

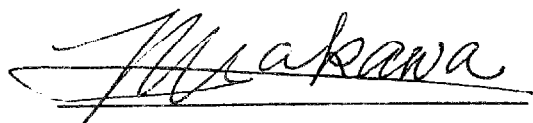
1. ミニッツ (Minutes of Meeting)

MINUTES OF THE JOINT EVALUATION  
ON  
THE JAPANESE TECHNICAL COOPERATION  
FOR  
THE RESEARCH PROJECT FOR HIGHER UTILIZATION OF FORESTRY AND  
AGRICULTURAL PLANT MATERIALS IN THAILAND

The Japanese Evaluation Team, organized by the Japan International Cooperation Agency (hereinafter referred as JICA) and headed by Mr. Hideki Miyakawa, visiting the Thailand from March 5, 2001, and the Thailand Evaluation Team, headed by Dr. Tongchai Kampee, formulated the Joint Evaluation Team (hereinafter referred as “the Team”), for the purpose of evaluating the achievement of the Japanese Technical Cooperation for the Research Project for the Higher Utilization of Forestry and Agricultural Plant Materials in Thailand (hereinafter referred to as “the Project”).

As the result of a series of discussion, the Team agreed to forward to respective Government a report of the evaluation, which is referred to in the documents attached hereto.

March 14, 2001



Mr. Hideki Miyakawa  
Leader  
Japanese Evaluation Team



Prof. Dr. Thira Sutabutra  
President  
Kasetsart University

THE JOINT EVALUATION REPORT  
ON  
THE RESEARCH PROJECT FOR HIGHER UTILIZATION OF FORESTRY AND  
AGRICULTURAL PLANT MATERIALS IN THAILAND

1. INTRODUCTION

Based upon the Record of Discussion (hereinafter referred to as "the R/D") signed on March 15, 1996, the Government of Japan and the Government of Thailand have been implementing the Project since August 1, 1996. The Project is scheduled to be implemented for five (5) years and is to be completed on July 31, 2001.

When the Japanese Advisory Team visited the Project, the Japanese and Thai joint evaluation team amended the draft of PDM to adapt it to the situation, and signed on it as the PDM on August 14, 1998. At the same time, a Plan of Operations (PO) was prepared for the whole project period. The Narrative Summary of the PDM is as follows:

The Overall Goal of the Project:

- The effectiveness of the new model of agroforestry system is verified through a verification study on a model community, and the model is introduced into the rural communities in Thailand.

Project Purpose:

- A new model of agroforestry system with higher utilization of forestry and agricultural plant materials is developed for sustainable rural development.

Output:

- The technologies on biological process of the agroforestry system are improved and developed.
- A sustainable agroforestry system is formulated and recommended.
- Practical and clean pulping technology for small-scale pulp mill is developed for higher utilization of forestry and agricultural plant materials.
- Utilization and environmental management technology for pulping waste and plant material residues are developed.

With the remaining project period of approximately 5 months, JICA dispatched the evaluation team to the Kingdom of Thailand, and Thai side also formed an evaluation

team. Both teams joined and formed a joint evaluation team to evaluate the Project together. The members of the joint evaluation team were described on Item 2 of this document.

## 2. MEMBERS OF THE JOINT EVALUATION TEAM

### 2-1 The Japanese Evaluation Team

- (1) Mr. Hideki MIYAKAWA / Leader  
Deputy Managing Director, Forestry and Natural Environment Department, JICA
- (2) Dr. Kazuhiko OGINO / Agroforestry  
Professor, School of Environmental Science, Department of Ecosystem Studies,  
University of Shiga Prefecture
- (3) Dr. Kazuhiko SAMESHIMA / Pulping Technique  
Professor, Department of Forest Science, Faculty of Agriculture,  
Kochi University
- (4) Mr. Shinichi NOGUCHI / Planning Evaluation  
Project Officer, Forestry and Environment Division,  
Forestry and Natural Environment Department, JICA
- (5) Mr. Takahiro MIYOSHI / Evaluation Analysis  
Analyst, International Division, Fukuyama Consultants Co.,Ltd.

### 2-2 The Thai Evaluation Team

- (1) Dr. Tongchai Kampee / Leader  
Previous Vice-President for Student Affairs, Kasetsart University
- (2) Dr. Nikhom Laemsak / Pulping Technique  
Biomaterial Sciences, Department of Forest Products, Faculty of Forestry,  
Kasetsart University
- (3) Mr. Chittiwat Silapat / Agroforestry  
Office of Policy Planning and Budgeting, Forest Industry Organization (FIO)
- (4) Ms. Duanghathai Chenchavitha / Planning Evaluation  
Monitoring and Evaluation Sub-division, Planning Division, Department of  
Technical and Economic Cooperation (DTEC)
- (5) Ms. Hataichanok Siriwadhanakul / Planning Evaluation  
Japan Sub-Division, Bureau of Extension Cooperation,  
Department of Technical and Economic Cooperation (DTEC)



### 3. OBJECTIVES OF THE EVALUATION

Objectives of the evaluation of the Project were as follows:

(1) To execute a comprehensive evaluation of the achievement in accordance with the original plan described in the Record of Discussion (R/D), Tentative Schedule of Implementation (TSI), and the PDM.

(2) To make recommendations and suggestions concerning the measures to be taken after the termination of the cooperation of the Project.

### 4. METHODOLOGY OF EVALUATION

#### 4-1 Evaluation Method

The Project was evaluated jointly by the Japanese and Thai sides. The Team visited project sites and had a series of hearings from Japanese long-term experts, Thai counterparts and important parties related to the Project.

In order to conduct the final evaluation precisely and efficiently, the joint evaluation team employed JPCM (JICA Project Cycle Management) method. The JPCM evaluation method is based on the Project Design Matrix (PDM), which shows the logical inter-relationships among the components of the Project.

The Team analyzed and evaluated the Project by means of Achievement Chart, Accomplishment Grid and Evaluation Grid from the viewpoints of five evaluation criteria in accordance with the JPCM. Finally, the Team made a set of recommendation and suggestions.

#### 4-2 Items of the Evaluation

The Evaluation was conducted from the viewpoints of five evaluation criteria as shown below:

##### (1) Efficiency

Efficiency of the project implementation is analyzed with the emphasis on the relationship between Outputs and Inputs shown in the PDM in terms of timing, quality and quantity.

##### (2) Effectiveness

Effectiveness concerns the extent to which the Project Purpose in the PDM has been achieved, or is expected to be achieved, in relation to the Output produced by the Project.

(3) Impact

Impact is intended and unintended, direct and indirect positive and negative changes as results of the Project. It includes impact of the Project for the Overall Goal and Super Goal in the PDM, as the intended positive change.

(4) Relevance

Relevance of the Project plan is reviewed as the validity of project purpose and overall goal in connection with the development policy of the Thailand Government and needs of the beneficiaries and also the relationship between the objectives of different levels in PDM.

(5) Sustainability

Sustainability of the Project is assessed in organizational, financial and technical aspects by examining the extent to which the achievement of the Project is sustained or expanded after the Project is completed.

## 5. ACCOMPLISHMENT OF THE PROJECT PLAN

### 5-1 Input

Inputs from Japanese side have been made satisfactorily as planned. Inputs from Thai side have also been made fairly enough to implement the Project, while some contents of inputs have been changed and supported by Japanese side due to the financial difficulty faced by the university because of the financial crisis in Thailand.

Each evaluation for the inputs is shown in Accomplishment Grid (ANNEX 2).

#### (1) Inputs from Japanese side

Inputs allocated for the Project from Japanese side are as follows:

a) Dispatch of Japanese experts:

Long-term expert:

A Leader / Pulping Technology expert for 5 years

A Coordinator for 5 years

An Agroforestry expert for 4.1 years

Short-term expert: 15 experts

b) Counterpart training:

FY 1996 2 persons  
FY 1997 2 persons  
FY 1998 7 persons  
FY 1999 3 persons  
FY 2000 2 persons  
FY 2001 1 person (planned)  
Total in FY1996 – 2001 17 persons

(all participating counterparts are still working in counterpart institutions)

c) Provision of machinery and facilities:

FY 1996 69.0 million yen  
FY 1997 69.5 million yen  
FY 1998 41.0 million yen  
FY 1999 106.0 million yen  
FY 2000 11.0 million yen  
Total in FY 1996-2000 296.5 million yen  
(equivalent to approximately US\$2,492 thousand)  
(conversion rate: US\$1.00 = 119.0 yen)

d) Assistance of local cost

FY 1996 772,000 baht  
FY 1997 1,193,000 baht  
FY 1998 1,594,040 baht  
FY 1999 1,536,954 baht  
FY 2000 1,692,000 baht (planned)  
FY 2001 582,000 baht (planned)  
Total in FY 1996-2001 7,369,994 baht

(2) Inputs from Thai Side

Inputs allocated for the Project from Thai side are as follows:

a) Land, buildings and facilities at the project sites

Land at the Kasetsart University for green houses  
9 experimental sites for agroforestry (total area is 13.4ha)  
Offices in Kasetsart Agricultural and Agro-Industrial Product Improvement

Institute (KAPI)  
Pulping house  
Experimental Spaces

b) Allocation of counterpart

99 counterparts from KAPI, the Faculty of Forestry and other faculties in Kasetsart University, and Forest Industry Organization (FIO) of the Ministry of Agriculture and Cooperatives.

c) Tools and other materials

A variety of tools and materials for fundamental experiments

d) Administrative and experimental expense and activities

FY 1996	3,000,000 baht	
FY 1997	12,327,759 baht	
FY 1998	8,444,296 baht	
FY 1999	24,587,357 baht	
FY 2000	10,570,144 baht	
FY 2001	5,652,031 baht	(planned)
Total in FY 1996-2001	64,581,587 baht	

## 5-2 Activity

Planned activities seem to be accomplished in the sense that most of the activities in the Project have been conducted satisfactorily to achieve the target of each activity, while some sub-activities have remained to be completed.

Each evaluation for activities is shown in Accomplishment Grid (ANNEX 2). The contents of project activities are as follows:

- (1) Technical improvement of the biological process of the agroforestry system
  - (1-1) On-site studies on biological processes of the agroforestry system
    - Field survey on growth and yield of *Eucalyptus camaldulensis* and paper mulberry
    - Identification and inoculation of mycorrhizal fungi
    - Establishment and silvicultural treatments of agroforestry plantations
  - (1-2) Improvement of mass-propagation and molecular biological techniques of the trees

- Classification and selection of paper mulberry clones by using DNA techniques
  - Somatic hybridization and direct gene uptake of paper mulberry protoplasts
  - Improvement of mass-propagation techniques of paper mulberry by tissue culture
- (2) Research on socio-economic background and formulation of sustainable agroforestry system model
- (2-1) Historical, cultural and social characteristics of the traditional community technology
- Historical background of pulp and paper production and utilization
  - Investigation of the history, cultural and social characteristics of the traditional community technology
- (2-2) Incentive for sustainable rural development and formation of rational agroforestry system model
- (2-3) Pilot studies on paper mulberry resource management
- Study on the management of natural stands
  - Study on the paper mulberry plantation
  - Study on the agro-ecological requirements for paper mulberry
- (3) Cleaner technology for small scale pulp and paper production
- (3-1) Characteristics analysis of raw materials and development of harvesting and storage method
- Characteristics analysis of raw materials for pulp mill
  - Development of harvesting and stripping machine
  - Research on post-harvest deterioration of raw materials and their control measures
- (3-2) Cleaner technology for chemical & mechanical pulping method for a small scale mill
- Research on alkali and alkali-oxygen pulping
  - Research on sulfite pulping
  - Research on organosolv pulping
  - Research on explosion pulping
  - Development of model design for small scale pulp and paper mill
- (3-3) Biotechnology for development of pulping and paper making
- Investigation of microorganisms and microbial enzymes
  - Studies on microbial enzymes and their production
  - Research on application of bio-pulping and bio-bleaching



- (4) Utilization and management of pulping wastes and plant material residues
  - (4-1) Utilization and management of pulping wastes
    - Utilization of pulping and paper making waste water as fertilizer and soil amendment
    - Waste management for pulping and paper making
    - Cleaner technology for pulping and paper making
  - (4-2) Utilization of related residues for other purposes
    - Investigation of valuable extracted chemicals for food additives and other uses
    - A production of higher digestible feed from plant waste

### 5-3 Output

Planned outputs seem to be accomplished in the sense that targets of outputs in the Achievement Chart (ANNEX 3) have been attained satisfactorily, although there are a few activities remained to be completed.

Each evaluation for output is shown in Accomplishment Grid (ANNEX 2). And the results of output are follows:

- (1) The technologies on biological process of the agroforestry system are improved and developed
  - 5 technical reports
  - 1 technical manual in Thai language
  - 5 presentations in seminars
  - Some experimental data were obtained
  - Some analyses were done
- (2) A sustainable agroforestry system is formulated and recommended
  - 2 technical reports
  - 3 presentations in seminars
  - Some experimental data were obtained
  - Some analyses were done
- (3) Practical and clean pulping technology for small-scale pulp mill is developed for higher utilization of forestry and agricultural plant materials
  - 12 technical reports
  - 2 technical manuals in Thai language



- 8 presentations in seminars
- Some experimental data were obtained
- Some analyses were done
- Some techniques were utilized practically
- Some advises were inquired from communities and private companies

(4) Utilization and environmental management technology for pulping waste and plant material residues are developed

- 4 technical reports
- 2 presentations in seminars
- Some experimental data were obtained
- Some analyses were done

#### 5-4 Project Purpose

It can be evaluated that the project purpose will be accomplished at the end of the Project, because of some facts such as (1) all of the expected outputs are basically accomplished, (2) formulation of models of agroforestry system is in progress, (3) a schedule of compiling the final report has been set, and (4) participating Thai researchers seem to have satisfactorily mastered the technologies related to the model being developed by the Project.

The remaining period to finalize the Project will be insufficient, unless Counterparts and Japanese Experts cooperate at their utmost efforts toward compiling the final report.

## 6. EVALUATION WITH 5 CRITERIA

### 6-1 Efficiency

Even though Thai financial crisis has influenced on the input from Thai side, the expected outputs were mostly attained by the efforts of Japanese Experts and Counterparts to cooperate at their utmost abilities. In addition, the Project utilized the equipment of video editing provided by Japanese Grant Aid, and some technical exchanges have also been made through seminars with other JICA projects (Conservation and Afforestation Project II in Lao PDR and Central Forestry Development Training Center Project in Myanmar). Thus, efficiency of the Project is evaluated as high.

## 6-2 Effectiveness

It can be evaluated that the project purpose will be accomplished at the end of the Project, because of some facts such as (1) all of the expected outputs are basically accomplished, (2) formulation of models of agroforestry system is in progress, (3) a schedule of compiling the final report has been set, and (4) participating Thai researchers seem to have satisfactorily mastered the technologies related to the model being developed by the Project.

The remaining period to finalize the Project will be insufficient, unless Counterparts and Japanese Experts cooperate at their utmost efforts toward compiling the final report.

## 6-3 Impact

According to the opinions of Counterparts, Japanese Experts and rural communities, all impacts were positive. Especially it is noted that the paper mulberry began to draw the interest of Thai government. Therefore, the Project is considered to have left mostly positive impacts in and out of the university. About the accomplishment of the overall goal, which is one of the expected impacts by the Project, it is viewed by Counterparts and Japanese Experts that the extension of the new model in rural communities can be attained but it takes time and needs efforts. For the extension of the models in rural communities, Thai government is expected to cooperate institutionally and financially.

## 6-4 Relevance

Based on the opinions of Counterparts, Japanese Experts and rural communities, relevance of the Project is evaluated as very high in all aspects such as the target of the national policy, the needs of the university, and the needs of rural communities in Thailand. PDM (project design matrix) has been made logically.

## 6-5 Sustainability

From comprehensive analysis from institutional, financial, and technical aspects, it is evaluated that a basic sustainability of the Project is expected after the end of the Project. There are some concerns to make a full guarantee of sustainability. Firstly, for extension of the new model in rural communities, KAPI is not fundamentally an extension institution so that it needs cooperation with other extension institutions. Secondly, the finance of research and extension will not be sufficient and it needs financial supports from external funding such as Royal Project, foreign donors, etc. Thirdly, for the technical aspect, individual techniques have already been well developed and

transferred to Thai researchers, however the integration of the developed techniques is necessary.

## 7. RESPONSES TO THE RECOMMENDATIONS FROM THE MID-TERM EVALUATION

7-1 Monitoring has been conducted in accordance with the Monitoring and Evaluation Plan set up in the time of the mid-term evaluation.

7-2 Detailed annual plans including a concrete target of each year have been formulated and authorized in the Joint Coordinating Committee.

7-3 In order to reinforce the organization in institutional, financial and technical areas, a monthly meeting has been held by key persons of KAPI and the Faculty of Forestry.

7-4 In order to strengthen a linkage between KAPI and the Faculty of Forestry, monthly meeting has been rotationally held by KAPI and the Faculty of Forestry.

7-5 Thai researchers in the same field have had a series of meetings in order to achieve the targets, and formulated the annual plan.

## 8. CONCLUSTION AND RECOMMENDATIONS

### 8-1 Conclusion

From results of project accomplishment and evaluation based on five criteria, conclusions are derived as follows.

For efficiency, impact, and relevance, it is evaluated that the Project has been very successful.

For effectiveness, it is evaluated that the project purpose is basically accomplished in the sense that formulation of models of agroforestry system is in progress.

For sustainability, it is evaluated that the project effect can be sustained in the aspects of institution, finance, and technology, while there are some concerns.

## 8-2 Recommendations

- (1) Each sub-topic activity in the Project shall produce a final report in its field before the end of June 2001. Each final report shall be written in English or Thai language and submitted in a standardized format by the Project, but English summary has to be attached to each report.
- (2) In order to integrate technology in four topics mentioned in the PDM for finalizing new models of agroforestry system, Thai topic leaders shall discuss in their consensus and propose the new models.
- (3) In order to achieve the overall goal of the Project, further development into integrated technology of established techniques of agroforestry and pulping shall be pursued.
- (4) Human resource development is necessary for securing rural community leaders who have initiative in promoting the new models in rural communities.
- (5) In-country training and Third Country Training based on the results of project activities will be useful to secure the sustainability of the project effect, and to disseminate technology and knowledge obtained in this project to other area in Thailand and the other countries.
- (6) Much effort is needed to apply developed new models in rural communities in Thailand. It is advisable that JICA could provide additional supports, for example dispatch of individual experts in charge of technical training and extension to rural communities.



Name of the Project : Research Project for Higher Utilization of Forestry and Agricultural Plant Materials in Thailand

1. Period of Cooperation : 5 years (1996.8 - 2001.7)

2. Implementation Agency in Beneficiary Country : KAPI in Kasetsart University, Thailand

3. Target Group: Staff of Kasetsart University

Date: 2001.3

4. Project Area : Kasetsart University Experimental Fields of Agroforestry

PDM (ANNEX 1)

Narrative Summary	Verifiable Indicators	Means of Verification	Important assumptions
<p><b>Overall Goal of the Project</b></p> <p>The effectiveness of the new model of agroforestry system is verified through a verification study on a model community, and the model is introduced into the rural communities in Thailand.</p>	<ol style="list-style-type: none"> <li>The new model of agroforestry system (agroforestry system or/and new pulping technology) is carried out in a model community.</li> <li>The economic condition of the model community is improved through introduction of the new model.               <ol style="list-style-type: none"> <li>Income of farm household/community/private</li> <li>Agroforestry productivity/Pulp production</li> </ol> </li> <li>The new model of agroforestry system is introduced into other rural communities               <ol style="list-style-type: none"> <li>Number of communities/private companies who newly adapt the model</li> <li>Impression of the farmers/communities/private companies who newly adapt the model</li> </ol> </li> </ol>	<ol style="list-style-type: none"> <li>Project report</li> <li>Questionnaire survey to villagers /communities/private companies about the socio-economic condition</li> <li> <ol style="list-style-type: none"> <li>Annual report of extension office in RFD or other related agencies</li> <li>Questionnaire survey to farmers/communities /private companies about the impression of the model</li> </ol> </li> </ol>	<ol style="list-style-type: none"> <li>The implementation organization for verification study on the agroforestry system model is not drastically changed</li> <li>The national policy for reforestation is not changed</li> <li>Market condition of pulp and paper is not drastically changed</li> <li>Economic condition of Thailand is not drastically depressed</li> <li>The extenuation system for agroforestry and /or pulping technology is not changed.</li> </ol>
<p><b>Purpose of the project</b></p> <p>A new model of agroforestry system with higher utilization of forestry and agricultural plant materials is developed for sustainable rural development.</p>	<p style="text-align: center;"><b>At the end of the Project</b></p> <ol style="list-style-type: none"> <li>The output borne from the Project will be compiled systematically and usefully as a report( e.g. guideline, etc)</li> <li>Thai researchers will satisfactorily master the technologies of the developed model               <ol style="list-style-type: none"> <li>Extent of understanding of technology</li> <li>Number of papers, announcement in related society and seminar, etc.</li> </ol> </li> </ol>	<ol style="list-style-type: none"> <li> <ol style="list-style-type: none"> <li>Project Report</li> <li>Guideline, etc.</li> <li>Interview survey with related personnel in the project.</li> </ol> </li> <li> <ol style="list-style-type: none"> <li>Interview survey with research staff of Thai side</li> <li>Interview survey with related personnel in the projects.</li> <li>Record of papers, announcement in related society, related seminar held in and out the institute, etc.</li> </ol> </li> </ol>	<ol style="list-style-type: none"> <li>The extension system for agroforestry and /or pulping technology is not changed.</li> <li>C/P continue working in the institute.</li> <li>Economic condition of Thailand is not drastically depressed.</li> </ol>
<p><b>Output of the project</b></p> <ol style="list-style-type: none"> <li>The technologies on biological processes of the agroforestry system are improved and developed.</li> <li>A sustainable agroforestry system is formulated and recommended.</li> </ol>	<ol style="list-style-type: none"> <li>The improved/developed technologies will be assessed based on the following indicators.               <ol style="list-style-type: none"> <li>Number of papers and their content.</li> <li>Existence of technical manuals and their content.</li> <li>Numbers of papers for the seminar and related society, and their content.</li> <li>Progress of the works</li> <li>Experimental data (survival rate, growth rate, annual possible amount of mass-propagation etc.)</li> </ol> </li> <li>The agroforestry system will be assessed based on the following indicators.               <p style="text-align: center;">Same as above (1) to (4)</p> <ol style="list-style-type: none"> <li>Extent of improvement of traditional technology</li> <li>Experimental data( productivity of agroforestry model,</li> <li>Appropriateness of agroforestry model.</li> <li>Financial viability (Result of cost- benefit analysis)</li> </ol> </li> </ol>	<ol style="list-style-type: none"> <li> <ol style="list-style-type: none"> <li>Project Report</li> <li>Interview survey with related personnel in the project.</li> <li>Record of papers, announcement in related society, related seminar held in and out the</li> <li>Technical manuals</li> <li>Records of management activities of the pilot</li> <li>Records for mass propagation and genetic experiments.</li> </ol> </li> <li>Same as above (1) to (4)</li> <li>Record of management activities of the pilot forest.</li> </ol>	<ol style="list-style-type: none"> <li>C/P continue working in the institute with high motivation.</li> <li>The structure of research system in KAPI (Kasetsart University) does not changes significantly.</li> </ol>

Name of the Project : Research Project for Higher Utilization of Forestry and Agricultural Plant Materials in Thailand

1. Period of Cooperation : 5 years (1996.8 - 2001.7)

2. Implementation Agency in Beneficiary Country : KAPI in Kasetsart University, Thailand

3. Target Group: Staff of Kasetsart University

Date: 2001.3

4. Project Area : Kasetsart University Experimental Fields of Agroforestry

PDM (ANNEX 1)

Narrative Summary	Verifiable Indicators	Means of Verification	Important assumptions
<p>3. Practical and Clean Pulping technology for small scale pulp mill is developed for higher utilization of forestry and agricultural plant materials.</p> <p>4. Utilization and environmental management technology for pulping wastes and plant material residues are developed.</p>	<p>3. The improved/developed technologies will be assessed based on the following indicators. Same as above (1) to (4) (5) Experimental data (data for harvesting machine, data for storage loss of raw materials, energy-saving rate of each pulping method, degree of environmental (6) Financially viability (Result of cost-benefit analysis) (7) Adaptation by communities and private companies including consultation for them.</p> <p>4. The improved/developed technologies will be assessed based on the following indicators. Same as above (1) to (4) (5) Experimental data (waste water quality, effect of reutilization , analysis of extracted chemicals, possibility for digestible feed, etc.) (6) Financially viability (Result of cost-benefit analysis) (7) Adaptation by communities and private companies including consultation for them.</p>	<p>3. Same as above (1) to (4) (5) Record of machinery test. (6) Records of storage test (7) Record of pulping technology test</p> <p>4. Same as above (1) to (4) (5) Record of verification test for utilization. (6) Records of water quality test (7) Records of analysis data of extracted chemicals and reuse materials.</p>	
<p><b>Activities for the project</b></p> <p>1. 1-1. Research on the biological processes of the agroforestry system 1-2. Research on the molecular biological and mass-propagation techniques for improvement of the agroforestry system</p> <p>2. 2-1. Research on historical , cultural , and socioeconomic characteristics of the traditional community technology 2-2. Form a rational agroforestry system 2-3. Carry out pilot studies on paper mulberry resource management</p> <p>3. 3-1. Analyzing characteristics of raw materials and research on harvesting and storage methods 3-2. Research on pulping technologies for small scale mill. 3-3. Research on bio-pulping and bio-bleaching technologies.</p> <p>4. 4-1. Research on utilization /management technologies of pulping wastes. 4-2. Research on utilization technology of related residues.</p>	<p><b>INPUT</b></p> <p><b>Japanese Side</b></p> <p>1. Long-term experts: 3 persons×5 years. 2. Short-term experts: some persons/year×3 month. 3. Counterpart training in Japan : some persons/year ×2 months 4. Provision of machinery and equipment 5. Other appropriate assistance for local cost</p>	<p><b>INPUT</b></p> <p><b>Thai Side</b></p> <p>1. Land , building and facilities 2. C/P location and administrative personnel 3. Equipment , machinery, vehicles, instruments, tools and other r materials 4. Administrative and experimental expenses and activities</p>	<p>1. Input equipment is not delayed by the reasons of custom clearance, etc. 2. Operational budge for research activities is provided on the schedule 3. The structure of research system in KAPI (Kasetsart University) does not changes significantly.</p> <p><b>Pre conditions</b></p> <p>1. C/Ps who participate in the Project do not oppose the Project</p>

## Accomplishment Grid

Category	Indicators	Source of Information	Method	Evaluation	Grade
Input	(Japanese side)				
	J-1. Japanese experts				
	J-1.1 Amount	Personnel input records sheet	Based on the sheet, to confirm as to whether the input was carried out to satisfy its planned amount.	With 3 long-term experts for 5 years, and several short-term experts, the amount of personnel input of J/E is satisfactory compared with the plan.	A
	J-1.2 Quality and Timing	C/P, J/E	Question about the degree of satisfaction of C/P and J/E about the quality and timing of input.	A Japanese expert of agroforestry has been dispatched 10 months later than planned. According to the questionnaires, the most answers have approved of the timing and quality of J/E, while a few stated that a particular subject such as DNA related research is difficult to find a suitable expert.	B
	J-2. Counterpart's training in Japan				
	J-2.1 Amount	Personnel input records sheet	Based on the sheet, to confirm as to whether the input was carried out to satisfy its planned amount.	Since 1996, 17 C/Ps have been trained or planned to be trained in Japan, it seems to be enough to satisfy the plan.	A
	J-2.2 Quality and Timing	C/P, J/E	Question about the degree of satisfaction of C/P and J/E about the quality and timing of training.	According to the questionnaires, the most answers have approved of the timing and quality of training in Japan	A
	J-3. Provision of machinery and facilities				
	J-3.1 Amount	Equipment records sheet	Based on the sheet, to confirm as to whether the input was carried out to satisfy its planned amount, and to check the present condition of them.	Total amount of 291 million yen valued equipment are installed and it satisfies the planned amount.	A
	J-3.2 Quality and Timing	C/P, J/E	Question about the degree of satisfaction of C/P and J/E about the quality and timing of equipment input	According to the questionnaires, the most answers have approved of the timing and quality of equipment from Japan.	A
	J-4. Assistance of local cost				
	J-4.1 Amount	Financial Records, J/E (Mr. Maruta)	Based on the financial records, to confirm as to whether the necessary input was carried out.	6.7 million baht worth of local cost assistance has been made by Japanese side.	A
	J-4.2 Timing and Subject	C/P, J/E	Question about the degree of satisfaction of C/P and J/E about the timing and subject of local cost assistance by Japanese.	According to the questionnaires, the most answers have approved of the timing and subjects of local cost assistance from Japanese side, while a few state that operation cost such as transportation cost should have been more supported.	B
	(Thai side)				
	T-1. Land, buildings and facilities at the project sites				
	T-1.1 Amount	Field Survey	To confirm as to whether the necessary input was carried out, and to check the present condition of them.	All items such as land, building, and other facilities needed to implement the project seem to be well prepared.	A
T-1.2 Quality and Timing	C/P, J/E	Question about the degree of satisfaction of C/P and J/E about the quality and timing of preparation of land, buildings, and facilities.	According to the questionnaires, the most answers have approved of the quality of building and facilities provided by Thai side.	A	

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## Accomplishment Grid

Category	Indicators	Source of Information	Method	Evaluation	Grade
	<b>T-2. Allocation of C/P</b>				
	T2.1 Amount	Personnel input records sheet of Thai side	Based on the sheet, to confirm as to whether the input was carried out to satisfy its planned amount.	99 C/Ps have been participating in this project as shown in the record.	A
	T2.2 Quality and Timing	C/P, J/E	Question about the degree of satisfaction of C/P and J/E about the quality and timing of personnel input from Thai side.	According to the questionnaires, the most answers have approved of the quality and timing of the C/P, while a few pointed out that a few C/P did virtually nothing in spite of their names listed in the project.	B
	<b>T-3. Tools and other materials</b>				
	T-3.1 Amount	Equipment records sheet, J/E.	Based on the sheet, to confirm as to whether the input was carried out to satisfy its planned amount, and to check the present condition of them.	Since the financial crisis hit Thailand, inputs of tools and materials from Thai side is not enough and Japanese side had to support. However, it did not cause any negative influence to the progress of the project.	B
	T-3.2 Quality and Timing	C/P, J/E	Question about the degree of satisfaction of C/P and J/E about the quality and timing of input from Thai side.	According to the questionnaire, most answer have approved of efforts of Thai side to provide equipment at their utmost ability, although the actual input of equipment from Thai side is not so much.	B
	<b>T-4. Administrative and experimental expenses and activities.</b>				
	T-4.1 Amount	Financial Records, J/E (Mr. Maruta)	Based on the financial records, to confirm as to whether the necessary input was carried out.	Because of financial crisis, local cost covered by Thai side (58.6 million baht) seemed to be less than it would be expected. But it did not affect the progress of works.	B
	T-4.2 Timing and subject	C/P, J/E	Question about the degree of satisfaction of C/P and J/E about the timing and subject of local cost assistance by Japanese.	According to the questionnaires, the most answers have approved of the timing and subjects of local cost sharing of Thai side, even though the amount is not enough.	B
	<b>Final Evaluation</b> Inputs from Japanese side have been made satisfactorily as planned. Inputs from Thai side have also been made fairly enough to implement the Project, while some contents of inputs have been changed and supported by Japanese side due to the financial difficulty faced by the university because of the financial crisis in Thailand.				
Activities	Research on the biological 1-1. processes of the agroforestry system	Achievement Chart	Achievement Chart is made by a member of the evaluation study team to confirm as to whether the target of this activity is attained from the technical point of view.	According to the Achievement Chart, the planned level of this activity has been achieved almost completely, and some achievement were more than expected, while a very few sub activities remain to be completed.	A
	Research on the molecular biological and mass-propagation techniques for improvement of the agroforestry system 1-2.	Achievement Chart	Achievement Chart is made by a member of the evaluation study team to confirm as to whether the target of this activity is attained from the technical point of view.	According to the Achievement Chart, the planned level of this activity has been achieved almost completely, and some achievement were more than expected, while a very few sub activities remain to be completed.	A
	Research on historical, cultural, and socioeconomic 2-1. characteristics of the traditional community technology	Achievement Chart	Achievement Chart is made by a member of the evaluation study team to confirm as to whether the target of this activity is attained from the technical point of view.	According to the Achievement Chart, the planned level of this activity has been achieved mostly.	B

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## Accomplishment Grid

Category	Indicators	Source of Information	Method	Evaluation	Grade
	2-2. Form a rational agroforestry system	Achievement Chart	Achievement Chart is made by a member of the evaluation study team to confirm as to whether the target of this activity is attained from the technical point of view.	According to the Achievement Chart, the planned level of this activity has been achieved almost completely.	A
	2-3. Carry out pilot studies on paper mulberry resource management	Achievement Chart	Achievement Chart is made by a member of the evaluation study team to confirm as to whether the target of this activity is attained from the technical point of view.	According to the Achievement Chart, the planned level of this activity has been achieved almost completely.	A
	3-1. Analyzing characteristics of raw materials and research on harvesting and storage methods	Achievement Chart	Achievement Chart is made by a member of the evaluation study team to confirm as to whether the target of this activity is attained from the technical point of view.	According to the Achievement Chart, the planned level of this activity has been achieved mostly, although a few sub activities remain to be completed.	B
	3-2. Research on pulping technologies for small scale mill.	Achievement Chart	Achievement Chart is made by a member of the evaluation study team to confirm as to whether the target of this activity is attained from the technical point of view.	According to the Achievement Chart, the planned level of this activity has been achieved mostly, although a few sub-activities especially on "sulfite pulping" and "small scale pulp and paper mill" remain to be completed.	B
	3-3. Research on bio-pulping and bio-bleaching technologies.	Achievement Chart	Achievement Chart is made by a member of the evaluation study team to confirm as to whether the target of this activity is attained from the technical point of view.	According to the Achievement Chart, the planned level of this activity has been achieved almost completely, while a very few sub activities remain to be completed.	A
	4-1. Research on utilization /management technologies of pulping wastes.	Achievement Chart	Achievement Chart is made by a member of the evaluation study team to confirm as to whether the target of this activity is attained from the technical point of view.	According to the Achievement Chart, the planned level of this activity has been achieved mostly, although a few sub activities remain to be completed.	B
	4-2. Research on utilization technology of related residues.	Achievement Chart	Achievement Chart is made by a member of the evaluation study team to confirm as to whether the target of this activity is attained from the technical point of view.	According to the Achievement Chart, the planned level of this activity has been achieved mostly, although a few sub activities especially on "investigation of valuable extracted chemicals for food additives and other uses" remain to be completed.	B
<b>Final Evaluation</b>					
Planned activities seem to be accomplished in the sense that most of the activities in the Project have been conducted satisfactorily to achieve the target of each activity, while some sub-activities have remained to be completed.					
<b>Outputs</b>					
	1. The technologies on biological processes of the agroforestry system are improved and developed.	Achievement Chart, documents, C/P, J/E	To confirm as to whether this output is accomplished with achievement chart and various documents stated in PDM.	According to the Achievement Chart and the quantity and quality of documents, the planned level of this output has been achieved mostly. According to the questionnaire, most answers have shown confidence of achievement of this output.	A
	2. A sustainable agroforestry system is formulated and recommended.	Achievement Chart, documents, C/P, J/E	To confirm as to whether this output is accomplished with achievement chart and various documents stated in PDM.	According to the Achievement Chart and the quantity and quality of documents, the planned level of this output has been achieved mostly. According to the questionnaire, most answers have shown confidence of achievement of this output.	A

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## Accomplishment Grid

Category	Indicators	Source of Information	Method	Evaluation	Grade
	3. Practical and Clean Pulping technology for small scale pulp mill is developed for higher utilization of forestry and agricultural plant materials.	Achievement Chart, documents, C/P, J/E	To confirm as to whether this output is accomplished with achievement chart and various documents stated in PDM.	According to the Achievement Chart and the quantity and quality of documents, the planned level of this output has been achieved mostly. According to the questionnaire, most answers have shown confidence of achievement of this output.	A
	4. Utilization and environmental management technology for pulping wastes and plant material residues are developed.	Achievement Chart, documents, C/P, J/E	To confirm as to whether this output is accomplished with achievement chart and various documents stated in PDM.	According to the Achievement Chart and the quantity and quality of documents, the planned level of this output has been achieved fairly. According to the questionnaire, majority have shown confidence of achievement of this output, while a few cast doubt on achievement.	B
<p><b>Final Evaluation</b></p> <p>Planned outputs seem to be accomplished in the sense that targets of outputs in the Achievement Chart (ANNEX 3) have been attained satisfactorily, although there are a few activities remained to be completed.</p>					
The Project Purpose	1. Preparedness of the final report	draft contents of the final report or guideline, schedule, etc.	To confirm as to whether a draft contents of the final reports is prepared, and a detailed schedule to finalize the report is also prepared. In addition, quality of contents is estimated with results of achievement chart.	The project is still on progress and the contents of the final report are not determined yet in detail. However, formulation of models of agroforestry system is in progress and the scheduled date to finalize the final report has been set. Outputs have been mostly achieved. With these elements, it is anticipated that the final report will be compiled as expected at the end of the project.	B
	2. Level of understanding of the technologies of the developed model by Thai researchers	C/P, J/E	To confirm the level of understanding of the technologies of the developed model with questionnaire and observation of evaluation study team.	According to the questionnaires, the most answers have approved of the achieved level of understanding of the new model by Thai researchers.	A
	<p><b>Final Evaluation</b></p> <p>It can be evaluated that the project purpose will be accomplished at the end of the Project, because of some facts such as (1) all of the expected outputs are basically accomplished, (2) formulation of models of agroforestry system is in progress, (3) a schedule of compiling the final report has been set, and (4) participating Thai researchers seem to have satisfactorily mastered the technologies related to the model being developed by the Project.</p> <p>The remaining period to finalize the Project will be insufficient, unless Counterparts and Japanese Experts cooperate at their utmost efforts toward compiling the final report.</p>				

\* Readers are advised that "Grade"s are put to help reader's understanding of the results, and they are not objective indicators such as points.

## \* Abbreviation

- 1 "C/P" = counter part
- 2 "J/E" = Japanese expert
- 3 "K.U." = Kasetsart

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## Achievement Chart

("SA"= Achieved than expected. / "A"= Completely achieved. / "B"= Mostly achieved. / "C"= Partly achieved, but not sufficient/ "D"= Not achieved)

Project's Code	PDM Code	Activities	Target	Personnel	Grade (A/B/C/D)	Comments
<b>Agroforestry System</b>						
[P-1]	<b>Output 1 + 2</b>	<b>DEVELOPMENT OF AGROFORESTRY SYSTEM MODEL</b>	Technologies on biological processes of the agroforestry system are improved and developed. / A sustainable agroforestry system is formulated and developed	Bunvong Thaiutsa	A	Case studies in some villages showed a high potential of agroforestry system model development.
SP 1-A	<b>Output 1</b>	Technological improvement of biological processes of the agroforestry model	A new agroforestry system is technically established through improvement of biological processes of the system.	Bunvong Thaiutsa	SA	Forest ecosystem, plant physiological, genetics and tissue culture and cytological studies achieved approved high standard of scientific research performance.
T 1A-1	Activity 1-1	On-site studies on biological processes of the agroforestry system model	The biological process technologies for the agroforestry system are developed on site level.	Bunvong Thaiutsa	SA	Ecological and silvicultural field experiment showed excellent performance.
ST(1A-1)-1	Activity 1-1. 1	Field survey on growth and yield of Eucalyptus camaldulensis and paper mulberry	Areas (state and private) of existing Eucalyptus plantation in Thailand are clarified.	Bunvong Thaiutsa Ladawan Puangchitra	C	Eucalyptus was considered not to be the main target of the project.
ST(1A-1)-2	Activity 1-1. 2	Identification and inoculation of mycorrhizal fungi	The growth of target crops is promoted and the yields increase through mycorrhizal inoculation.	Uthaiwan Sangwanit Poonpilai Suwannarit	C	Mycorrhizae studies were fairly well carried out, but the output still to be developed.
ST(1A-1)-3	Activity 1-1. 3	Establishment and silvicultural treatments of agroforestry plantations	A suitable combination of forest and agricultural crops in agroforestry system is selected./ Maximal growth and yields of various varieties of plant materials for paper production are clarified. / Silvicultural treatments and harvesting techniques of paper mulberry are established.	Bunvong Thaiutsa Ladawan Puangchitra	SA	Presentation by Dr. Laddawan was very comprehensive and super excellent. Valuable data on paper mulberry silvicultural treatment, response to soil property, growth performance, biomass accumulation were duely collected. Application potential of the data to practical management is so high that much is expected to develop in future project, if any. Autonomous development in future research activities are immense.


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Project's Code	PDM Code	Activities	Target	Personnel	Grade (A/B/C/D)	Comments
T 1A-2	Activity 1-2	Improvement of mass-propagation and molecular biological techniques of the trees	Suitable tree varieties for the agroforestry system are selected, improved and mass-propagated.	Yupa Mongkolsook	SA	Well organized, well performed research activities, which solved many practical problems in establishing paper mulberry plantation.
ST(1A-2)-1	Activity 1-2. 1	Classification and selection of paper mulberry clones by using DNA techniques	Suitable clones especially of paper mulberry are classified.	Somsak Apisitwanich	B	Laboratory techniques established are excellent. Further activities are to be expected to complete the taxonomical issues of <i>Broussonetia</i> .
ST(1A-2)-2	Activity 1-2. 2	Somatic hybridization and direct gene uptake of paper mulberry protoplasts	Suitable hybrids are produced through the protoplasts technology.	Salak Phansiri	SA	Great scientific contribution was made in introducing shoots from protoplast culture technique in paper mulberry. This is the first successful trial of the world.
ST(1A-2)-3	Activity 1-2. 3	Improvement of mass-propagation techniques of paper mulberry by issue culture	The selected clones for the agroforestry system are mass-propagated.	Yupa Mongkolsook	SA	Contribution toward practical performance of paper mulberry plantation is great. It is more than expected. Problems of seedling supply were almost solved.
SP 1-B	<b>Output 2</b>	Research on socio-economic background and formulation of sustainable agroforestry system model	A sustainable agroforestry system is formulated and recommended.	Songkram Thammincha	A	Most important part of the output of the project is under preparation. Five cases, Santisuk, Ban Na Luang Nai, Wang Chin, Thong Pha Phum, and Sakeo are to be formulated.
T 1B-1	Activity 2-1	Historical, cultural and social characteristics of the traditional community technology	The historical, cultural and social background of the traditional community technology are elucidated.	Songkram Thammincha	A	Integration of historical and incentive analysis studies is in progress.
ST(1B-1)-1	Activity 2-1. 1	Historical background of pulp and paper production and utilization	The traditional technologies for pulping and paper production are elucidated, and the potentiality and relation with modern technology are identified.	Songkram Thammincha Santi Suksard Savitree Pisuttipiched Korapin Riddiboot	B	Comprehensive analysis of historical records.



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Project's Code	PDM Code	Activities	Target	Personnel	Grade (A/B/C/D)	Comments
ST(1B-1)-2	Activity 2-1. 2	Investigation of the history, cultural and social characteristics of the traditional community technology	The historical, cultural and social background of the traditional community technology in northern and northeastern Thailand are elucidated.	Jaisakran Hiranpruk	B	Comprehensive analysis of historical records.
T 1B-2	Activity 2-2	Incentive for sustainable rural development and formation of rational agroforestry system model	Potential incentives borne from the agroforestry system model are confirmed.? A sustainable agroforestry system which can be contributed to the rural development is formulated.	Jiraphan Kuldilok Santi Suksard Rudee Theerawanich	B	Well organized analysis of farmers' incentive.
T 1B-3	Activity 2-3	Pilot studies on paper mulberry resource management	Characteristics on the management of paper mulberry plantation and the feasibility of it are identified and grasped.	Songkram Thammincha	A	Pilot study on agroforestry model is in progress.
ST(1B-3)-1	Activity 2-3. 1	Study on the management of natural stands	The management practices of paper mulberry are grasped.	Songkram Thammincha Korapin Riddiboot Anan Anantachote	B	Suggestive cost-benefit analysis
ST(1B-3)-2	Activity 2-3. 2	Study on the paper mulberry plantation	The feasibility of paper mulberry plantation establishment is confirmed.	Songkram Thammincha Korapin Riddiboot Anan Anantachote	B	Suggestive cost-benefit analysis
ST(1B-3)-3	Activity 2-3. 3	Study on the agro-ecological requirements for paper mulberry	The agro-ecological characteristics of paper mulberry are identified.	Songkram Thammincha Korapin Riddiboot Anan Anantachote	A	Agroforestry system model is in progress.




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Project's Code	PDM Code	Activities	Target	Personnel	Grade (A/B/C/D)	Comments
<b>Pulping Technology</b>						
[P-2]	<b>Output 3 + 4</b>	<b>DEVELOPMENT OF PULPING AND RELATED TECHNOLOGY</b>	Environmentally sound and high utilization technologies on pulp production are developed.	Vittaya Punsuvon	A	Optimum Conditions should be set in the mills at practical scale.
SP 2-A	<b>Output 3</b>	Cleaner technology for small scale pulp and paper production	As the results of 2A-1 to 3, the practical and environmental sound technology for small scale pulp and paper production is developed.	Vittaya Punsuvon	A	Technologies should be reflected to the materials to be produced by agroforestry model.
T 2A-1	Activity 3-1	Characteristics analysis of raw materials and development of harvesting and storage method	Characteristics of raw materials are elucidated and technologies for harvesting, stripping and storage are developed.	Vittaya Punsuvon	B	Materials should be specific quality, and the requirement should be shown to agroforestry.
ST(2A-1)-1	Activity 3-1. 1	Characteristics analysis of raw materials for pulp mill	Basic data of properties for raw materials are collected.	Vittaya Punsuvon Savitree Pisuttipiched	A	Optimum quality should be shown by Agroforestry practice.
ST(2A-1)-2	Activity 3-1. 2	Development of harvesting and stripping machine	A harvesting and stripping machine is developed.	Vicha Manthamkan Phaisan Wuttijumnong	A	Other developments of machines will be needed.
ST(2A-1)-3	Activity 3-1. 3	Research on post-harvest deterioration of raw materials and their control measures	A Technology for the preventing post-harvest losses of raw material is developed.	Suchada Ujjin Prsnar Siriacha	B	Control measures should be simple but effective.
T 2A-2	Activity 3-2	Cleaner technology for chemical & mechanical pulping method for a small scale mill	Practical pulp and paper process technologies for hand made and/or small scale mill are developed.	Wikhan Anapanurak	A	Pulping method should be specific to product market and environment.
ST(2A-2)-1	Activity 3-2. 1	Research on alkali and alkali-oxygen pulping	Processes of alkali-oxygen pulping in paper mulberry, bagasse and rice straw are identified.	Wikhan Anapanurak Vittaya Punsuvon	A	Selections needed for raw material and market.
ST(2A-2)-2	Activity 3-2. 2	Research on sulfite pulping	Processes of sulfite pulping are identified, and their applicability is also confirmed.	Savitree Pisuttipiched Pratuang Puthson	D	Ammonium Sulfite will have a merit as fertilizer.





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Project's Code	PDM Code	Activities	Target	Personnel	Grade (A/B/C/D)	Comments
ST(2A-2)-3	Activity 3-2. 3	Research on organosolv pulping	Processes of organosolv pulping are identified, and their applicability is also confirmed.	Wikhan Anapanurak Penjit Sangsurasak	B	Selection need for raw materials and market.
ST(2A-2)-4	Activity 3-2. 4	Research on explosion pulping	Processes of explosion pulping are identified, and their applicability is also confirmed.	Nikhom Laemsak Vittaya Punsuvon Yoshinari Kobayashi	A	Selection need for raw materials and market.
ST(2A-2)-5	Activity 3-2. 5	Development of model design for small scale pulp and paper mill	A model mill for small scale pulp and paper is designed.	Tongchai Srinophakun Penjit Sangsurasak	C	Should be shown in the end.
T 2A-3	Activity 3-3	Biotechnology for development of pulping and paper making	A practical technology of bio-pulping and bio-bleaching is developed by using biotechnology.	Prisnar Siriacha Prisnar Siriacha Vichien	A	Screening has been done well, but practical application for paper mill is needed.
ST(2A-3)-1	Activity 3-3. 1	Investigation of microorganisms and microbial enzymes	The microbial enzymes for bio-pulping and bio-bleaching are selected.	Kitpreechavarich, Lerluck Chitradn, Manee Tantirungkij, Malee Srisodsuk, Suchada Ujjin	A	Screening work is well done, but screening should be done suitable for each raw materials needed.
ST(2A-3)-2	Activity 3-3. 2	Studies on microbial enzymes and their production	The microbial enzymes are identified and the applicability is confirmed.	Kitpreechavarich, Lerluck Chitradn, Manee Tantirungkij, Malee Srisodsuk,	A	Practical enzyme production has been developed. It might be used in other enzymes.
ST(2A-3)-3	Activity 3-3. 3	Research on application of bio-pulping and bio-bleaching	Applicability of enzymes and/or microorganisms in conventional methods is grasped.	Prisnar Siriacha Vichien, Kitpreechavarich, Lerluck Chitradn, Malee Srisodsuk, Suchada Ujjin	B	Need more data in practical scale application.
SP 2-B	<b>Output 4</b>	Utilization and management of pulping wastes and plant material residues	Pulping wastes and plant material residues are utilized and the wastes are environmentally-well managed	Thamrongrat Mungcharoen	B	Need more work. Many possibility exist.




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Project's Code	PDM Code	Activities	Target	Personnel	Grade (A/B/C/D)	Comments
T 2B-1	Activity 4-1	Utilization and management of pulping wastes	A technology for utilization of the pulping wastes are developed.	Thamrongrat Mungcharoen	B	Waste use is essential for small scale pulp mill.
ST(2B-1)-1	Activity 4-1. 1	Utilization of pulp and paper making waste water as fertilizer and soil amendment	A Technology for reuse of pulping wastes as fertilizer and soil amendment is established.	Supamard Panichasakpatna Jongruk Chancharoensuk Chairerk Suwannarat	B	Very important, should be tested in the practical fields.
ST(2B-1)-2	Activity 4-1. 2	Waste management for pulping and paper making	A friendly environmental management is established, to contribute the preservation of the ecological conditions surrounding pulp mills.	Penjit Srinophakun Prisnar Siriacha Nusara Sinbuathong Pramote Sirorote	A	Reactor developed, but cost should be low enough.
ST(2B-1)-3	Activity 4-1. 3	Cleaner technology for pulping and paper making	The wastes of a pulp mill are minimized and their quality is with in environmental sound level./ This will improve productivity & product quality of the mill	Thamrongrat Mungcharoen Sunun Limtrakul Thongchai Srinophakun Penjit Sangsurasak Nusara Sinhuathong Patana	B	Need more analysis at practical mills.
T 2B-2	Activity 4-2	Utilization of related residues for other purposes	Pulp and paper and related residues are highly utilized	Vichai Haruthaitanathan	B	Market development is needed.
ST(2B-2)-1	Activity 4-2. 1	Investigation of valuable extracted chemicals for food additives and other uses	Sweetener of xylan/xylose/xylitol are extracted from pulping wastes? Stem from paper mulberry and other plants is utilized as mosquito coil and other uses	Vichai Haruthaitanathan Klanarong Sriroth Vilai Santisopasri Penkwan Chompreeda Hatairat Rimkeeree Phaisan Wuttijumong	C	Mosquito repellent has been developed. Need other products.
ST(2B-2)-2	Activity 4-2. 2	A production of higher digestible feed from plant waste	Higher digestible animal feeds are produced by a partial hydrolysis of the plant materil wastes.	Vichai Haruthaitanathan Klanarong Sriroth Vilai Santisopasri Sombat Khotavivatana	B	Silage was made, but quality should be improved.



## Evaluation Grid

	Indicators	Source of Information	Method	Evaluation	Grade
Efficiency	1. Output Accomplishment	Accomplishment Grid	To confirm with the Accomplishment Grid	According to the Accomplished Grid, the planned four outputs have been accomplished mostly. According to the questionnaire, most answers have shown confidence of achievement of outputs, while a few were doubtful especially in the field of agroforestry.	B
	2. Input Accomplishment				
	2-1. Amount and Quality of input	Accomplishment Grid	To confirm with the Accomplishment Grid	most of the necessary inputs have been made as planned, although some change of contents have occurred in Thai side due to the financial crisis.	B
	2-2. Timing of input	Accomplishment Grid	To confirm with the Accomplishment Grid	Most of the answers in the questionnaire have approved of the input timing, but a few pointed out delays in some inputs.	B
	3. Efficiency				
	3-1. Comparison of output with input	JICA staff	To confirm as to whether the quantity of input can be justified by comparison of output from JICA staff's point of view	Compared with other forestry-related projects, 300 million yen valued input of equipment seems to be relatively high, however, this input seems to be justified as necessary since the project's theme required several laboratory-based experiments with equipment. Therefore, a sort of efficiency seems to be attained.	A
	3-2. Combination of input	C/P, J/E	To ask as to whether inputs contents and level are proper or not from a view point of a virtual project manager. Moreover to ask them what part of the input should be changed and why if the finance increase or decrease.	The majority of interviewees saw the project input level is reasonable and efficient. Some C/Ps think that the input of training or equipment has to be increased, while some J/Es think that the input of equipment has to be reconsidered with capability of C/Ps.	B
3-3. Any linkages with other type of cooperation which promote the efficiency.	J/E and JICA staff	To check any cooperation such as grant from overseas or other projects in Thailand ?	Technical exchange were made through seminar held in cooperation with other JICA project out of Thailand such as Laos. In addition, visual editing facilities provided by a grant-aid of Japan were used to make a promotion video of this project.	A	
<b>Final Evaluation</b> Even though Thai financial crisis has influenced on the input from Thai side, the expected outputs were mostly attained by the efforts of Japanese Experts and Counterparts to cooperate at their utmost abilities. In addition, the Project utilized the equipment of video editing provided by Japanese Grant Aid, and some technical exchanges have also been made through seminars with other JICA projects (Conservation and Afforestation Project II in Lao PDR and Central Forestry Development Training Center Project in Myanmar). Thus, efficiency of the Project is evaluated as high.					

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## Evaluation Grid

	Indicators	Source of Information	Method	Evaluation	Grade
Effectiveness	1. Preparedness of the final report	draft contents of the final report or guideline, schedule, etc.	To confirm as to whether a draft contents of the final reports is prepared, and a detailed schedule to finalize the report is also prepared. In addition, quality of contents is estimated with results of achievement chart.	The project is still on progress and the contents of the final report are not determined yet in detail. However, formulation of models of agroforestry system is in progress and the scheduled date to finalize the final report has been set. Outputs have been mostly achieved. With these elements, it is anticipated that the final report will be compiled as expected at the end of the project.	B
	2. Level of understanding of the technologies of the developed model by Thai researchers	C/P, J/E	To confirm the level of understanding of the technologies of the developed model with questionnaire and observation of evaluation study team.	According to the questionnaires, the most answers have approved of the achieved level of understanding of the new model by Thai researchers.	A
<p><b>Final Evaluation</b></p> <p>It can be evaluated that the project purpose will be accomplished at the end of the Project, because of some facts such as (1) all of the expected outputs are basically accomplished, (2) formulation of models of agroforestry system is in progress, (3) a schedule of compiling the final report has been set, and (4) participating Thai researchers seem to have satisfactorily mastered the technologies related to the model being developed by the Project.</p> <p>The remaining period to finalize the Project will be insufficient, unless Counterparts and Japanese Experts cooperate at their utmost efforts toward compiling the final report.</p>					
Impact	1 Possibility to accomplish the Overall Goal of the Project.	C/P, J/E, Evaluation Study Team	To ask the relevant by questionnaire as to whether the overall goal of the project seems to be met eventually. In addition, an observation study is conducted by a member of the evaluation study team.	Most of the answers in the questionnaire saw that the developed model and technologies will be extended into the rural community, while half of the answers also said it is conditional, such as the necessity of more time to complete the model and more time to extend the model to the rural community. Thai government is expected to cooperate.	B
	2 The changes accrued from the project which the relevant feel / think.	C/P, J/E	To ask the relevant by questionnaire to describes freely as to what and how the project bring any change around the area, university, etc.	There are several positive impacts such as (1) drawing of interests of not only academics but also the government for paper mulberry, (2) upgrading of laboratory's function with inputs of equipment and machinery, (3)interdisciplinary cooperation among departments in the University , (4) positive change of attitudes of some villagers for dealing with waist water, (5) some key C/P got promotion in the university, (7) a new course of paper technology is established in the university etc, while there is no significant negative impact.	A
<p><b>Final Evaluation</b></p> <p>According to the opinions of Counterparts, Japanese Experts and rural communities, all impacts were positive. Especially it is noted that the paper mulberry began to draw the interest of Thai government. Therefore, the Project is considered to have left mostly positive impacts in and out of the university. About the accomplishment of the overall goal, which is one of the expected impacts by the Project, it is viewed by Counterparts and Japanese Experts that the extension of the new model in rural communities can be attained but it takes time and needs efforts. For the extension of the models in rural communities, Thai government is expected to cooperate institutionally and financially.</p>					

"Grade" is defined as "A= Perfect", "B= Not perfectly but not affecting the project progress" and "C= Not perfectly and affecting the project progress"

## Evaluation Grid

	Indicators	Source of Information	Method	Evaluation	Grade
Relevance	1. Relevance of the Project for Thai government's national policy	C/P, J/E	To ask as to whether the project is still meaningful along with the current national policy.	According to the questionnaire, most of answers said it is meaningful very much. In addition, the current government focuses on the rural development balanced with consideration of environment conservation.	A
	2. Relevance of the Project for the needs of Kasetsart University.	C/P, J/E	To ask as to whether the project is still meaningful for the current situation of Kasetsart University.	According to the questionnaire, most of answers said it is meaningful very much for the current situation and needs of the university.	A
	3. Relevance of the Project for the needs of rural communities in Thailand.	C/P, J/E	To ask as to whether the project is still meaningful for the rural communities in Thailand.	According to the questionnaire, most of answers said it is meaningful very much for the current situation and needs of the rural communities in Thailand.	A
	4. Relevance with plan setting of PDM.	PDM	Is the composition of PDM logical?	Project's PDM (Project Design Matrix) seems to be made logically.	A
<p><b>Final Evaluation</b></p> <p>Based on the opinions of Counterparts, Japanese Experts and rural communities, relevance of the Project is evaluated as very high in all aspects such as the target of the national policy, the needs of the university, and the needs of rural communities in Thailand. PDM (project design matrix) has been made logically.</p>					
Sustainability	1. Institution				
	1-1. Capability of Kasetsart University	C/P, J/E	To check the capability of Kasetsart University to continue the research works after the end of this project.	All of the answers in the questionnaire saw the university has enough skills and knowledge to continues the research works.	A
	1-2. K.U. strategy to extend the technology to the rural community.	C/P	To check as to whether C/P has an intention to spread the acquired technology to other areas and whether it has a clear strategy for it through interview with C/P.	There are enthusiasm among C/Ps to extend the developed model and technologies through training and seminars in rural communities. Some interviewees pointed out that KAPI itself can not extend effectively because C/Ps are academic staff, and it needs some cooperation with other extension-related organizations.	B
	2. Finance				
2-1. Financial condition of Kasetsart University	C/P	To consider as to whether KU can exist with regard to financial aspect.	Even though most of the answers in questionnaire saw it is difficult for K.U. to continue the research works by self funding, but some external funding such as the government or foreign donors is highly expected.	B	
2-2. Financial source to promote the extension of the technology.	C/P	To check as to how C/P think about finance in order to expand the acquired technology to the rural communities after the cooperation period is end.	Most of the interviewees saw it is difficult for K.U. to conduct the extension works by itself especially in financial term, and some cooperation work with other extension-related organization is expected.	B	

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## Evaluation Grid

	Indicators	Source of Information	Method	Evaluation	Grade
	3. Technology  Possibility for C/P to manage 3-1. the technology to be shared in its organization..	Expert and C/P	To check as to how C/P are about to share and use the acquired technology in the organization. Also to check the continuity of C/Ps in the KU after the project's end.	Currently the acquired knowledge are exchanged by informal communication, reading published reports, and holding several seminars. Some said researchers' knowledge are still remained individually, not shared in the organization. However, since all of main C/Ps are expected to remain in K.U. after the project, the knowledge will be stored in the K.U.	B
	3-2. Local needs for the technology	Experts, C/P	To check as to whether the transferred technology is suitable to needs of the rural communities after the cooperation period is end.	According to the interview, the majority saw that the developed technologies will be meaningful and beneficial for rural communities. However, some pointed out that the feasibility of the model is not confirmed yet.	B
<p><b>Final Evaluation</b></p> <p>From comprehensive analysis from institutional, financial, and technical aspects, it is evaluated that a basic sustainability of the Project is expected after the end of the Project. There are some concerns to make a full guarantee of sustainability. Firstly, for extension of the new model in rural communities, KAPI is not fundamentally an extension institution so that it needs cooperation with other extension institutions. Secondly, the finance of research and extension will not be sufficient and it needs financial supports from external funding such as Royal Project, foreign donors, etc. Thirdly, for the technical aspect, individual techniques have already been well developed and transferred to Thai researchers, however the integration of the developed techniques is necessary.</p>					

\* Readers are advised that "Grade"s are put to help reader's understanding of the results, and they are not objective indicators such as points.

## \* Abbreviation

- 1 "C/P" = counter part
- 2 "J/E" = Japanese expert
- 3 "K.U." = Kasetsart University

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