

# Integrated Mangrove Rehabilitation in Ban Tong Tasae Mangrove Community Forest

Trang Province on the Andaman Coastline of Thailand



## EXECUTIVE SUMMARY



April 2013

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The project “Integrated Mangrove Rehabilitation in Ban Tong Tasae Mangrove Community Forest, Trang Province on the Andaman Coastline of Thailand” designed not only to plant trees – mangrove reforestation but also to enhance the fishery and coastal productivity. The outcome of this project is expected to enhance the coastal welfare in Ban Tong Tasae village. The project activities were proposed for two years (2010-2012). The project was carried out through the local participations and the cooperative researches by the research teams

from Chulalongkorn University and Rajamangala University of Technology Srivijaya, Trang Campus supported through the research grants from Yves Rocher Foundation and Yves Rocher Thailand. Taking the royal initiatives on self-sufficiency toward sustainable development into account, the research team has drawn up the framework of transforming His Majesty King Bhumibol Adulyadej of Thailand’s guidelines into the working reality of mangrove rehabilitation and management plan. As the community based management



already exist, the new forest should be sustained following the guidelines of **self-sufficiency** through the capacity building based on **adaptive management** - a systematic approach for improving resource management by learning from management outcomes (The U.S. Department of Interior Technical Guide – Adaptive Management Working Group, 2008) Changes in resource system as influenced by fluctuating environmental condition and management action as in Figure 1. Adaptive management requires the participation of stakeholders. Stakeholders should be involved early in the adaptive management cycle, to help assess the problem and designed activities to solve it. Stakeholders can help to implement and monitor those activities, and participate in the evaluation of results. In order to evaluate the mangrove reforestation in term of beneficiary gained by the on-going mangrove rehabilitation project, the research followed the guideline in adaptive management as in Figure 2. Capacity building for community monitoring program has been proposed as an integral part of the project to provide evidences and insights supporting the success of the process. The research team as well as the local communities had been working hands in hands in the process of learning while doing throughout the project operation. Adaptive management, not only measure the effective decisions and enhanced benefits resulting from the project, but also measure how well the objectives of the on-going project meet in term of environmental, social and economic goals. It also increased scientific knowledge as well as provided the best practices in mangrove rehabilitation plan.



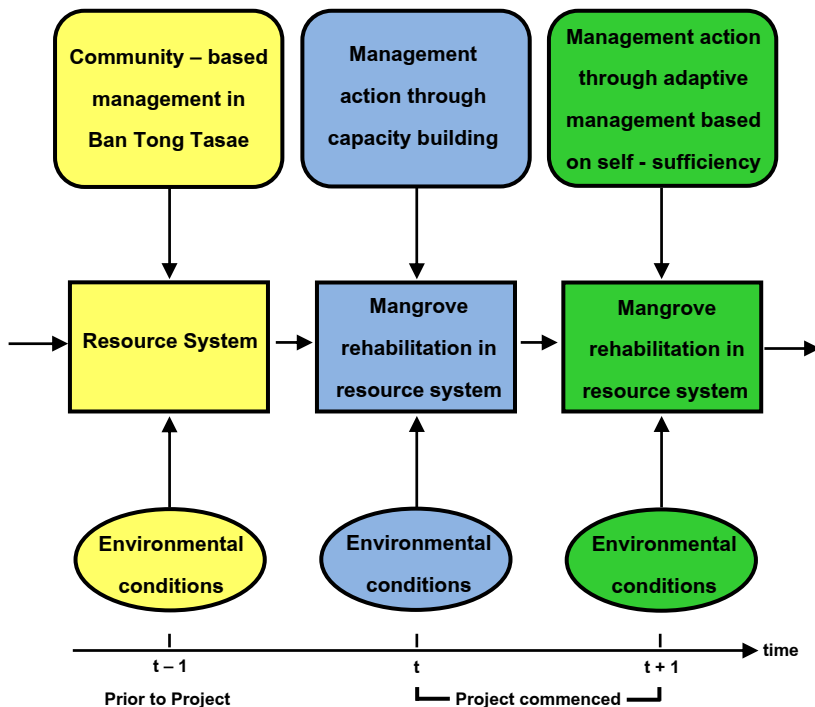


Figure 1 Change in resource system as influenced by fluctuating environmental conditions and management actions. Management produces immediate returns (costs and/or benefits) and longer – term changes in resource status (adapted from The U.S. Department of the Interior Technical Guide – Adaptive Management Working Group, 2008)



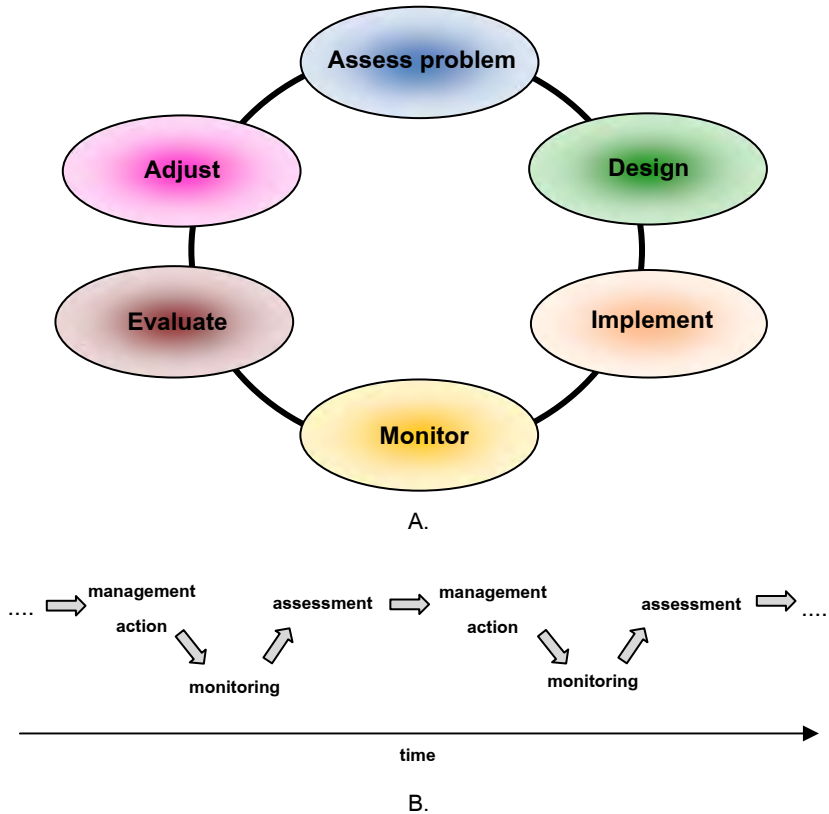


Figure 2 A. Diagram of the adaptive management process

B. Iterative cycle of adaptive management. Management actions are based on objectives, resource status, and learning. Data from followup monitoring are used to assess impacts and update understanding. Results from assessment guide decision taking in the next time period.

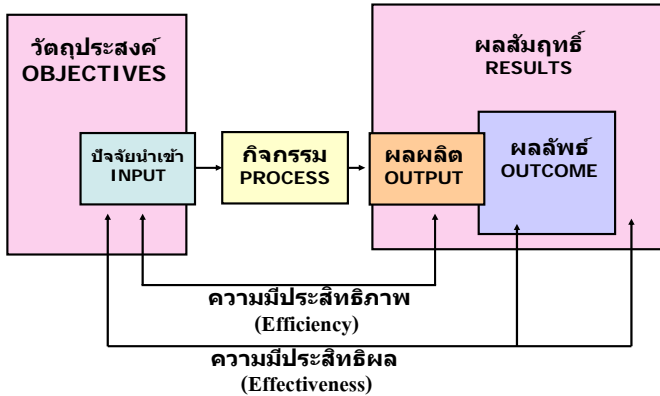




The outcome evaluation on the success of the Integrated Mangrove Rehabilitation in Ban Tong Tasae Mangrove Community Forest concentrated on the profounded impact of reforestation the productivity and welfare in the community. The evaluation covered the efficiency and the effectiveness of the integrated mangrove rehabilitation scheme as in Figure 3. The evaluation on the efficiency of the project was based on the output of the project in the changes in physical environment. The effectiveness of the project was evaluated through the outcome from the impacts of the reforestation program in economic and coastal welfare, health care system and the social behavior aspects. The community capacity to sustain the on-going mangrove rehabilitation project was also focused.

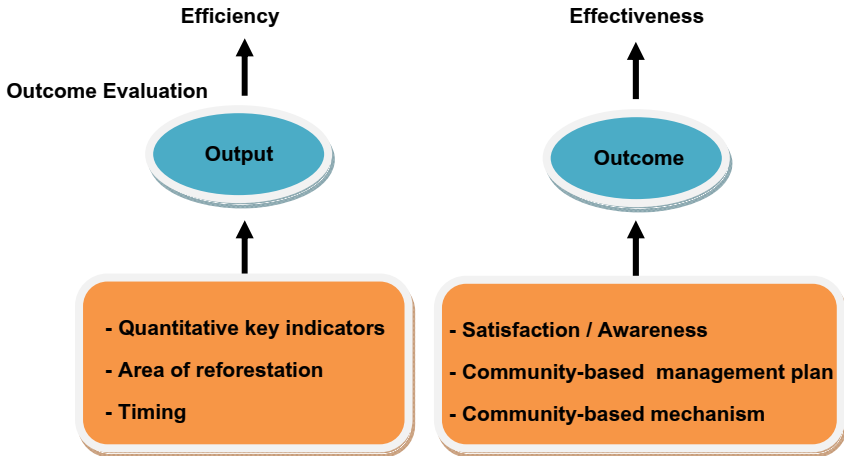
The mangrove reforestation activities in the project were carried out under the framework of UNEP “Plant for the Planet : Billion Tree Campaign” which was proposed by Yves Rocher Foundation of the 50 million trees worldwide as the target to celebrate the 50<sup>th</sup> Anniversary in the success of Yves Rocher. The Project “Together, Let’s Plant for the Planet” by Yves Rocher Foundation was carried out in many different parts of the world in the attempt to conserve the world nature and environment for next generations. The success of the Integrated Mangrove Rehabilitation in Ban Tong Tasae Mangrove Community Forest Project was due to the combined efforts of the local community, the research team and several government agencies such as the Department of Marine and Coastal Resources through Mangrove Conservation Division and local agencies involved in particular Mangrove Management Section No.3 (Lower South), Mangrove Resource Development Station No.32 (Yan-ta-khao, Trang) and Mangrove Resource Development Station No.37 (Tungwah, Satun) and Provincial administrative agencies such as the local administrative agency of Tung Krabua, Administrative Office of Amphoe Yan-ta-khao and Provincial Office of Trang Province.





A.

Level of Evaluation



B.

Figure 3 A. The concept on project evaluation on efficiency and effectiveness of the rehabilitation scheme with

B. Key indicators in the output and outcome evaluation of the project





The integrated mangrove rehabilitation project as funded by Yves Rocher Foundation and Yves Rocher Thailand not only invested in the **social capital** but also in the long term development of knowledge gained, human development and capacity building in the Ban Tong Tasae community in order to sustain the on-going mangrove rehabilitation project.

The major goal of the project was to support and facilitate mangrove rehabilitation in Ban Tong Tasae mangrove community forest by providing the rehabilitation scheme. Mangrove reforestation in Ban Tong Tasae Mangrove Community Forest were planned by the research team and the local based on the knowledge and local wisdom shared on site selection, site preparation, selected mangrove species, planting technique, spacing and monitoring as well as maintenance technique. Multispecies of mangrove plants were selected namely *Rhizophora mucronata*, *R. apiculata*, *Bruguiera* spp., *Ceriop* spp., *Avicennia alba* and *Sonneratia* spp. Wild mangrove propagules and seedlings as well as potted seedlings and ball planted seedlings were used. Site preparation were prepared by clear cutting and thinning of shrubs and ground cover vegetation under old canopies. The clear cutting and thinning of shrubs and ground cover vegetation provided the open space for seedling growth and also enhanced the natural regeneration process. Under the first year, the project has accomplished the reforestation plan and contributed the total of 135,700 trees planted in the main reforestation area (AP) of 200 rai as in Figure 4 the new accreted mudflat of 50 rai at Ko Klang as in Figure 5 and the enlarged medicinal plant plantation of 100 rai as in Figure 6 The reforestation was a success due to the number of trees planted exceed the original target and of high averaged survival rate of more than 80%.

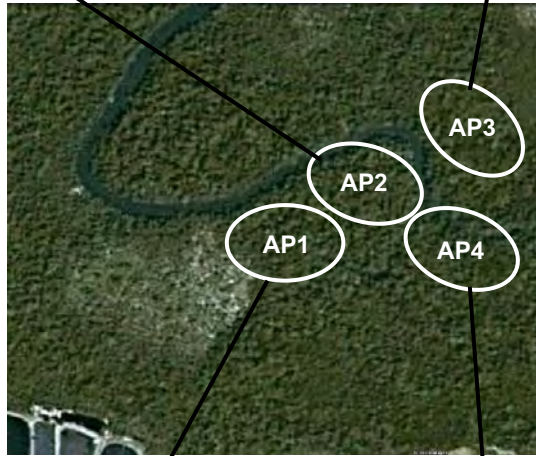




*Rhizophora apiculata*, *R.mucronata*,  
*Bruguiera* spp., *Bruguiera sexangula*



*Bruguiera sexangula*



*B.sexangula*, *Avicennia alba*, *Ceriop tagal*,  
*R.apiculata*, *R.mucronata*, *Bruguiera* spp.

*R.apiculata*, *R.mucronata*, *Bruguiera* spp.

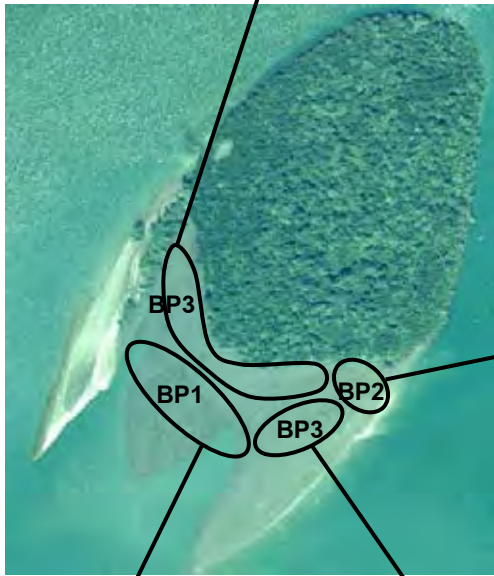


Figure 4 Mangrove reforestation on main forest AP of 200 rai in  
Ban Tong Tasae mangrove community forest, Trang Province





*Sonneratia caseolaris*, *Rhizophora apiculata*, *R. mucronata*, *Bruguiera sexangula*



*S. caseolaris*,  
*Nypa fruticans*

*Avicennia alba*

*S. caseolaris*, *R. apiculata*,  
*R. mucronata*, *B. sexangula*



Figure 5 Mangrove reforestation on accreted mudflat BP of 50 rai on Ko Klang in Ban Tong Tasae mangrove community forest, Trang Province





Figure 6 Medicinal plantation area of 100 rai in Ban Tong Tasae mangrove community forest, Trang Province

Integrated mangrove rehabilitation scheme through local participation proposed for the Ban Tong Tasae mangrove community forest is the reforestation program coupled with the enhancement of the fishery resources by crab seed restocking in order to sustain both the forest and fishery productivity. The success on the hatching and rearing of crab larvae from wild gravid females *Episesarma singaporensis* Tweedie, 1936 to crab seed and juveniles for restocking in the Marine Crab Nursery and Rearing Unit at Rajamangala





University of Technology Srivijaya, Trang Campus were evidenced due to the expertise of the research team. The release of crab seeds for restocking were carried out jointly with the local villagers at intervals of 4-5 times. Each time released 10,000 crab seeds into the plantations. Tagging method using sequential coded wire tags induced by the single shot tag injector was used to monitor the survival and growth of the restock crab seeds in the wild as compared to the control area. The stocking effectiveness was calculated at 13.26% with the estimation on the grapsid crab population in the area of 4,647 individuals.



Figure 7 Enhancement of fishery productivity by crab seed stocking in the reforestation area in Ban Tong Tasae mangrove community forest, Trang Province.



Biodiversity of fishery resources and changes in fishery community production were the key ecological indicators to assess the rehabilitated potential of the mangrove ecosystem. The comprehensive survey on biodiversity of fishery resources indicated the rich and productive mangrove ecosystem in term of mangrove diversity and fishery resources namely phytoplankton, zooplankton, benthos and fishes. The results from these key ecological indicators had indicated that the existing biodiversity and biological productivity could sustain the ecosystem attributes and services in term of habitats, food sources and nursery area. Water and sediment quality variations in the coastal area and Ban Tong Tasae mangrove forests were according to seasonal variations. These were also true for the changes in density and composition in phytoplankton and zooplankton communities. Mangrove reforestation showed the profound effect on the increases in diversity and density of both meiofauna and macrofauna. Several key benthic indicators showed the increases in density and diversity as the mangrove forest aged. These species were namely harpacticoid copepods, grapsid crabs, fiddler crabs, mangrove red snail, *Ovassimineia brevicula* and certain bivalves. The mangrove reforestation did not showed the profound effect on the fish community in the Ban Tong Tasae mangrove community forest. However the fish diversity revealed the dependency of fishes in the mangroves as the requirements of niches in term of habitats, food sources and nursery areas. Fish indicators of the rehabilitated potential of the mangrove forest were also recorded. The increased in fishery community production were detected when compared between the period prior to the project and the rehabilitation phase. The changes in the food webs demonstrated the importance of integrated mangrove rehabilitation as the enhancement of biodiversity and fishery productivity.



The assessment on socio-economic and demographic structures of the Ban Tong Tasae Community revealed the **social capital** of the village being an old village with the formal record of 23 years. The social capital existed in the strong bondings among the majority community members through their relationships as relatives, kins and neighbors staying in this community for a long period of time. This social capital allowed the villagers to unite in participating in both personal and village activities. According to the age and sex distribution of household members, the Ban Tong Tasae community was one of the aging society of population aged 60 to over comprised more than 10 percent of the whole population. On the economic status of Ban Tong Tasae compared to other adjacent villages, the economic status of the village was considered in the upper middle class level. The majority of household heads in the village were with land and house ownerships. It was found that the main occupations in the village were in the rubber plantations as owner or/and occupational employee in the rubber plantations. Approximately 10 percent of households in the village earned their livings in small-scaled fishery. High mangrove dependency, in term of direct and indirect uses, was evidenced in Ban Tong Tasae mangrove community forest. Ban Tong Tasae, with very long history of coastal management, had set up the mangrove conservation group for more than 14 years. The community members conducted series of activities on mangrove conservation and rehabilitation each year. The villagers expressed that they together with their families played important roles in sustaining the sound mangrove management. The strength of unity in the community was the major factor contributing to the success of the mangrove management. Other factors contributing to the success in respective order were the strong and competence leadership and the supports from the government agencies.





The outcome evaluation on the success of the Integrated Mangrove Rehabilitation in Ban Tong Tasae Mangrove Community Forest covered the efficiency and the effectiveness of the project. The evaluation on the efficiency of the project was based on the output of the project on the changes in physical environment. The effectiveness of the project was evaluated through the outcome from the impacts of the reforestation program in economic and coastal welfare, health care system and the social behavior aspects. The community capacity to sustain the on-going mangrove rehabilitation project was also focused. Community perception on the success of the integrated mangrove rehabilitation was scored 78.9 out of 100. The community was satisfied with the project and how the project had been executed. The villagers expressed that not only the project had contributed to the mangrove and fishery productivity but it also allowed the Ban Tong Tasae village to stand out as one of the successful community-based mangrove management in the country. This success would enhance and provide more opportunity for the community to form the network with other communities, government agencies and non- government agencies. Community participation in drawing up the integrated mangrove and coastal resources management plan was the major step toward sustaining the on-going mangrove rehabilitation efforts as in Figure 8. Through the adaptive management, the community realized the importance of public participation by working hands in hands in the process of learning, going together and growing together.





Figure 8 Community participation in drawing up the integrated mangrove and coastal resources management plan for Ban Tong Tasae Mangrove Community Forest in March 2012 at Trang Provincial Office

Lessons learned from the Integrated Mangrove Rehabilitation in Ban Tong Tasae Mangrove Community Forest have contributed to several issues for revision in order to expand the existing community-based management based on “**voluntary-basis**” to the adaptive mangrove management. The process in the adaptive management would lead to effective co-management and network building as well as building up the full public participation in term of assessment design/planning implementation monitoring and evaluation. The future



sustainable community-based management in Ban Tong Tasae would depend upon the co-management and networking among stakeholder within the community and outside the community.

Documents and share technical information and lessons learned from this project were published in series in order to provide guidelines for adaptive management. **Monograph on the Medicinal Plants in Ban Tong Tasae Mangrove Community Forest** was first of the series released on January 2012. The second book in the series titled “**Monograph on the Biodiversity of the Ban Tong Tasae Mangrove Community Forest, Trang Province**” was published in February 2013. This monograph consisted of two parts namely the study on biodiversity of fishery resources and changes in fishery community production in Ban Tong Tasae mangrove community forest as the key ecological indicators to assess the rehabilitation success of the project. The latter component of the book was the compilation of detailed morphological characteristics, ecological roles and distribution of each species found in the Ban Tong Tasae mangrove forests. The last book in the series “**Outcome Evaluation on the Success of Integrated Mangrove Rehabilitation in Ban Tong Tasae Mangrove Community Forest, Trang Province**” was published in March 2013. The outcome evaluation on the success of the integrated mangrove rehabilitation project covered both the efficiency and the effectiveness of the project.



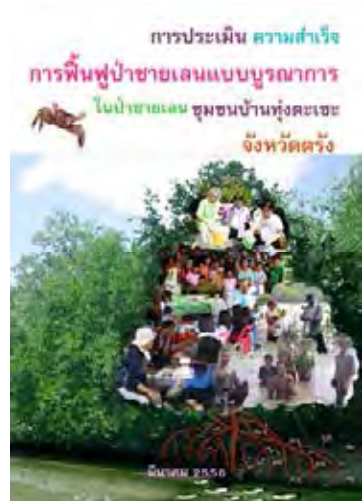


Figure 9 Monographs and technical reports to be disseminated as the results of the project Integrated Mangrove Rehabilitation in Ban Tong Tasae Mangrove Community Forest, Trang Province





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