants --Extending plywood market industry and upgrading value-adding of products --90 trained operators</p>	<p>--Pilot survey in some rubber-wood processing plants --Relevant reports</p>	

Continued

Project element	Objectively verifiable indicators	Means of verification	Important assumptions
Output 1 & 2: --Establish the procedures of pentachlorophenol-free sawn-timber and FR plywood processing --Training course, study tour, workshop	3 reports, 2 procedures, 1 product and 2 standards will be achieved; Output 1 will be completed at Feb., 1998; Output 2 will be completed at Dec., 1998.	3 reports, 2 guidelines of procedures and 2 standards will be submitted to ITTO for monitoring, 1 product will be inspected by ITTO officers.	--Typhoon may delay the implementation of some activities
Activities: 1.1 Preservation techniques 1.2 Dry techniques 1.3 FR plywood 2.1 Training course 2.2 Study tour 2.3 Workshop	6 CRIWI staff, 90 participants in the training course, 2 international experts, vacuum pressure equipment, drying kiln, DN-10 flammability test meter, calorimeter(model 30), computers etc.	The input categories (USD) as follows: project personnel 59,100 duty travel 75,000 capital equipment 160,000 consumable items 57,000 miscellaneous 12,000	

7. Work plan

This project is proposed to start at Jan. 1997, and last for 24 months. The detailed work plan is list as follow:

WORK PLAN

OUTPUT/ACTIVITY	RESPONSIBLE PART	SCHEDULE (in months)
OUTPUT 1:	CRIWI HNGAFB FRIM	1 2 3 4 5 6 7 8 9 10 11 12 1 2 3 4 5 6 7 8 9 10 11 12
1.1 Preservation Tech.	4	_____
1.2 D technique	1	_____
1.3 FR plywood		_____
OUTPUT 2:		
2.1 Training course	4 2	_____
2.2 Study tour	5 1	_____
2.3 Workshop	4	_____

8. Institutional arrangements for the execution and operation

8.1 Management structure

The project is assisted by Hainan General Agricultural Farm Bureau(HNGAFB) and FRIM. CRIWI, an institute with fairly large research staff and comprehensive facilities is capable of carrying out the proposed activities efficiently under the supervision of the Chinese Ministry of Forestry, Chinese Ministry of Foreign Trade and Economic Cooperation, and ITTO. Over the years, the institute has been recognized as a premier research institution in the fields of wood technology and has been fairly active internationally. CRIWI has 6 divisions. Divisions of wood preservation, wood drying have following research areas: wood preservative, wood insects, wood micrology, fire retardant of wood based panels and wood material, wood drying.

8.2 Key staff

Yang Hong

Senior Engineer, Deputy Director of CRIWI, born in 1960, Chinese, B.S., graduated from Nanjing Forestry University. Recent 3 years work: in charge of planning and management of R & D, extension service of technology and international cooperation at CRIWI. The main research focus on marketing of timber product and wood based panels.

Liu Yanji

Professor, Director of Division Wood preservation, born in 1939, Chinese, B.S., majoring inorganic engineering, graduated from Tianjin University. Research focus on Fire retardant wood based panels. Recent 3 years work:

- Research on wood thermal and burning properties of main wood species in China funded by National Natural Science Committee.
- National Standard: Test method on fire retardant treated wood of mainly used wood species in China, project leader.
- Research on fire retardent particleboard, project leader.
- Research on fire retardant MDF, project leader.
- Research on fire retardant plywood and timber, project leader.
- Research on wood preservative, project

leader.

Zhu Jiaqi

Associate Professor of CRIWI, born in 1946, Chinese, B.S., majoring wood adhesive and wood modification, graduated from Beijing Light Industry College, research focus on fire retardant of wood based panels. Recent

3 years work:

- Research on fire retardant MDF, project participant.
- Research on fire retardant plywood and particleboard, project participant.
- Research on decorate material of molded particleboard, project participant.
- Research on fire retardant decorate materials, project leader.

Jiang Mingliang

Assistant Professor of CRIWI, born in 1965, Chinese, PhD, majoring Agrochemical and Organic Chemistry, graduated from Beijing Agricultural University and Wuhan University. research focus on wood preservation and preservative. Recent 3 years work:

--Study on synthesis of chemical hybridizing agents and their application for wheat, PhD dissertation.

--ITTO pre-project: Development and Extension of Rubberwood Processing and Utilization Technology, project participant.

Liu Xiuying

Assistant Professor of CRIWI, born in 1954, Chinese B.S., majoring Microbiology, graduated from Tianjin Light Industry college, research focus on wood fungi and wood preservation. Recent 3 years work:

--Research on wood preservative, project participant.

--ITTO pre-project: Development and Extension of Rubberwood Processing and Utilization Technology, project leader.

--Evaluation and determination on three main wood degradation enzymes in wood rot fungi.

--Study on wood preservative for building materials, project participant.

Xing Jiaqi

Assistant Professor of CRIWI, born in 1960, Chinese, M.S., majoring Entomology,

graduated from Nankai University and South China Agricultural University, research focus on wood insects and wood preservation. Recent 3 years work:

--ITTO pre-project: Development and Extension of Rubberwood Processing and Utilization Technology, project participant.

--Study on wood preservative for building materials, project participant. Recent 3 years work:

--The application of polyacrylamide gel electrophoresis technique to the study of termite toxicity.

Gao Ruiqing

Assistant Professor of CRIWI, born in 1965, Chinese, M.S., majoring wood processing, graduated from Beijing Forest University, research focus on wood drying technology.

Recent 3 years work:

--Major participant of the state's Eighth-five-year key project "Research on drying mechanism, characteristics, schedules of industrial using fast-growing woods", taking charge of the sub-project "Research on wood drying characteristics and Schedules".

Li Wei

Engineer of CRIWI, born in 1971, Chinese, B.S., graduated from Beijing Forest University, administrator. Recent 3 years work:

--ITTO pre-project: Development and Extension of Rubberwood Processing and Utilization Technology, project participant.

-- Wood and plastic fiber, project participant.

-- ITTO project: The identification properties and uses of the tropical timber imported to China from Africa, project participant.

9. Prior obligation and prerequisites

This project is the follow-up of the pre-project ITTO PPD 6/94 Rev. 1 (I).

10. Possible future actions

The outputs of this project will be introduced to rubber-growing areas of China, as well as neighboring countries, to facilitate the upgrading of their local rubberwood industries. Training programs will be continued for as long as the industry deemed necessary. The performance of the industry will be continuously monitored through visits and regular dialogues, to evaluate the impact of the outputs of this project and to identify further needs for future actions.

Further funded research on integrated utilization of rubberwood residue to produce high quality wood-based panels would much be appreciated.

PART III - MONITORING, REPORTING AND EVALUATION

1. Report

In accordance with the policies and procedures of ITTO, CRIWI will present to ITTO progress reports in half-year intervals and the final report will be sent to ITTO within 3 months after the end of the proposed activities.

2. Monitoring reviews and evaluation

In accordance with the policies and procedures of ITTO, Monitoring mission will be proceeded on the following schedule.

3. Schedule

The monitoring and reporting schedule as following:

Description	Date
1. First disbursement request	15 Jun. 1997
2. First Project Progress Report	30 Oct. 1997
3. Monitoring Mission	30 Dec. 1997
4. Second Project Progress Report	15 Jul. 1998
5. Project Completion Report	30 March 1999

PART IV - PROJECT BUDGET

1. Project budget (USD)

10.	Project Personnel	
11.	National experts*	28,800
12.	Administrative personnel*	4,800
13.	Consultants	
14.	Other labor	19,500
15.	Fellowships and training	
16.	International experts	6,000
19.	component Total	59,100
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20.	Sub-contracts	
21.	Sub contract x	
22.	Sub contract y	
29.	component Total	
<hr/>		
30.	Duty Travel	
31.	Daily subsistence allowance	36,200
32.	Transport costs	38,800
39.	Component Total	75,000
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40.	Capital items	
41.	Premises	
42.	Land	
43.	Capital equipment*	160,000
49.	Component Total	160,000
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50.	Consumable items	
51.	Raw materials	25,000
52.	Spares	
53.	Utilities	19,000
54.	Office supplies	13,000
59.	Component Total	57,000
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60.	Miscellaneous	
61.	Sundry	12,000
62.	Refund of Pre-Project costs	26,375
69.	Component Total	38,375
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70.	ITTO Monitoring, Evaluation, and Administration	
71.	Monitoring and evaluation	9,100
72.	Administrative costs	9,823
79.	Component Total	18,923
99.	GRAND TOTALS	408,398

*Chinese government (in kind)

More details is shown in appendix 1

OVERALL PROJECT BUDGET BY ACTIVITY(USD)

OUTPUT/ACTIVITY	BUDGET COMPONENTS							
	PROJECT PERSONAL	SUB CONTRACTS	DUTY TRAVEL	CAPITAL ITEMS	CONSUMABLE	MISCELL- ANEOUS	ITTO MONITORING	GRAND TOTAL
Output 1								
Activity 1.1	27,200		21,200	40,000	19,900	2,000		110,300
Activity 1.2	9,600		5,700	60,000	12,600	1,000		889,000
Activity 1.3	9,600		5,500	60,000	16,500	1,000		92,600
Output 1 Sub-total	46,400		32,400	160,000	49,000	4,000		291,800
Output 2								
Activity 2.1	8,700		17,800		4,000	2,000		30,900
Activity 2.2	2,400		15,000			3,000		20,400
Activity 2.3	1,600		9,800		4,000	3,000		20,000
Output 2 Sub-total	12,700		42,600		8,000	8,000		71,300
ITTO monitoring						26,375*	18,923	45,298
Grand Total	59,100		75,000	160,000	57,000	38,375	18,923	408,398

N.B. 26,375* is the refund of pre-project costs.

2. Yearly Project Budget by Source

CONSOLIDATED YEARLY PROJECT BUDGET (USD)

ANNUAL DISBURSEMENTS ----- BUDGET COMPONENTS	Total	1997	1998
10. Project personnel	59,100	32,100	27,000
20. Sub-contracts			
30. Duty travel	75,000	43,400	31,600
40. Capital items	160,000	160,000	
50. Consumable items	57,000	49,000	8,000
60. Miscellaneous	38,375	32,875	5,500
70. ITTO monitoring, evaluation, and administrative	18,923	14,500	4,423
99. GRAND TOTAL	408,398	331,875	76,523

Appendix 1 Detail Project budget(USD)

10. Project personnel

11. National experts(28,800)

200(per expert/month) 6 experts 24 months=28,800

12. Administrative personnel(4,800)

200(per expert/month) 2 experts 12 months=4,800

14. Other labor (19,500)

Activity	Other labor
1.1 Preservation techniques	7,000
1.2 Drying techniques	4,000
1.3 FR plywood	4,000
2.1 Training course	1,500
2.2 Study tour	2,000
2.3 Workshop	1,000

16. International experts(6,000)

300(per expert/day) 2 experts 10 days=6,000**

(** Used in activity 2.1)

30. Duty Travel

31. Daily subsistence allowance (36,200)

Activity 1.1	20(per expert/day)	4 experts	190 days=15,200
Activity 1.2	20(per expert/day)	1 expert	210 days=4,200
Activity 1.3	20(per expert/day)	1 expert	200 days=4,000
Activity 2.1	International experts:		
	160(per expert/day)	2 experts	10 days=3,200
	National experts:		
	20(per expert/day)	6 experts	30 days=3,600
Activity 2.2	100(per expert/day)	6 experts	10 days=6,000

32. Transport costs (38,800)

Activity 1.1	500(per expert once)	4 experts	3 times=6,000
Activity 1.2	500(per expert once)	1 expert	3 times=1,500
Activity 1.3	500(per expert once)	1 expert	3 times=1,500

Activity 2.1

International experts:

1,000(per expert once) 2 experts 1 time=2,000

National experts:

500(per expert once) 6 experts 3 times=9,000

Activity 2.2 1,500(per expert once) 6 experts 1 times=9,000

Activity 2.3 350(per expert once) 28 experts 1 time= 9,800

40. Capital items(160,000)

Activity 1.1	Vacuum pressure equipment	40,000
Activity 1.2	Drying kiln	60,000
Activity 1.3	DN-10	2,500
	DT-30 DTA	20,000
	Hot-press	5,000
	Vacuum pressure equipment	20,000
	Reactor	12,500

50. Consumable items(57,000)

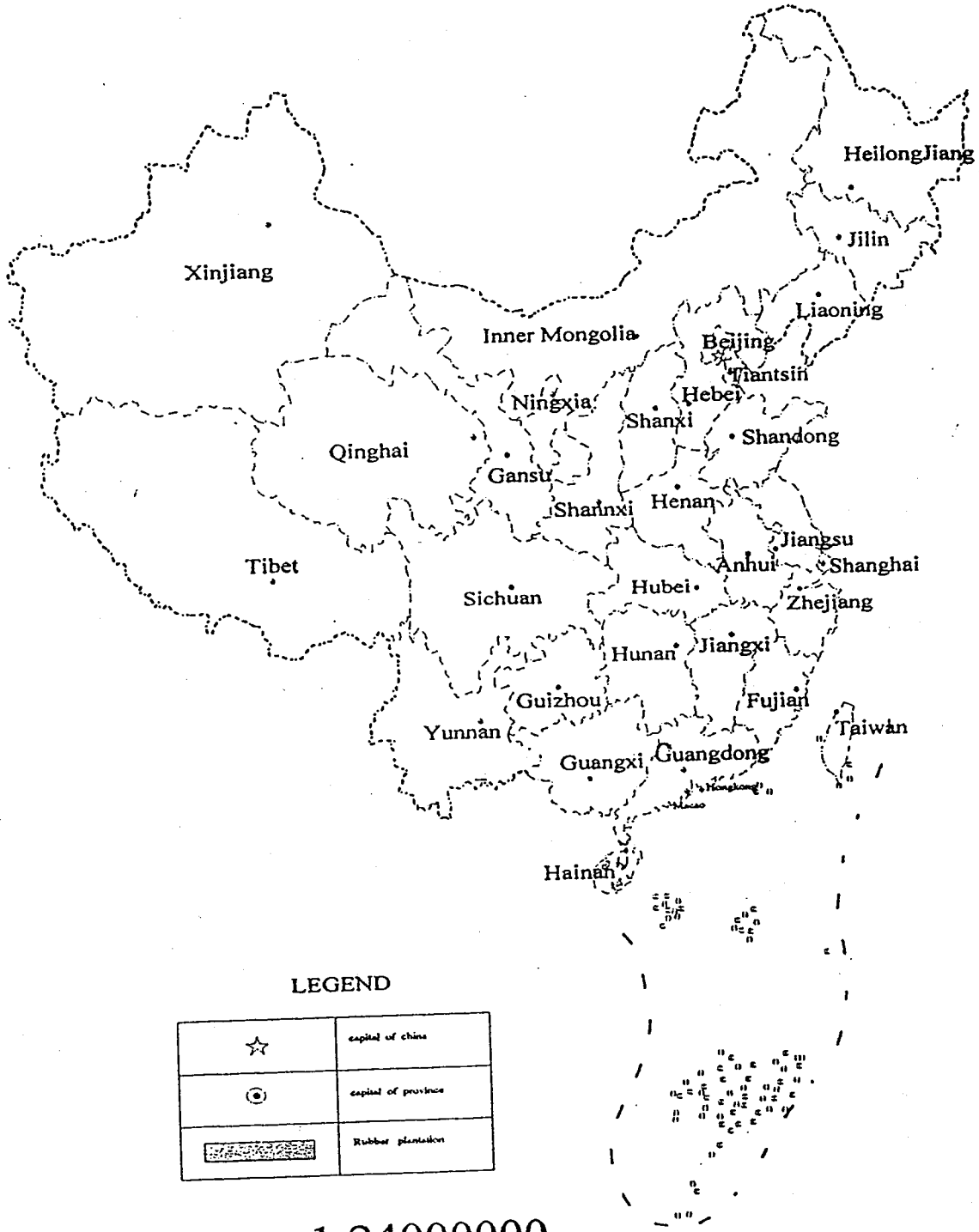
Activity	Rubberwood	Chemicals	Utilities	Office supplies
1.1	6,000	5,500	4,400	3,000
1.2	1,500	1,000	8,100	1,000
1.3	6,000	5,000	4,500	1,000
2.1			1,000	4,000
2.3			1,000	4,000
Total	13,500	11,500	19,000	13,000

60. Miscellaneous (12,000)

Activity 1.1	Preservation techniques	2,000
Activity 1.2	Drying techniques	1,000
Activity 1.3	FR plywood	1,000
Activity 2.1	Training course	2,000
Activity 2.2	Study tour	2,000
Activity 2.3	Workshop	4,000

70. ITTO Monitoring (18,923)

China Rubber Plantation



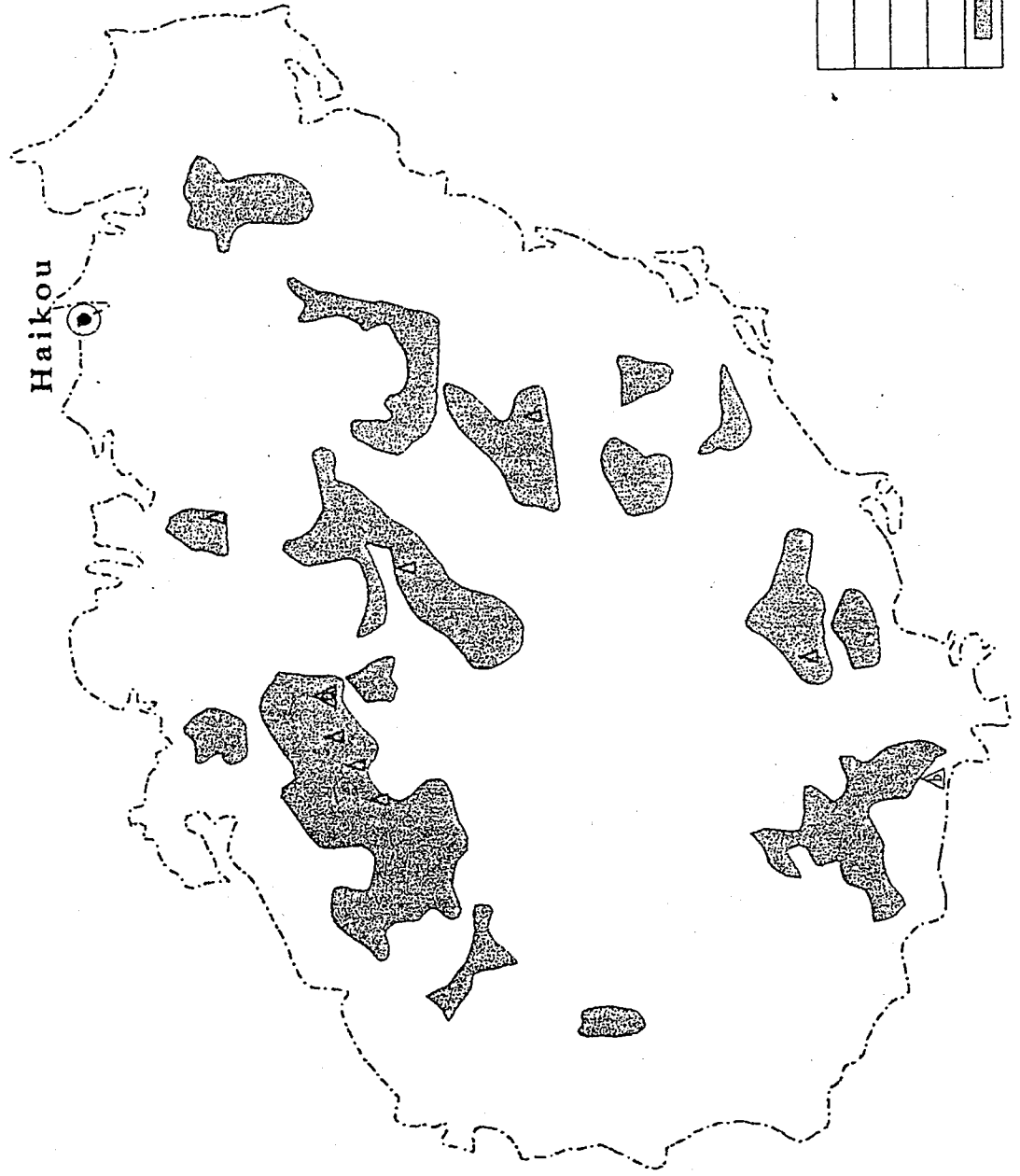
LEGEND

☆	capital of china
⊙	capital of province
▨	Rubber plantation

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Hainan Rubber Plantation

Appendix 2-2

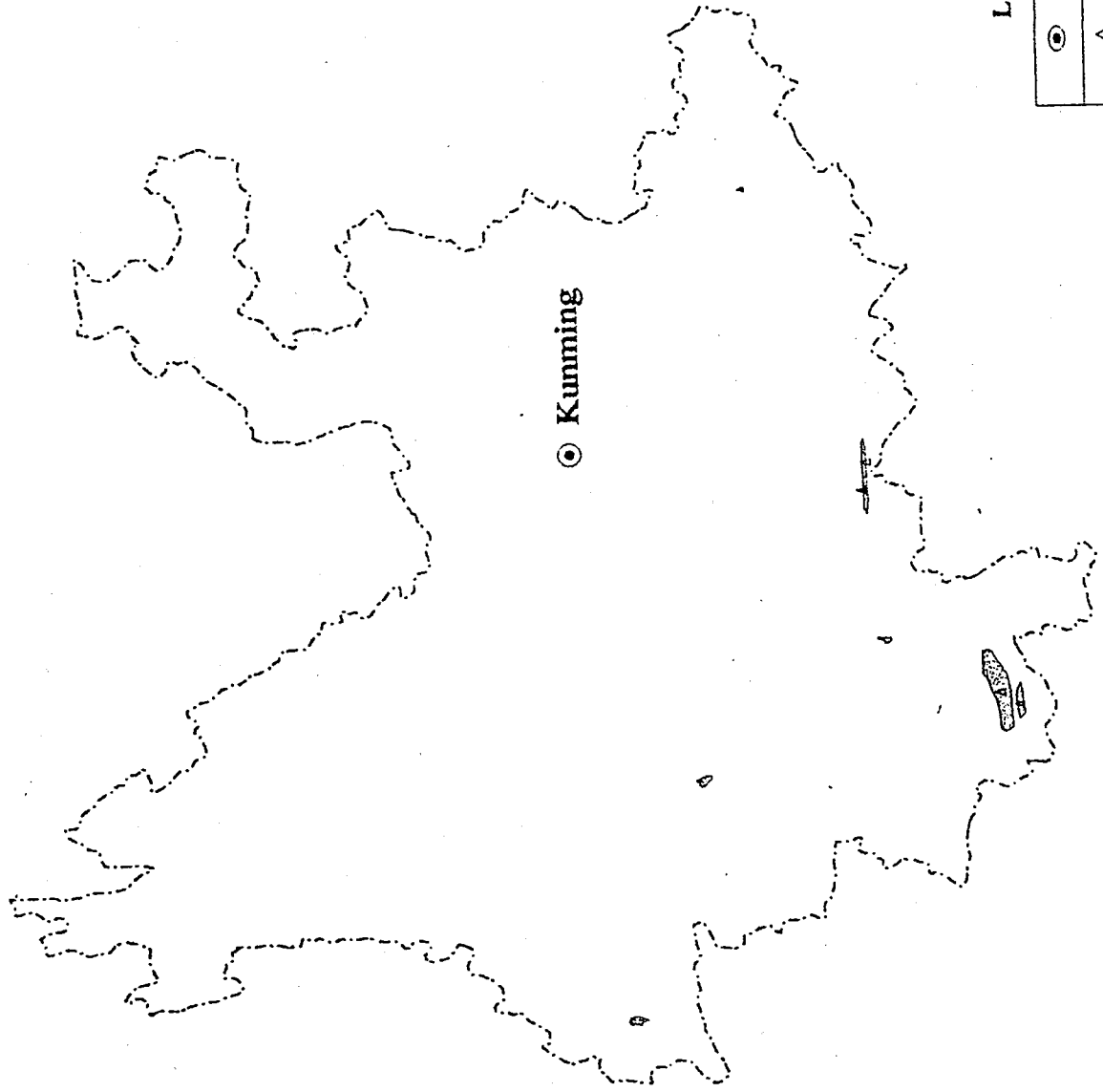


LEGEND

⊙	capital of province
△	Rubberwood plant
△	Xilan Rubberwood plant
△	Sanya Rubberwood plant
[Stippled Box]	Rubber plantation

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Yunnan Rubber Plantation



LEGEND

●	capital of province
△	Rubberwood plant
▨	Rubber plantation

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