

<b>1. Outline of the Project</b>									
<b>Country:</b> Kingdom of Thailand	<b>Project title:</b> Research Project for Higher Utilization of Forest and Agricultural Plant Materials in Thailand								
<b>Issue/Sector:</b> Forestry Processing	<b>Cooperation scheme:</b> Project-type Technical Cooperation								
<b>Division in charge:</b> Forestry Cooperation Division, Forestry and Fisheries Development Cooperation Department	<b>Total cost:</b> 318.5 million JP Yen								
<b>Period of Cooperation</b>	(R/D): 15 March 1996								
	(Implementation): 1 August 1996 - 31 July 2001								
	(F/U): 25 February 2004 - 2 March 2004								
<b>Partner Country's Implementing Organization (s):</b> Kasetsart University (Faculty of Forestry/Kasetsart Agricultural and Agro-Industrial Products Improvement Institute (KAPI))	<b>Supporting Organization in Japan:</b> Forestry Agency, Ministry of Education, Culture, Sports, Science and Technology, Shiga Prefecture								
<b>Related Cooperation</b>									
<p><b>1.1 Background of the Project</b></p> <p>In the 1980s-1990s, Thailand's forest were diminishing rapidly due to an increasing demand for timber fuelled by rapid economic development and an increase in population, as well as an increase in the cultivation of forests and slash-and-burn agriculture carried out by poor farmers. Thailand's Royal Forest Department has prioritized the maintenance of 40% of all land as forest in its national social and economic development plan and promotes afforestation. The Thai government recognized the need for technology that enables the efficient use of timber and development of timber alternatives, and requested Japan's assistance in a Project-type technical cooperation to develop a manufacturing technique for pulp and paper which was expected to meet the increasing demand and to extend the method. In response, the Thai and Japanese governments agreed to establish a project aiming at creating a new model for an agroforestry system that would enable the regional agricultural societies to sustainably develop through the production of pulp and paper.</p> <p><b>1.2 Project Overview</b></p> <p><b>(1) Overall Goal</b></p> <p>The effectiveness of the new agroforestry system model is verified through a verification study on a model community, and the model is introduced into the rural communities in Thailand.</p> <p><b>(2) Project Purpose</b></p> <p>A new model for an agroforestry system with higher utilization of forestry and agricultural plant materials is developed for sustainable rural development.</p> <p><b>(3) Outputs</b></p> <ol style="list-style-type: none"> <li>The technologies on biological processes of the agroforestry system are developed.</li> <li>A sustainable agroforestry system is recommended.</li> <li>Practical and clean pulping technology for a small scale pulp mill is developed for higher utilization of forestry and agricultural plant materials.</li> <li>Utilization and environmental management technology for pulping wastes and plant material residues are developed.</li> </ol> <p><b>(4) Inputs (as of the Project's termination)</b></p> <table border="0"> <tr> <td colspan="2"><b>Japanese side:</b></td> </tr> <tr> <td><b>Long-term expert</b> 6 persons</td> <td><b>Equipment</b> 296.5 million Yen</td> </tr> <tr> <td><b>Short-term expert</b> 15 persons</td> <td><b>Operating cost</b> 7,369,994 Baht</td> </tr> <tr> <td><b>Trainees received</b> 17 persons</td> <td>(approx. 22,081,000 Yen)</td> </tr> </table>		<b>Japanese side:</b>		<b>Long-term expert</b> 6 persons	<b>Equipment</b> 296.5 million Yen	<b>Short-term expert</b> 15 persons	<b>Operating cost</b> 7,369,994 Baht	<b>Trainees received</b> 17 persons	(approx. 22,081,000 Yen)
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<b>Thai Side:</b>	
<b>Counterpart</b>	<b>99 persons</b>
<b>Land and facilities</b>	<b>Equipment purchase (apparatus, vehicles, basic laboratory equipment) Land (greenhouse, 9 experimental sites for agroforestry: total area 13.4 ha) Facilities (experimental space, pulping house, etc)</b>
<b>Local cost</b>	<b>Administrative and experimental expense and activities 64,581,587 Baht (approx. 179,000,000 Yen)</b>
<b>2. Evaluation Team</b>	
<b>Member of Evaluation Team</b>	Kokusai Kogyo (Thailand) Co., Ltd. – Mr.Precha Chuntakorn, Team Leader – Ms.Nuengnam Navaboonniyom, Researcher
<b>Period of Evaluation</b>	31 January 2005-4 March 2005 <b>Type of Evaluation:</b> Ex-post Evaluation
<b>3. Results of Evaluation</b>	
<b>3.1 Summary of Evaluation Results</b>	
<b>(1) Impact</b>	
<p>In order to extend the project results, KAPI attempted to apply the new agroforestry system model to the Phufah Project<sup>1</sup> from 2001. KAPI's activities included the planting of paper mulberry mixed with another crop (i.e. red beans), as recommended in the evaluation at the time of project termination, as well as the promotion of paper mulberry plantation for the prevention of slope erosion and landslides and technology transfer on paper production. Besides the activities in the Phufah Project, KAPI also conducted 12 training courses and workshops with 647 trainees from 2002 to 2005. KAPI also conducted further application of the technologies researched during the project to plants other than paper mulberry, extended its research activities to other fields such as product development and marketing, and provided technical guidance to persons concerned with the paper-making industry.</p> <p>Owing to the continuous and great attempts of KAPI mentioned above, the Overall Goal of the Project is considered to be partly achieved, as some components of the model, namely pulp and paper production, marketing, waste management, and environmental protection, have been adopted and carried out by communities and companies related to the paper industry. On the other hand, the component on paper mulberry plantation has just revealed its first step of achievement through the activities of communities in the Phufah Project, while other farmers tend to focus less on plantation activities. This may be due to the improvement of economic conditions after termination of the project and the trend towards more profitable economic crops or other well-paid jobs, and to the fact that Thailand still allows the export of paper products regardless of whether the raw materials are from the planted trees or natural trees in the forest. For this reason, farmers tend to take the easier way by not planting the paper mulberry trees but utilizing those found in forest.</p> <p>As for the impact not anticipated by the Project, the Project has contributed to farmer communities by setting a price standard for paper mulberry paper, categorizing the price of the thick paper and the thin paper.</p>	
<b>(2) Sustainability</b>	
a. Technical Aspects	
<p>The sustainability of the counterparts in terms of research capabilities is considered to be high considering that the techniques and knowledge they obtained are being used in their research works and expanded to other fields. KAPI's capability for maintenance of equipment and machines used on a daily basis is considered to be moderately high, partly owing to the skills and techniques</p>	

<sup>1</sup> The Phufah Project, under the Patronage of Her Royal Highness Princess Mahachakri Sirindhorn, was established in Borkuar District, Nan Province in 1999. One of the main objectives of the project is to study, research and transfer technology for development and sustainable natural resources management together with the coordinating center for rural development and improvement of the living conditions of local people. The Phufah Project has been supported by various organizations in both public and private sectors. Kasetsart University (KU) has taken responsibility of 100 rai of land, of which 10 rai has been allocated to KAPI.

obtained during the implementation of the Project.

b. Organizational Aspects

The sustainability in terms of human resources is very high considering that KAPI has been able to secure a very high retention rate of counterparts (i.e. 98 out of 99 staff, who were assigned as project counterparts, are still working in KU). KAPI is also likely to secure more staff for further research activities.

c. Financial Aspects

KAPI was able to maintain its financial sustainability by continuously getting support from KU and other institutions for research activities and technology transfer. However, the budget related to equipment repairs seems to be relatively unstable.

d. Sustainability of Project Effects

Using the skills and techniques obtained during the Project, KAPI has sustained its research activities for both development of the Agroforestry System Model and development of pulping and related technologies, while extending its research activities to other fields and further applying the technologies to other kinds of plants besides paper mulberry.

In addition to the technologies for the better plantation, KAPI has also extended its research activities on pulp and paper production, marketing, waste management, and environmental protection, which are all the processes of the “new” agroforestry system model.

### 3.2 Factors that have promoted project

#### (1) Impact

- Financial support for technology transfer was highly sustained, owing to the Thai government’s main focus on grassroots people and its support to the One Tambon One Product (OTOP) policy. This has brought about cooperation from Kasetsart University, the Bank of Agriculture and Agricultural Cooperatives (BAAC), and so on, to support the activities of KAPI for extending the agroforestry system model, particularly the product development and marketing components, to the communities.

#### (2) Sustainability

- KAPI could attain high sustainability in continuing its research activities and expanding the results since the institute maintains its policy focusing on conducting research and transferring results to the community.
- Financial sustainability in terms of research activities and technology transfers can be continuously expected owing to KAPI’s high motivation and enthusiasm in conducting research activities and transferring technology to farmers, which is consequently related to attempts in finding financial sources to support such activities.
- The high education level and high research capability of the counterparts of the Project are one of the main factors promoting the efficiency and continuation of the research activities.
- Equipment used daily and highly sophisticated equipment provided during the Project allow the counterparts and other university experts to continue research activities.

### 3.3 Factors that have inhibited project

#### (1) Impact

- Improvement of economic conditions after termination of the Project has affected the interest of farmers in planting paper mulberry. The tendency to focus on the paper mulberry industry has been changed to more profitable and easier jobs which can be easily found during a period of economic upturn.
- The absence of export control on paper products made from natural materials constrains the extension of paper mulberry plantation promoted by the Project because farmers tend to cut down indigenous paper mulberry.
- Due to the high maintenance cost of some equipment provided by the Project, continuation of some activities needing to use such equipment is restrained.

## **(2) Sustainability**

There is concern that product development at the handicraft-level may have limitations due to the price down of paper making from paper mulberry because handmade paper products are freely available on the market, while no problems with continuation of KAPI's activities for product development using paper mulberry paper and its technology transferring to farmers have occurred up to this time.

### **3.4 Conclusions**

Judging from the techniques acquired by the counterparts and from institutional capabilities, both on the ability to secure a number of researchers and the ability to secure financial support, the sustainability of the Project is considered to be high. The research activities both for development of the Agroforestry System Model and development of pulping and related technologies have been continued and extended to other fields, and further application of the technologies to other kinds of plants is also conducted.

It can be concluded that the project has partly achieved its overall goal by having some components of the model being carried out by communities, while activities to promote paper mulberry plantation are achieved to a lesser degree due to the fact that the economic situation in Thailand has drastically changed.

### **3.5 Recommendations**

#### ***For JICA:***

With regard to the necessity of utilizing some highly sophisticated equipment directly imported from Japan such as the BOD and COD analyzers, and the limited maintenance capacity in Thailand, it is recommended that an engineer who can conduct maintenance of such highly sophisticated equipment should be dispatched to KAPI for the technical transfer principally on the maintenance of such equipment.

#### ***For KAPI:***

Product development of paper made from paper mulberry at the industrial level is one of the main factors for further continuation of KAPI's activities. Therefore, it is necessary to consider the promotion of the research and development of paper mulberry to be applied to industrial products, similar to the utilization of kenaf for building boards and draining material for preload in Japan. As an initial phase to start the research and development described above, KAPI should conduct an analysis of industries which can utilize paper mulberry as a product ingredient, and also consider the concrete fields to be developed, market needs, the practicable scope of technical activities by KAPI, and the necessity of technical cooperation from Japan.

### **3.6 Lessons Learned**

- The highly sophisticated equipment, such as the BOD and COD Auto-analyzers, were procured from Japan. When this equipment breaks down, it is very difficult to find an agent who can repair it. Considering the sustainability of equipment utilization and the prospect of having maintenance done by local resources, it is essential to carefully investigate the possibility of procuring such equipment in Thailand.
- Timely monitoring and proper review of the activities to achieve the overall goal and/or to utilize the outputs borne from the project activities, in accordance with the rapid change in the economic and social situation, is highly important.

### **3.7 Follow-up Situation**

- Three individual short-term experts were dispatched in fiscal year 2001, to assist in the activities at the agroforestry testing sites.
- In addition, the in-country training programs on the "Transfer of Technology for Paper Mulberry Pulp and the Paper Industry" were conducted on February 25 – 27 and March 1 – 2, 2004 in Chiangmai and at Kasetsart University, respectively.