

Report on
Community-based
Forest Rehabilitation and
Management



**Contribution to Forest Rehabilitation
in Thailand's Areas Affected by Tsunami Disaster**

PD 372/05 Rev. 1 (F)

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Prepared by
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Summary

After the December 2004 Tsunami has devastated the Southern Thailand' Andaman Sea Coast, be they its ecosystems, human lives and their properties, the Thailand Environment Institute (TEI), in collaboration with the Royal Forest Department (RFD), initiated Project: Contribution to Forest Rehabilitation in Thailand's Areas Affected by Tsunami Disaster, which was funded by the International Tropical Timber Organization (ITTO).

This project of TEI, with a duration of 3 years and a 1.5 year extension, has focused on the community-based coastal resource management in order to enhance the forest contribution to sustainable livelihoods and ecological security (CBM-SLES). Its key outputs were:

- The workshop proceedings in terms of practical knowledge and experiences from various sectors' 97 participants,
- The 751.72 ha of destroyed coastal forests, now fully rehabilitated for various objectives, especially to reduce possible impacts from strong waves and wind, as well as coastal erosion, to increase local food supply, to enrich local ecosystem, and to re-build landscaping and forest demarcation,
- The training need assessment and 2 training courses organized for 82 operational staffs and local community leaders,
- Awareness raising activities, regularly held in conjunction with other activities designated for each of the various target groups,
- Two pilot CBM-SLES action plans developed and endorsed by major stakeholders,
- Coastal resource capacity building and networking on coastal natural resource established, and
- Research and monitoring programs developed.

Local communities or target beneficiaries have highly benefited from the rehabilitated coastal ecosystems in terms of local food supply, occupational and habitat security. They have also acquired more knowledge and experiences in coastal forest rehabilitation, especially on how to safeguard local ecosystems and how to get benefits from increasing mangrove areas and aquatic animals. Moreover, they are aware and proud of their coastal rehabilitation results in which they have fully participated and supported.

As local organizations, they are benefiting from participating in the integrated coastal management planning needed for project implementation and networking. Apart from that, community leaders in the area have better understood the local coastal management process and tools and how to work more closely and effectively with local government agencies.

For further project sustainability, awareness raising and capacity building among and for local community leaders will have to be continued with their supportive factors and elements already established like community revolving funds, integrated coastal resource management action plans, cooperation with local government and administrative agencies, and local school curriculum on local natural resources. Dissemination of information and knowledge gained and acquired during the project implementation will also be necessary in order to strengthen and keep expanding the various local people networks.

1. Introduction

Title:	Contribution to Forest Rehabilitation in Thailand's Areas Affected by Tsunami Disaster
Serial Number:	PD 372/05 Rev. 1 (F)
Implementation Agency:	Royal Forest Department
Collaborating Agency:	Thailand Environment Institute
Host Government:	Thailand
TEI Starting Date:	August 2008
Duration:	3 years + 1.5 years extended
Project Coasts:	\$ 377,800 (For output 1.2, 1.4, 1.5 and 1.6 only)

Description of the Work Implemented:

The 2004 Tsunami brought about lots of destruction to human lives, properties and economic infrastructures and environmental assets in the Andaman Coast of Southern Thailand. This project has accordingly initiated a process for rehabilitating the damaged coastal forests in that zone. Its development objective is to contribute to the long-term rehabilitation of the coastal forest resources and the livelihoods of local communities following that Tsunami disaster. While the project specific objectives were 1) to initiate a process of developing a community-based coastal resource management to enhance the contribution of forests to sustainable livelihoods and ecological security and 2) to promote bamboo use in Tsunami-affected areas in order to meet medium and long term needs in rural house construction.

Thailand Environment Institute (TEI) has signed the MOU with the Royal Forest Department (RFD) of Thai Government to collaborate in this project to respond to the project specific objective No.1 and delivering the project outputs Nos. 1.2, 1.4, 1.5 and 1.6) which are as follows;

Output 1.2 250 km of destroyed coastal forests (750 ha) rehabilitated

Output 1.4: Awareness raising activities implemented

Output 1.5: Two pilot CBM-SLES plans developed and endorsed by major stakeholders

Output 1.6 Research and Monitoring program developed

The project strategies involved the cooperation of a diversity of key stakeholders, developing an effective coastal resources management plan, initiating community-based forest management, and developing local community networks in managing the coastal ecosystems.

In order for the project to realize its further sustainability after its termination, the activities on awareness raising and capacity building for local community are still to be continually carried out along with their supportive factors/conditions that were previously set up such as community revolving funds, promoting cooperation with local government administrative and government agencies, and developing school curriculum on local natural resources.

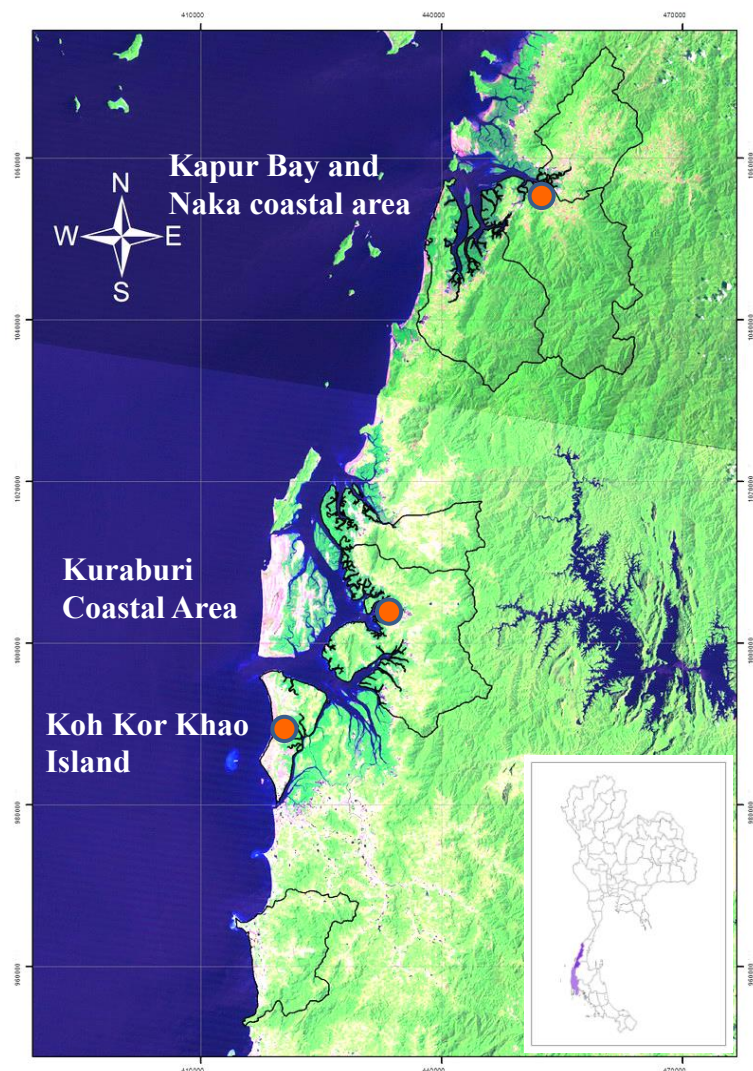
2. Methodology

Target site selection

Based on surveys on the Tsunami-affected areas in Phang Nga and Ranong Provinces, and opinions gathered from relevant authorities and community leaders, 3 target sites were then selected from those affected by the Tsunami based on the degree of their damage: moderate to high. Before the start of this project, it was found that the destroyed and damaged areas still remained without restoration while their community leaders and local administrators were badly in need of and were interested in rehabilitating them in a sustainable manner.

The selected target sites are;

- 1) **Kapur Bay and Naka coastal area:** Kapur Sub-district, Bang Hin Sub-district, Kapur District, and Naka Sub-district, Suk Samran District.
- 2) **Kuraburi coastal area:** Mae Nang Khao Sub-district, Bang Wan Sub-district, Kuraburi District.
- 3) **Koh Kor Khao Island,** Koh Kor Khao Sub-district, Takua Pa District.



Map of Project Site

Principal guidelines

This project work plan has been implemented with the following 3 principal guidelines;

- 1) **Participation** from community and local administrative organizations, initiated from local community leaders, formal and informal, calling for cooperation from members in school communities, local government and administrative organizations – internal and external – along with the capacity-building process for local community and networks leaders,
- 2) **Learning** through the use of traditional and technical knowledge sources, bearing in mind that it will take some time for local people to follow techniques and scientific knowledge externally proposed and introduced by intellectuals and local wisdom sources and, thus, there is the need for lesson concluding forums and exchanges,
- 3) **Integrating** socio-economic and environmental view points from various community members, specially highlighted after that Tsunami as very significant: forested areas as buffer zones against strong sea waves and winds, social awareness as a must to rehabilitate forested lands, to further stimulate socio-economic needs for food supply sources, water animal habitats, and eco-tourism-based incomes.

Output and activities

The project outputs: 1.2, 1.4, 1.5, and 1.6.: The methodologies comprised of diverse and different activities to be summarized before detailing each activity's results in the next section.

1) Coastal forests rehabilitation

Output 1.2 Destroyed coastal forests (750 ha) Rehabilitated

Activity 1.2.1 - Organize a Workshop for field officers and specialists to draw lessons learnt from Tsunami impacts on coastal forests

Activity 1.2.2 - Identify training needs of government staff and other stakeholders and design training programs

Activity 1.2.3 – Develop practical manual for coastal forest management to enhance ecological security

Activity 1.2.4 – Organize plant production and carry out planting

Activity 1.2.5 - Building capacity and network on coastal resources

Activity 1.2.6 - Organize two courses training for operating staff and community leader

2) Awareness raising

Output 1.4 Awareness raising activities implemented

Activity 1.4.1 - Develop public awareness raising material and activity

Activity 1.4.2 - Design and implement a media public awareness program

3) CBM-SLES plan

Output 1.5 Two Pilot CBM-SLES plans developed and endorsed by major stakeholders

Activity 1.5.1 – Validate with stakeholders forest cover within land use zoning in pilot areas of Phang Nga Province and Ranong Province

Activity 1.5.2 – To plan community-based coastal forest management integrating sustainable livelihoods and ecological security dimension

Activity 1.5.3 – To organize workshops to validate and build consensus on the plans

4) Monitoring

Output 1.6 Research and Monitoring program developed

Activity 1.6.1 – Develop a CBM-SLES support research and development program

Activity 1.6.2 – Develop a community-based ecological monitoring system

Activity 1.6.3 – Organize a validation workshop for the research and monitoring system

3. Presentation of the data

3.1 Coastal forests Rehabilitation

► Workshop on “Collaboration toward the Integrity of Ecological Systems and Coastal Communities”



Various workshop activities

Study tour and the workshop meeting on “Collaboration Toward the Integrity of Ecological Systems and Coastal Communities” was organized between October 14-16, 2009 at the Andaman Coastal Research for Development (Prapas Beach) in Ranong province. There were 97 participants from local government, academic institution, non-governmental organizations, including targeted communities. Prior to this, 4 small group meetings with local stakeholders had been held between October 5-10, 2009,

Key data output can be classified as follows.

1) Impacts of the Tsunami on coastal forests and ecosystems

- Mangrove forest was damaged by direct impact of the Tsunami wave up to a distance of 80 metres from the mouth of coastal inlets.
- Stand of *Xylocarpus* spp. Growing along the banks of inlets were damaged most severely, being uprooted and swept away by the force of the wave.

- *Rhizophora apiculata* trees were damaged by impact with uprooted *Xylocarpus* trees while *Rhizophora mucronata* and other species growing deep within the mangrove forests were only slightly affected.
- Beach forests were more severely damaged than mangrove forests because they bore the full brunt of the Tsunami wave. More than half (53%) of beach forests were uprooted and destroyed.
- Beach areas are still covered in deposits of sand, and the original water channels are now 2-3 times wider as a result of scouring.

2) **Learned lessons in forest and coastal resources rehabilitation**

- It is found that key components contributing to the safeguarding role of forest are the large size of forest, density of plants, including age and type of the trees
- Several organizations have replanted the mangrove as it is easily available to boost the reclamation in order to replace the natural plants affected by the natural disaster.
- External assistance was mainly contingent in nature. The recipient communities had no roles in the planning, thus, the fund being not responsive to the communities' needs. This is due the fact that the mission of donor organizations was sectoral, and the fund had to be quickly channeled to the recipients.
- The communities responded by making self-adjustments in three levels. (1) Individual basis. The adjustment is visible in their housing and occupation. They have become more alert and follow up with the flow of information, and become more aware of the importance of coastal resources. (2) Community basis. They have formed a group to plan and handle external assistance, thus boosting their new learning and more confidence in their potential and capacity. (3) Embracing global trend. They have increased carbon sinks and developed their social capital to deal with future changes.

3) **Recommended approaches for project implementation**

- Rehabilitating upstream, mid-stream and downstream ecosystems under sub-watershed management plans implemented by local organizations or communities.
- Managing coastal areas through land-use management, information surveys, reviews of tenure rights, demarcation of land boundaries, and reliable maps and databases.
- Surveying and rehabilitating local biodiversity through setting aside conservation areas, propagating rare local plant species, and promoting the integrated use of traditional and scientific knowledge.
- Continuous building of community capacity and networking for sustainable coastal resource management, and enhancing incomes from management, for example by adding value to fishery products and developing ecotourism ventures.
- Promoting the role of local administrative organizations and collaborative networks in managing overlapping systems of management.

- Promoting the formation of business groups to draw up codes of conduct for their members, in particular codes for activities in or around threatened beach forests.

The data output from the workshop was the needs of the stakeholders, which will be used to design the capacity enhancement program that priority should be made to boost the awareness about the conservation of coastal resources, participation of and dialogues between stakeholders, the survey of coastal resources and the restoration of ecological systems, including the planning of integrated and participatory management of coastal areas.

Finally, the proceeding report of the workshop, in Thai and English versions were produced and disseminated directly to participants and related organization, including on-line through www.tei.or.th and others stakeholder website.



Proceeding report in Thai and English

► Training need assessment and training programs development



Group discussion and in-depth interview on training needs

This activity aims to assess the training needs of government officials and other stakeholders, and to develop a training program to meet those needs. Analysis of stakeholders has been conducted together with need assessment of the three groups targeted for training: government staff, local administrative organization staff, and community leaders in the project sites. In-depth interviews and small group discussion have been conducted for a total of 52 persons.

An analysis of the opinions, needs and responsibilities of the target groups was carried out to identify key constraints and common needs. This is also sought to identify issues which can be tackled through training, divided according to knowledge, attitude and skills. The results are presented in the table below in order of importance (from high to low).

Knowledge	Attitude	Skills
<ul style="list-style-type: none"> - Coastal forest ecosystems - Links between forests and community well-being and climate change - Categories of forest land; relevant legislation and agencies - Appropriate species selection for rehabilitation - Rehabilitation of degraded forest 	<ul style="list-style-type: none"> - Participatory forest management - Sustainable forest use - Network development - Community capacity building and development of new leaders 	<ul style="list-style-type: none"> - Procedures and techniques for working with communities - Formulation of natural resource and environmental management plans - Use of maps and information systems in forest management - Project development and management - Documentation of experience and information - Presentation, communication and dissemination of information - Raising awareness among the local population and young people - Development of database systems - Community studies and analysis

The results have shown diverse needs. The needs of the government officials centre on the capacity to implement their assigned responsibilities, in particular the knowledge and techniques needed to rehabilitate forests and work with communities. For their part, communities need to learn more about relevant legislation, and to improve their skills in coordinating and working with government agencies.

The training program is divided into 5 courses covering the main identified needs and issues. The target groups can choose among the different courses, each of which is a short training course covering different key points of knowledge, attitude and skills. Though the courses are complete in themselves, together they form a coherent program.

Course 1 Sustainable rehabilitation of coastal forests and communities

- Coastal forest ecosystems
- Links with community well-being and climate change
- Participatory forest management and network development
- Sustainable forest use models

Course 2 Evaluation and rehabilitation of coastal forest ecosystems

- Forest ecosystems and indicators of ecosystem health
- Survey and evaluation of forest condition
- Rehabilitation of degraded forest
- Species selection and site preparation for rehabilitation

Course 3 Professional forest management

- Categories of forest land; relevant legislation and administrative responsibilities
- Use of maps and information systems in forest management
- Planning and implementation of forest projects
- Development of database systems for forest management

Course 4 Understanding, appreciating and developing forest management with communities

- Community assessments
- Procedures and techniques for working with communities
- Development of community capacity and new leaders
- Participatory monitoring and evaluation

Course 5 Describing local knowledge, identifying lessons and recording experiences

- Compilation and documentation of information and experience
- Effective presentation and communication
- Information dissemination

The appropriate training formats for the target groups will have the following features:

Activities: Workshops, training and study tours

Methods: Lectures are kept to a minimum; an open space is provided for expressing opinions and strengthening speaking and presentation skills; participants work in small groups to analyse problems and exchange views; case studies matching current practices are provided for analysis.

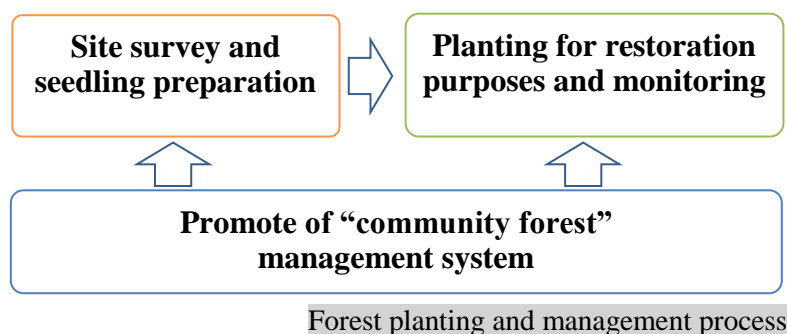
Duration: 2–3 days (to limit impact on participants' work schedules and livelihood activities)

Location: In target area or a nearby location

The organising each training event should be to clearly define learning objectives and target groups. Then, the format and content of training should be considered jointly to identify appropriate activities, tools, resource people, timing and location. Attention should also be paid to ensuring that the training host has the necessary human and financial resources, and to coordinating with relevant agencies, for example Royal Forestry Department, Department of National Parks, Wildlife and Plant Conservation, Department of Marine and Coastal Resources, Community Development Department and the Tourism Authority of Thailand. A system of monitoring and evaluation should also be put in place to assess and improve implementation of the training program.

► Coastal forest planting and community-based management

The coastal forest planting process conducted with community collaboration in the area targeted for long-term management. The operation was divided into 3 parts as follows:



Preliminary survey



Forest preliminary survey

From the target site surveys, it was found that coastal forests, composed of mangrove forests, terrestrial forests and beach forests, were 3,677 ha, in total, and 3,360 ha were in need of the systematically community-based management while 786 ha needed seedling-planting. The biggest area was in Kapur Bay in Ranong Province.

Table: Potential coastal forest area for planting and management by community

Target Site	Target Forest Area (ha)			Site Preparation	Planting Spices
	Total	Non-require planting area	Require planting area		
Kapur Bay and Naka Coastal Area					
Mangrove forest	224	107.2	320	For Yay Rang Island, Klang Bang Kung and Laem Por Ta, site preparation and weeding will be needed before planting begins.	R. apiculata, B. cylindrica, C. decandra, C. tagal, N. fruticans

Target Site	Target Forest Area (ha)			Site Preparation	Planting Spices
	Total	Non-require planting area	Require planting area		
Terrestrial forest	80	75.2	16	Land boundary surveying and demarcating, plus weeding	Bambusa sp., Hopea odorata, Swietenia macrophylla, S. gratum, Pterocarpus indicus
Kuraburi Coastal Area					
Mangrove forest	1,954	1,851.2	256	-	R. apiculata, R. mucronata, B. cylindrica, N. fruticans
Koh Kor Khao Island					
Mangrove forest	1,371	1,306.72	128	Land boundary surveying and demarcating, plus weeding	B. cylindrica, C. tagal, B. sexangula, R. apiculata, R. mucronata
Terrestrial forest	16	14.72	16	Land boundary surveying and demarcating	Bambusa sp., Hopea odorata, Swietenia macrophylla, S. gratum, Pterocarpus indicus
Beach forest	32	5.44	50	Ban Nok Na needs to be protected against grazing by villagers' livestock	D. indica, B. asiatica, H. tiliaceus, C. odollum, T. catappa, E. tumida, C. equisetifolia
Total	3,677	3,360	786		

Seedling preparation

Plant seedling species prepared were *Rhizophora apiculata*, *Rhizophora mucronata*, *Burquiera gymnorhiza*, *Nipa fruticans*, *Avicenia alba*, etc. were 391,600. Species for terrestrial and beach forests were bamboo, *Cerbera odollam*, *Eugenia curtisii*, Mahogany, Cossod Tree, Malabar Ironwood (*Hopea odorata* Roxb.) and Santol (*Sandoricum koetjape* Merr.) etc. These seedlings were nursed by 2 sources:

1) Government agencies:

- Andaman Coastal Research Station for Development (Prapas beach) which prepared 20,000 seedlings for beach forests,
- Phang-nga Plant Seedling Station which was responsible for 10,000 seedlings for terrestrial forests,
- Mangrove Forest Resources Development Station in the operation area which provided seedlings of *Rhizophora apiculata* and *Rhizophora mucronata* only

2) The local communities themselves:

- Shimi Community in Tambon Kapur prepared 20,000 non-mangrove seedlings,
- Ban Nok Na Community in Tambon Koh Kor Khao prepared 5,000 non-mangrove seedlings

- Ban Bang Niang Community in Tambon Koh Kor Khao prepared 10,000 non-mangrove seedlings while the plan was to construct a seedling nursery to provide additional seedlings for beach forests.
- Ban Bang Niang community in Tambon Koh Kor Khao prepared 10,000 non-mangrove seedlings while the plan is made to construct a seedling nursery to provide additional seedlings of beach forests.

Planting results



Planting activities

So far, the project has worked with local communities, government agencies and youth groups to implement the coastal forest ecosystem rehabilitation in 118 times in replacing and planting seedlings in terrestrial forests, beach forests and mangrove forests. There were 7,693 participants and the total of planted area was 751.72 ha. Most of the planting area was mangrove forests damaged by the 2004 Tsunami disaster. The seedling species chosen were based on the planting purpose. Altogether there were 48,730 seedlings.

Table: Result of forest planting activity

	Year 1 (Aug 08-Jul 09)	Year 2 (Aug 09-Jul 10)	Year 3 (Aug 10-Jul 11)	Extension period (Aug 11- Nov 12)	Total
No. of reforestation activity	-	41	39	38	118
Mangrove forest's seedling/pod	-	136,900	126,200	128,500	391,600
Terrestrial and Beach forests' seedling	-	34,400	7,250	7,080	48,730
No. of participant	-	2,586	2,154	2,953	7,693
Area (ha)	-	260.26	254.02	237.44	751.72

The replanting and restoration of mangrove forests are conducted in the following 3 patterns.

- 1) Weed elimination prior to replanting and restoration:** This was undertaken in Ao Kapur (Kapur Bay) covering the areas of Ban Shimi, Ban Banglampoo and Ban Banghin. The site was covered by *Derris trifoliata*, which had to be cleared away prior replanting. Seedlings were favorable for replanting because pods couldn't grow as quickly as the newly-growing *Derris trifoliata*. So far, the replanting has been carried out around Koh Loy, Koh Yai Rang and mangrove forests of Ban Banghin. Meanwhile, the sites of degraded mangrove forests around Klong Chan Kao of Ban Bang Niang was full of *Acanthus ebracteatus* Vahl, which replaced the deceased mangrove trees after the Tsunamis and the subsequent accumulation of mud and sand. Prior the replanting, *Acanthus ebracteatus* Vahl had to be cleared away. In such areas, it was found that replanting with pods experienced a higher survival rate than seedlings.
- 2) Replanting and restoration in bared areas:** This was undertaken in the mangrove forests of Ban Laem Now, Ban Tung Rak, Ban Bang Tib, Ban Bang Krung, Bang Muang Mai, Ban Nok Na, Bang Tung Tuk and Ban Pak Koh. The areas are largely left empty after the termination of mangrove forest concessions. Therefore, the replanting can be carried out with no need to clear away the weeds. If the areas are not invaded by crab-eating macaques and there are no strong winds, pods are preferred for replanting due to their high rate of survival, and they are easier to manage and less time-consuming. Meanwhile, replanting with seedlings requires highly attentive care and is time-consuming..
- 3) Replanting and restoration to enable resources utilization of the communities:** This was undertaken in the mangrove forests around Ban Bang Kluay Nok community and Ban Tung Rak community. The communities opted to plant mangrove palms along the canals in the mangrove forests, which have already been undergone preliminary restoration, in order to serve the utilization purposes of the communities. This is due to the fact that *Nypa* palms are multi-utilitarian and can generate their income. while the community mangrove forest committee plans to formulate the regulation on the sustainable utilization of *Nypa* palms.

Meanwhile, the restoration of beach forests has so far involved the replanting to replace the deceased trees after the Tsunamis. The selection of plant species for replanting is mainly based on the formerly existing plants. By now the replanting has taken place in the public space of the communities only, which represents around 3.5 ha. In regards to the restoration of terrestrial forests, the replanting aims to develop a boundary marker for watershed area and community forest areas and to serve as an awareness-raising activity for the communities. In the selection of plant species, not only area features but also community's utilization of the forests is taken into consideration, including the forests' function as food stock for wild animals.

In regards to the replanting monitoring which was conducted jointly with the community representatives, it is found that the survival rate was 80-95%. However, in certain areas only 60% survived due to the proximity to the sea, exposing the replanted areas to rough waves

and strong wind, while some restored areas were facing weed intrusion. Moreover, there were 48,500 aquatic animals released back to the nature.

Development of “community forest” management system

The activities that promote forest management by the community have been undertaken on a continual basis. This has involved the surveys of the boundary of the forests designated for community management, regulation formulation, meetings of the forest committee in order to review the roles and determine joint working plans, capacity-enhancement for the committee, including the development of the networks between different areas. These activities have contributed to the enhanced capacity of 12 communities in the restoration and management of forests. This is now covering around 3,688.2 ha. The patterns of community forest process promotion are as follows:

- 1) *Taking initiatives in target areas:*** This has been undertaken in the watershed area of Ban Muang Mai, for which 16.32 ha was surveyed and its boundary was marked. Besides, a formal committee was set up through the community consensus to act as a body that looks after the watershed area. Regulations on forest management were determined and forest fund was set up. To call for more attention from local people, a forest ordination ceremony was publicly held in the forest conservation area of Koh Kor Khao Sub-district and Ban Thung La-ong located the watershed area in the water supply source forest of Kao Boh Sai Mountain ranges. This ceremony was agreed upon and held after Ban Thung La-ong Community leaders have previously participated in a forest study trip to a community forest network in Kanchanaburi Province and to Ban Klong Rua in Pa Toh District of Chumphon Province. This was to make clear and known their common boundary lines for their community forest with other nearby communities that their natural resource management map has now been in place and should be recognized by all people, near and far, the local people themselves and other community residents can have an effective action plan for their community forests.
- 2) *Providing necessary support to strengthen their activities’ implementation:*** Such support was extended to Ban Shimi, Ban Banglampoo, Bang Bang Hin, Ban Leam Now, Ban Bang Kluay Nok, Ban Tung Rak, Ban Bang Tib, Ban Muang Mai, Ban Nok Na and Ban Bang Niang. The community forests of Ban Banglampoo, Ban Tung Rak and Ban Nok Na have now been registered with an area of 1,246 ha and these also cover the aquatic animal preservation zone in these 6 communities.

Ban Bang Kluay Nok has now revised their community regulations, natural resource management and is collecting name lists from their fellow villagers to request a permission to register their mangrove community forests. Ban Laem Now has prepared documents in order to extend their existing community forest by 3.2 ha more. Ban Bang Hin and Ban Bang Lampoo committees are considering a joint management plan for their community forests, but such action would require an approval from the 9th Mangrove Forest Resource Development Station – (Kapur)

Likewise, in Bang Thip, meetings were held for the various community committees in each community to review the community forest committee’s roles in building up their

data presentation capacity for the experience and lesson exchange among communities, as well as joint action plan formulation for Koh Kor Khao Area. Bang Niang Community committee have already collected their members' names and submitted necessary documents needed for the application and registration of their community forest of 5.92 ha. They are reviewing their community forest regulations, for which a competent committee will soon be elected and appointed. Ban Muang Mai and Ban Nok Na Community committees are also in the process of waiting for the registration permission for the mangrove community forest covering an area of 616 ha. The Ban Muang Mai community committee has already installed a board displaying their community forest utilization regulations in their community pier.

Building capacity and network on coastal resources management



Capacity building activities

The project wants to develop the capacity of government officials and other stakeholders in its target areas for sustained rehabilitation of coastal forests to provide *ecosystem security through community participation in coastal resource management*. To this end, the various aspects of the KAS framework were analysed cover KAS as follow detail;

- K – Status and threats to coastal forests
Links to well-being of coastal communities
- A – Importance of coastal ecosystems and their sustainable use
Participatory management of resources
- S – Appropriate methods for rehabilitating damaged and degraded coastal forests,
communication and participatory implementation

Capacity building was mostly informal activities like consultations, experience exchanges, and pilot activity demonstration. Formal activities were training courses and study trips. In one highlighted activity there were 5 training sessions attended by 72 participants.

Apart from that, one two3-training session course for 82 operating staff and community leaders was added during the extension period in order to develop the community capacity through workshop participation to discuss and exchange their experiences with other networks from different areas - regional and national - including the study visits. Each course was the 2 days plus 1 night with 80 participants for this period as they were core community group members, local government officials and local administrative organizations' officers. The main training methods were presentation and discussion of information with resource persons, practice in applying tools for surveying and data analysing, as well as in defining management approaches and formulation of pilot projects, presentation of results and exchange of views and experiences.

- The training course on **“Understanding, appreciating and developing forest management with communities”** was once organized to learn about principles, processes and techniques for strengthening community capacity to manage forest resources, improving skills in using analytical tools to understand communities, develop participatory approaches, and communicate effectively. The 35 participants learnt about the technique and process of community assessments and analysis of links between communities and forest resources, development of community capacity and new leaders. They also practiced on procedures and techniques for working with communities and stocktaking of lessons and past experience.
- The training course on **“Professional forest management”** was once organized for 45 participants to build their knowledge and understanding of the laws and regulations governing different categories of forest land, and to improve skills in the use of forest planning and management tools.

Participants learnt about categories of forest lands, relevant legislation processes and administrative responsibilities, use of GPS maps and information systems in forest management, database system development, and project cycle for forest management. These improved their understanding of laws and regulations relevant to forest management and helped broaden their skills and perspectives in planning and developing local forest management projects.

Moreover, the Koh Kor Khao's environmental network committee once had an opportunity to welcome and share experiences on implementation of mangrove forest rehabilitation and management with Sri Lanka National Committee Mangrove Forest Project for Future (or MFF) during their study visit to Thailand.

For site management network development there was some progress as the Kapur Bay coastal resources management network had their every-three-month meetings with relevant agencies to review their implementation and could accordingly present the progress of each site implementation. This network development was connected with the coastal resources management network at the regional level.

Also, the Koh Kor Khao's environmental network with local officials at the 19th Mangrove Forest Resources Development Station (Lam-kann) and Koh Kor Khao's TAO officers have had their regular reviews on implementation by increasing the public relations with external organizations, and community baseline data compilation, also necessary to be mobilized in order to register community forests shared by five communities and for more promoting community-based ecotourism.

3.2 Awareness Rising

► Surveys of community data



Overview of community in the target areas

In order to better understand the project's target areas, data – socio-economic, environmental - were surveyed and collected through studying the community plans, interviewing community leaders and using questionnaires. The following are their main characteristics.

- 1) **Kapur Bay and Naka Coastal Area:** Villages are situated in a large expanse of mangrove forests. Rivers and canals flow from Naka Mountains into the bay, thus a sink for agricultural chemical run-off and urban waste. The people, making a living from coastal resources, account for 35% of the whole community population. Most of them are landless and have relied mainly on coastal resources. It was them who have initiated mangrove forest restoration and designated part of it for a nursery for aquatic animals. That was how the local people started to manage both the mangrove and the terrestrial forests.

- 2) **Kuraburi Coastal Area:** Large mangrove forests lie at the estuaries into which a number of canals - Kura, Thungrak, Hang, Kurod, and Bang Tib – flow. The water supply sources are in Mae Nang Khao Mountain. The six targeted communities are aware of the significant link between the terrestrial and mangrove forests’ ecological systems. Most communities’ sizes in this area are medium and large. 22% of local people make a living by harvesting coastal resources. Due to this, some communities began to discuss about the sustainable coastal resource management and wanted to learn more about this from other communities’ best practices.

- 3) **Koh Kor Khao Island:** There are five communities here. Most of them are small and have less than 80 households. 86% of the population relies on mangrove and coastal forest areas as food banks while 27% are involved in coastal fisheries. The rest are involved in rubber plantations and hiring out. Koh Kor Khao Island possesses a wealth of natural resources, such as peat swamp, beach and terrestrial forests, coral reefs and sea grass. Their beautiful scenery and serenity render it a popular destination site for foreign tourists even though their community tourism is still in the initial stage.

Public awareness rising



Awareness raising activities for general people youth and school children

Various awareness raising activities were implemented in 3 target groups: the general public, youngsters and school children.

The general public

- 1) **Data and information dissemination** through monthly village meetings and various village planning sessions,
- 2) **Community's natural resources surveys** by utilizing satellite mapping and images as their analytical tools to analyze situations of their existing natural resources and surveys for clearer community forest boundaries, especially in the case of the Klong Tone community forest in Koh Kor Khao Island where representatives of their environmental network surveyed to monitor various carbon-capturing soil characteristics and set up four permanent survey plots of a 20x50 meter size. They designated some specific sites with GPS in order to monitor future forest characteristic changes and carbon absorption or sinks in the Klong Tone community forest. The results of the preliminary assessment revealed that the Klong Tone community forest had the carbon storage in the total biomass 246.25 ton/ha that converted to be amount of carbon dioxide absorption at 902.81 ton/ha, also having its oxygen generation or release at 656.50 ton/ha
- 3) **Information and opinion exchanges** have regularly been organized for the two local networks: the *Koh Kor Khao Environment Network* members who are representatives from 5 communities in the island and *the Kapeo Bay Network* members who are representatives from 6 communities around the bay. These networks can serve as a consultation and coordination forum for coastal resource management, providing necessary support for one another and discussions on important issues.
- 4) **As a learning network with others** in the southern coastal area to help them to get support from outside like in the case of the Tone Tong Water Falls watershed conservation group which is working with Bang Muang Mai Community leaders and some volunteers from Thai Fund Foundation in the construction of the check dams in the Tone Tong Water Falls so that watershed area can better retain the moisture level in dry seasons. The Koh Kor Khao Community Tourism Group, in the meanwhile, co-hosted a meeting of the community tourism network for the northern Andaman area.

Youth groups

- 1) **A natural resources learning forum** for young people was supported in their work by community leaders in the 5 communities. The youth group of Ban Bang Kluay Nok conducted surveys of aquatic coastal animals and organized a forum to present their collected data on key aquatic animals. After collecting community records through some community leaders' story-telling at different time intervals in order to observe changes in local and natural resources, the youth group of Ban Thung La-ong initiated a conservation activity in the Khao Bor Sai watershed forest area in collaboration with the village committees and some of their partners.

- 2) **Youth capacity development** was achieved through meetings and workshops. These were to improve their public speaking skills and capacity to capture key ideas through Mind Map software program which is seen necessary for their future data brainstorming and villagers' participation in the various communities. Some youths from Ban Bang Tip and Ban Tung La-Ong and their 16 guardians had the opportunity to take site visits in the two districts of Surat Thani Province to learn and share experiences with the youth networks there on participation in various community-level environmental management models, which they can apply in their own communities.
- 3) **Experience exchanges** with youths from other areas, and attending the Andaman Youth Network's forums and youth activities in the watershed area in Nan Province on a 2-way communication method and brainstorming ideas for the development of their future activities. Youths also learnt about global warming impacts in a national youth seminar

School children

- 1) **Youth camps** were organized for upper primary education pupils and lower secondary education students. The first youth camp: Happy Bikes for the Mangrove Forest Conservation was organized by Ban Chi Mee Community during their summer vacation for the Kapur Bay Youth Group. Some 50 youths were present. The second youth camp was organized on awareness-raising for 60 young people from Ban Bang Tib and Koh Kor Khao Island under the slogan "Mangrove Forest Lovers".
- 2) **Two environmental study activities** carried out with teachers of Ban Bang Hin School in the Kapur Bay. These were organized in the afternoon of every Wednesday for 46 lower secondary education students so that they could learn about and understand their community's environmental issues. After the training, they could select and develop some interesting issues into environmental education materials for their discussion with villagers.
- 3) Bang Krung School and Bang Wan Sub-district Administrative Organization organized reforestation on 12th August: Her Majesty the Queen's Birthday Celebration Day.

► Design and implement public awareness materials



Awareness raising materials

Here are media materials for raising local people's awareness.

- **Leaflet** highlighting Nipa Palms which are multi-purpose plants, of which leaves are locally and extensively used to produce household utensils by southern people. These palms are commonly found in various mangrove forests.
- **Campaigning signboards** for mangrove and natural resources conservation and for hornbill conservation in Koh Kor Khao Sub-district
- **Board maps with information and data** about reforested areas, community forests and their regulations, aquatic animal conservation sites, and
- **Papers** with survey results on coastal resources and local marine lives, as well as the project's coastal resource management plans formulated and accepted by concerned community leaders and local government organizations and agencies.

3.3 CBM-SLES Plans

Community-based Coastal Resources Management to Enhance the Contribution of Forests for Sustainable Livelihoods and Ecological Security



Planning activity for coastal resources management

► Stakeholders' consultation and planning process

To achieve this, two pilot sites were selected for developing a participatory coastal resources management plan. These are (1) the Kapur Bay area, Kapur District in Ranong Province, and (2) Koh Kor Khao Island, Takua Pa District in Phang Nga Province.

And then the 5 tambon administrative organizations got together to discuss and brainstorm with some officers from the Marine and Coastal Conservation Unit No. 5 (Phuket), a local mangrove forest resources development station and the provincial office of natural resources and environment on an integrated resource management action plan and its appropriate guidelines to avoid duplication of responsibilities by those who would be involved with this community-based coastal resource management. A workshop on community's development direction setting and integrated natural resources management was then held at Muang Mai Sub-district's community collaborative organization center in Amphawa District of Samut Songkram Province on how to work with various partners involved with natural resource management.

The highlight of this integrated coastal resources management planning was data collection and analysis, conducting forums to jointly recognize the various communities' local problems and needs. These would be the main part of the drafted integrated coastal resources management plan to first be presented to the committee of each community. After that, the local people's revised drafted plan would eventually be submitted for the provincial partnership meeting. There were 45 participants in the meeting to validate the draft integrated coastal resources management plan at the Kapur Bay in Ranong Province. The meeting was co-hosted by Ranong's natural resources and environment office and the Marine and Coastal Conservation Unit No. 5 (Phuket). There were 65 participants in the meeting to finalize the integrated coastal resource management plan at Koh Kor Khao in Phang Nga Province. That meeting was co-hosted by the 19th Mangrove Forest Resource Development Station (Lamkann) and Koh Kor Khao Tambon Administrative Organization.

► Brief: The Kapur Bay Coastal Resources Management Plan

Background Information

The Kapur Bay, covering an area of about 28 sq. kilometers, is located in 4 sub-districts of Kapur District of Ranong Province. As an area around the Kapur River's mouth where water from several canals flows down, it is thus very fertile and suitable for the continuous growth of plants, and of various land and water animals. It has also become local communities' livelihoods and food sources for ages. At present, its local population is about 19,500. Their majority has been involved with fishery while a certain number are cultivating land for rubber trees, oil palms, coffee and local orchards like rambutans, mangosteens, durians, as well as animal husbandry.

Part of the Kapur Bay area's terrestrial and mangrove forests, though covering mostly everywhere, has privately been owned and used for agricultural activities, prawn ponds and residential locations, actually sparsely found. At this stage it is recognized that more and more fertile forested lands will soon turn into agricultural activity sites.

Coastal resources situation

Located around the Kapur Bay are high mountains which are sources of most of its streams. There are terrestrial forests, mostly found in a preservation area, covering 21,031.25 rai. Besides, there are fertile mangrove forests of about 52,394 rai and seagrass zones, still rather intact, of about 804 rai. There are also beach forests and beautiful coral reefs, mostly found in a national park.

Here local communities are involved with coastal fishery; they are usually accessing mangrove forests, coastal and seashore forests, seagrass zones and coral reefs for food sources and for commercial purposes. Some beautiful touristic sites are also found therein.

Thus far, many communities around the Kapur Bay have participated in several coastal resource management activities. Such has begun when the mangrove forest concession ended in 1996. They are collaborating with the 9th Mangrove Forest Resource Development Station – (Kapur) and the Marine and Coastal Conservation Unit No. 5 (Phuket) in rehabilitating

local ecosystems and conducting surveillance for forest destruction and illegal fisheries. It was also found out that, after the 2004 Tsunami, a number of development organizations have stepped in to provide support for these communities in order to develop their leaders' capacity, organizing opinion and experience exchanges, and encouraging community-based coastal resource management processes and networking.

Current conditions: Problems and Needs

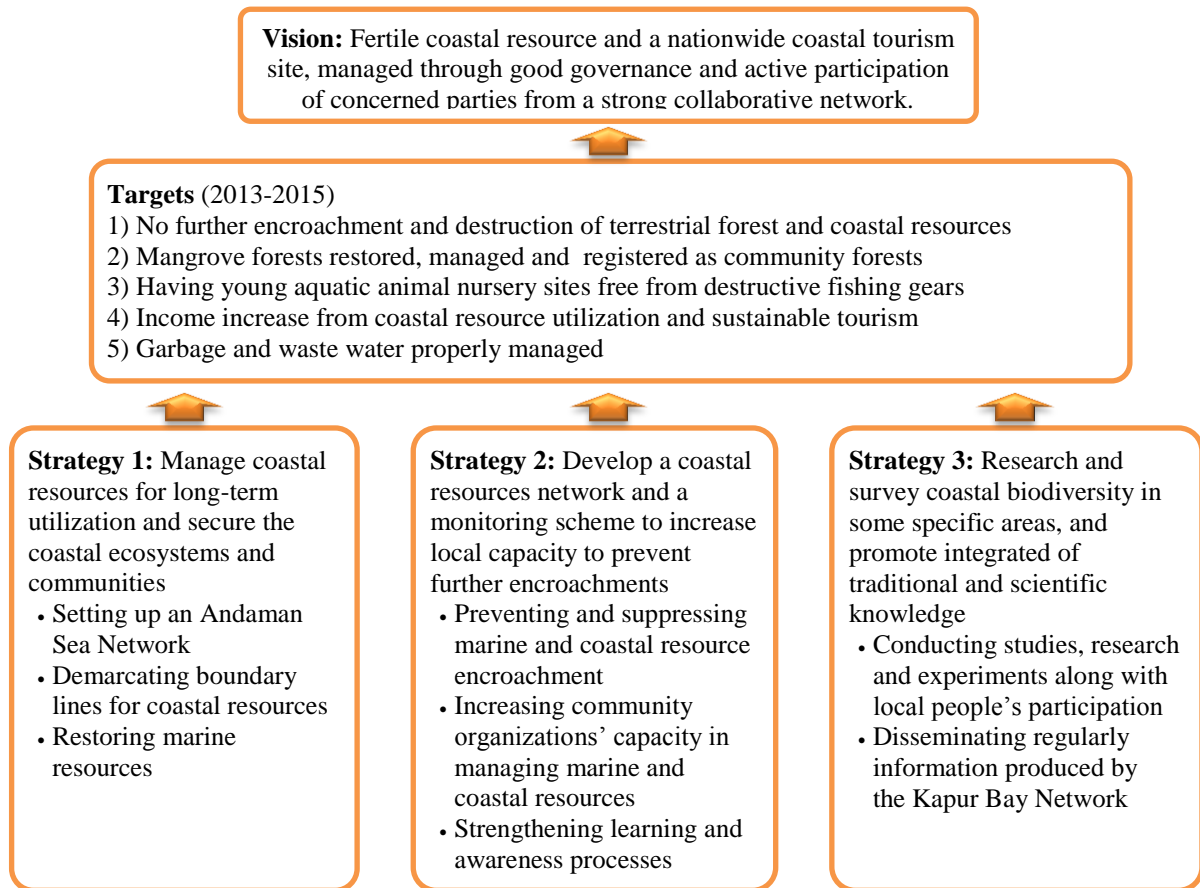
This neighborhood's main problems are related to illegal logging and forest encroachment, illegal trawlers' intrusion to do destructive coastal fishing, lack of effective measures to control illegal fishing gears, no effective community cooperation mechanisms for surveillance on illegal fishing, lacking proper understanding in coastal resource conservation and preservation on the part of some local key people, rather limited community collaboration in certain areas, lack of proper knowledge and models for the administration and management of sustainable coastal resource utilization, and lack of effective coordination and support from local state agencies and local administration organizations.

It can be seen that most of the communities are in need of conducting surveys and demarcating boundary lines for community coastal resource zones, dissemination of key information, raising community people's awareness in restoring and managing, as well as formulating appropriate regulations for local resource utilization to ensure that resource utilization is appropriate and can result in tourism income promotion varieties, thus consistent with the national natural resource management policies underlining the development of the community life quality based on natural resources that are jointly managed by the communities themselves.

Potential in the Kapur Bay coastal resources management

<p><u>Strengths</u></p> <ul style="list-style-type: none"> - Diverse and fertile natural resources - Beautiful beaches - Existing local networking - Local people's participation Presence of mangrove forest boundary demarcating and regulation formulating committees in some villages 	<p><u>Opportunities</u></p> <ul style="list-style-type: none"> - national and provincial strategies for coastal resource and eco-tourism management - State agencies more interested in community-based resource management - State officers and external organizations' continual community support - Community action plan formulation
<p><u>Weaknesses</u></p> <ul style="list-style-type: none"> - Terrestrial forests continually encroached Land proprietorship issues - Unclear group activities - Limited information on local networks' operations for local people - Lack of media for information dissemination to outsiders - Continual need for external support - Lack of legal knowledge on coastal issues 	<p><u>Threats</u></p> <ul style="list-style-type: none"> - Fisheries, local but carried out by outsiders - Unclear sub-district-related strategies - Local administration organization lack of realizing on planning process - Projects' regular discontinuity - Some activities carried out with no coherence with local communities' lifestyles - Natural disasters and global warming issues

Vision, Strategies and Guidelines



- **Vision:** The Kapur Bay becomes a fertile coastal resource and a nationwide coastal tourism site, managed through good governance and active participation of concerned parties from a strong collaborative network.
- **Missions:**
 - Coordinating with local state agencies and related entrepreneurs
 - Developing community leaders' capacity and coordination mechanisms
 - Restoring local ecosystems, resource utilization management and monitoring
 - Strengthening local communities' participation
 - Highlighting public relations among outsiders
- **Targets (2013-2015):**
 - 1) No further encroachment and destruction of terrestrial forest and coastal resources
 - 2) Mangrove forests restored, managed and registered as community forests
 - 3) Having young aquatic animal nursery sites free from destructive fishing gears
 - 4) Income increase from coastal resource utilization and sustainable tourism
 - 5) Garbage and waste water properly managed
- **Strategies and Guidelines:** In order to attain the defined targets, the following 3 strategies are defined together with their guidelines

Strategy 1: Manage coastal resources for long-term utilization and secure the coastal ecosystems and communities

- > Setting up an Andaman Sea Network by appointing a provincial working committee, holding meetings for the marine and coastal resource surveillance, and attending meetings of the Andaman Sea Network
- > Demarcating boundary lines for coastal resources by formulating an agreement on the Kapur Bay resource utilization, setting up community mangrove forests, conducting and demarcating the border lines for coastal resources belonging to the communities
- > Restoring marine resources by placing imitation corals made from cement tubes or pipes, setting up buoys for mooring boats in various coral reef areas, surveying coral resources, seagrass beds, and imitation corals to serve as touristic sites and to dive down to collect marine waste, locating young water animal conservation sites, regularly releasing sea animals, and setting up mangrove forest seedling nurseries.

Strategy 2: Develop a coastal resources network and a monitoring scheme to increase local capacity to prevent further encroachments

- > Preventing and suppressing marine and coastal resource encroachment by identifying and enforcing measures set up in accordance with the agreement communally made on resource source utilization, appointing community volunteers to keep surveillance of the resource destruction with radio surveillance volunteer network development agencies, making available boats to support the surveillance action of the marine and coastal resource surveillance volunteer groups
- > Increasing community organizations' capacity in managing marine and coastal resources through holding training in water diving for marine and coastal resource volunteers and conducting community studies as opinion and experience exchange means with related neighborhoods
- > Strengthening learning and awareness processes through the development of learning centers, holding some specific training for people, pupils, and university students, organizing young seedlings camps, encouraging youths to learn more about ecosystems

Strategy 3: Research and survey coastal biodiversity in some specific areas, and promote integrated of traditional and scientific knowledge

- > Conducting studies, research and experiments along with local people's participation by having in place marine and coastal resource databases, making uses of existing maps and related reports, carrying out community-based resource surveys on coral and seagrass zones, monitoring community-based recurrent canal and coastal ecosystem changes
- > Disseminating regularly information produced by the Kapur Bay Network, starting from making online information and outstanding media and developing innovative information dissemination channels

► **Brief: The Koh Kor Khao Coastal Resources Management Plan**

Background Information

Koh Kor Khao Island, a sub-district of Takua Pa District, has a real population of 725. Before the 2004 Tsunami, its population was much larger than this, but, due to some fear and feeling for insecure conditions in the future, a certain number of survivals have moved up ashore. At present, lots of migrant workers, mostly Burmese, have immigrated to work in plantations as wage earners. According to some calculations, there must be more than 500 workers. Most of the Koh Kor Khao residents are fishermen. They, however, also do some other things like gardening, animal husbandry, hiring out, and small trading, all of which can be done all year round.

In general, land in Koh Kor Khao is still green – either fertile terrestrial or mangrove forests. Apart from these, there are agricultural areas, prawn ponds and human settlements which are sparsely located. Some forested area, actually belonging to private owners, have not yet been cultivated while some other parts have increasingly been encroached and turned into new agricultural activity areas.

In Koh Kor Khao there does exist natural resource diversity, be they forests, sea grasses, corals, and sea animals. Mangrove forests account for 12,954.73 rai, terrestrial forests 4,005 rai, peat swamp forests, belonging to private owners, sea grasses 343 rai, coral reefs 2,300 rai. The 2004 Tsunami has destroyed some 300 rai of mangrove forests, mostly the western seashore forests, part of Koh Pha coral reefs, and a small part of the sea grasses located north of Koh Kor Khao Island.

In terms of the access degrees, at present, most of the mangrove forests have been largely accessible like beach and coastal forests, peat swamp forests, coral reefs, and sea grass zones. These are mostly serving local people as their food sources more than for their commercial purposes. Local people are making use of small boats and small fishing tools with which they cannot go very far from their seashore at seasonal intervals and with their inadequate fishing tools. Fishing in the mangrove forest areas can be done all year round while coastal fishing can better be done in dry seasons when there are no monsoons. Apart from these, local people are involved in tourism and do regularly collect forest vegetables and mushrooms in monsoon seasons.

Conditions, problems and needs

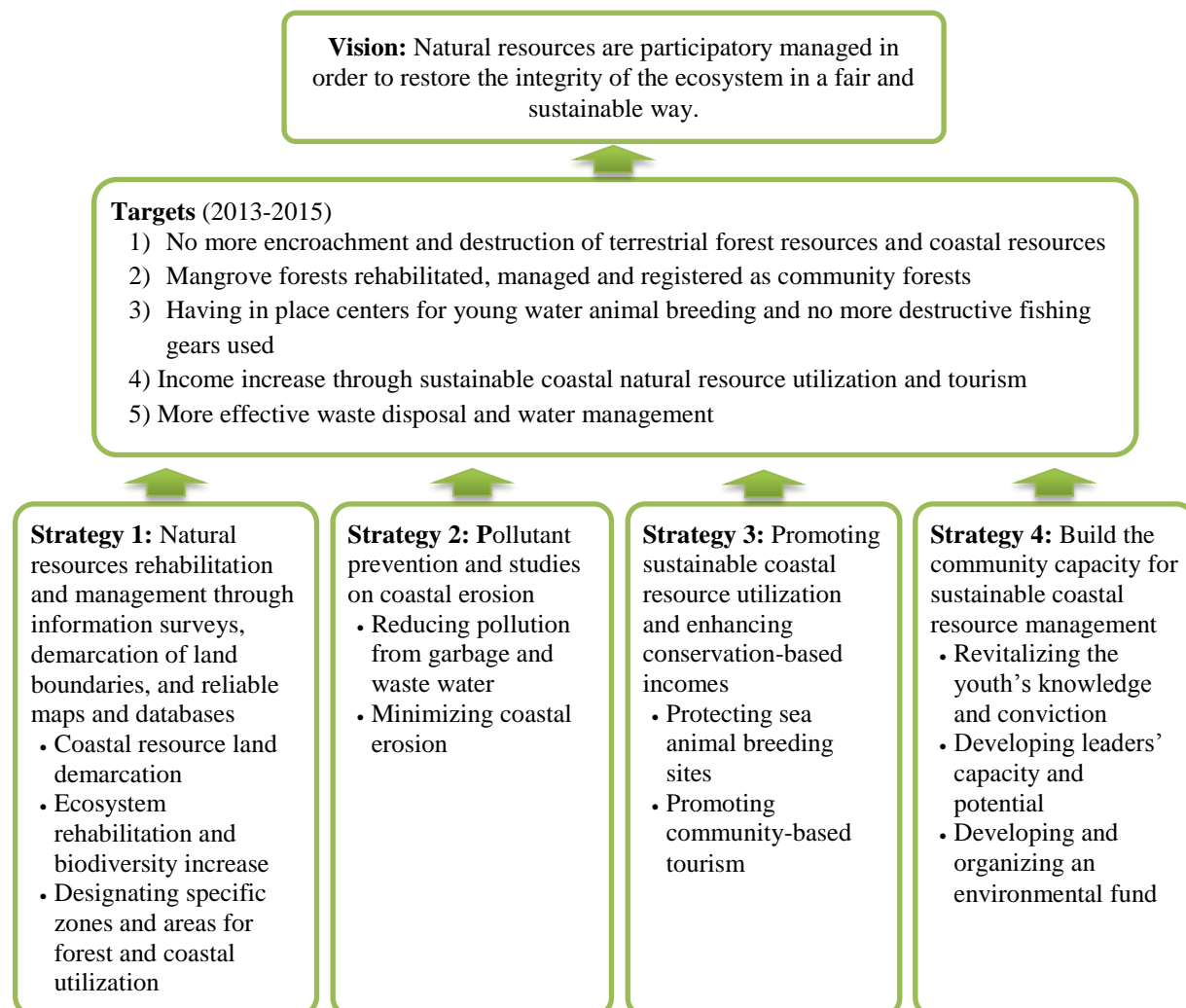
Their main problems, currently encountered, are trawlers illegally intruding to fish close to their seashores, lack of formal control on trawler fishing tools, outsiders secretly fishing and logging in mangrove forests, coastal erosion, more and more waste disposals along beaches and in mangrove forests, and lack of necessary measures for proper coral reef care.

In terms of local people's needs, most want to see an extensive survey and land delimitation done for the community seashore natural resources, dissemination of key natural resource information, rekindling the community spirit in rehabilitating, managing and formulating regulations for natural resource utilization to ensure appropriate and sustainable natural resource usages, as well as maximized tourism and livelihoods.

Potential in the Koh Kor Khao coastal resources management

<p><u>Strengths</u></p> <ul style="list-style-type: none"> - Diverse and fertile natural resources - Beautiful beaches - Ancient sanctuaries - 75% of coastal fishermen - Environment core leaders in each village - Monthly meetings in each village - Active participation in village activities - Some villages do have in place a mangrove forest land demarcation and utilization regulation committee. 	<p><u>Opportunities</u></p> <ul style="list-style-type: none"> - Some tourism entrepreneurs are interested in the current issue. - National and provincial strategies on coastal resource management and eco-tourism - More interest in community-based natural resource management on the part of the state sector - Community-based plan formulation
<p><u>Weaknesses</u></p> <ul style="list-style-type: none"> - Forests continually encroached. - Lack of coral care and preservation measures in tourist attraction sites - Lack of natural water source development - Land proprietorship issues - Unclear group activity organization - Gambling issues 	<p><u>Threats</u></p> <ul style="list-style-type: none"> - Land ownership by outsiders - Local fishery by outsiders - Some unclear sub-district strategies - Discontinuity of some key state projects - Natural disasters and global warming issues

Vision, Strategies and Guidelines



- **Vision:** Natural resources are participatory managed in order to restore the integrity of the ecosystem in a fair and sustainable way.
- **Mission:**
 - Coordinating with related local agencies and entrepreneurs
 - Capacity building for community leaders
 - Strengthening community-based participation
 - Promoting youth and women roles
 - Linking the natural resource, environmental, and socio-economic issues together always
- **Targets (2013- 2015):**
 - 1) No more encroachment and destruction of terrestrial forest resources and coastal resources
 - 2) Mangrove forests rehabilitated, managed and registered as community forests
 - 3) Having in place centers for young water animal breeding and no more destructive fishing gears used
 - 4) Income increase through sustainable coastal natural resource utilization and tourism
 - 5) More effective waste disposal and water management
- **Strategies and Guidelines:** In order to attain the set targets, 4 related strategies have been identified, together with their guidelines as follows:

Strategy 1: Natural resources rehabilitation and management through information surveys, demarcation of land boundaries, and reliable maps and databases

- > Coastal resource land demarcation: Surveying land boundaries and board/buoy installation to designate boundaries and limits for community forests, terrestrial forests, coral reefs, and sea grass zones
- > Ecosystem rehabilitation and biodiversity increase, such as regular releases of water animals into the sea, reforestation in terrestrial forests, mangrove forests and coastal forests, setting up seedling nursery centers, as well as care and protection of various water source forests and natural water sources
- > Designating specific zones and areas for forest and coastal utilization in order to distinguish specific and clear zones where to enforce related regulations for natural resource utilization

Strategy 2: Pollutant prevention and studies on coastal erosion

- > Reducing pollution from garbage and waste water by identifying appropriate measures for disposing garbage in beaches and mangrove forests, launching campaigns for waste separation, and setting up spots to buy up valuable waste
- > Minimizing coastal erosion: having in place regular surveys on coastal erosion and land changes

Strategy 3: Promoting sustainable coastal resource utilization and enhancing conservation-based incomes

- > Protecting sea animal breeding sites by conducting surveys on and designating sea animal preservation areas, building fish homes to prevent inappropriate fishing gears and to serve as sea animal habitats
- > Promoting community-based tourism through researches on community history and encouraging the preservation of ancient sites, developing and managing community-based tourism, and participating in meetings of the North Andaman Community Network, as well as developing new tourism routes and sources

Strategy 4: Build the community capacity for sustainable coastal resource management

- > Revitalizing the youth's knowledge and conviction by installing boards for general information and for local plant names along the nature study routes and developing 2 batches of coastal detectives
- > Developing leaders' capacity and potential by setting up Koh Kor Khao Community Council, providing necessary support for communities' studies and researches on natural resources, organizing training sessions and study trips on roles of community organizations and of Tambon administration organizations in sustainable coastal resource management and community-based tourism management
- > Developing and organizing an environmental fund through regular follow-up of and participation in the results of the local revolving fund every 6 months

► Stakeholder validation and consensus on the plans

On 25 October 2013 at the provincial town hall 45 participants were present in the meeting to review the draft integrated coastal resources management plan at Kapoe Bay in Ranong Province by having two co-hosts of Ranong's natural resources and environment office and the Fifth Marine and Coastal Resources Conservation Center. The meeting accepted the draft plan and requested that it be presented at the provincial level.

On 20 November 2013 at the provincial town hall 65 participants were attending a meeting to endorse the final integrated coastal resources management plan at Koh Kor Khao in Phang Nga Province by having two co-hosts of the 19th Mangrove Forest Resources Development Station (Lam-kann) and Koh Kor Khao's Tambon Administrative Organization. The meeting approved this integrated plan as some activities could lead to actions through local government administrative organizations and relevant local agencies' development plans such as watershed forest area protection and building artificial coral reefs.

The finalized action plans were produced and submitted to the relevant authorities at the district and the provincial levels. Some of the proposed activities have already been fulfilled, such as the artificial coral reefs which would help restore coastal ecosystems, increase biodiversity at Koh Kor Khao Island, promote community-based tourism – routes and sites at the Kapoe Bay.

List of stakeholders' name;

- Koh Kor Khao Administration Organization, Phangnga
- Muang Klaung Administration Organization, Ranong
- Kapur Administration Organization, Ranong
- Bang Hin Administration Organization, Ranong
- Naka Administration Organization, Ranong
- Provincial Administration Organization
- Provincial Office of Natural resources and Environment
- Region Office of Environment 16 (Phuket)
- Marine and Coastal Resources Conservation Center 5 (Phuket)
- Mangrove Resources Development Station 19 (Lamkan)
- Mangrove Resources Development Station 9 (Kapur)
- Mangrove Resources Development Station 42 (Suk Sum Ran)
- Muang Klaung Wildlife Sanctuary
- Provincial Fishery Office
- Takuapa District Community Development Office
- Kapur District Community Development Office
- Suk Sum Ran District Community Development Office
- Andaman Coastal Research Station for Development, Kasetsart University
- Phangnga Forest Research Station, Kasetsart University
- Thailand Environment Institute

3.4 Monitoring



Participatory monitoring

► Seedling survival rate and change

In order to monitor the seedling survival rate, 10 plots of 4x4 meter size were designated in various locations with certain conditions. 1 was close to Chan Klao Canal in a mangrove forests located in Koh Kor Khao Island, 2 close to Wat Canal in a mangrove forest in Koh Kor Khao Island, 3 in a mangrove forest at Ban Bang Hin, and 4 in mangrove forests in Ban Laem Now.

The results revealed the survival rate was 80-95 per cent, and only one was 60 per cent in areas largely surrounded with weeds before the seedling planting.

In 2012, the survey on mangrove forests' fertility revealed about 2-4 layers of canopy with moderate soil covers with not less than 10 flora species, more or less like in the 2010 surveys or 2 years ago. Most of them were *Acrostichum speciosum*, *Rhizophora apiculate*, and *Bruguiera gymnorrhiza*. The abundantly-found undergrowth species were *Acrostichum speciosum*, *Xylocarpus granatum/moluccensis?* and *Bruguiera parviflora*. However, most trees gained their increased girth size with less density. The surveys found more benthic fauna/benthos such as mud lobsters, mangrove crabs, fiddler crabs, hermit crabs, *Cerithidea sp.* and Nerites.

Survey results: marine clam population and sizes in the Kapur Bay

Hoi Hwan/Belcher's venus clams and **Hoi Khaow**/Oriental hard clams are main economic aquatic resources for all communities in the Kapur Bay. According to the lunar month, the best periods for collecting them are before the first and third quarters and before the full moon and new moon. Their collection can be done with simple tools like coconut shell slivers, small gardening rakes or even spoons: just dig less than 5 centimeters in sand dune surfaces and one will see and can collect them.

The first survey was done in August 2010 by Ban Bang Hin School's eighth-graders and their parents who have earned their living by collecting these two species of clams. The second survey was organized in July 2012. The clam monitoring methodology was begun with locating five sampling plots of a 5x5 meter size. They then rake the designated plots with PVC pipe rakes fixed with nails as their teeth. They then manually pick up clams, separating them according to their species and same plot before size measurement, weight check, and data recording.

The survey results in 2010 and 2012 showed that both clam species average sizes were not significantly different: **Hoi Hwan** - average size of 3.4 cm. and **Hoi Khaow** - average size of 4.0 cm. But their density was different: 45 kg. to 32 kg./ha. Such was due to provisionally higher sea water temperatures.

Socio-economic

It was found that, after the 2004 Tsunami, those who used to be affected changed and adjusted their behaviors. They preferred fishing close to the coast so that they could return home more quickly if such disaster ever happened again. Moreover, it was found that people in this area paid more attention to daily weather forecast which they would like to share amongst themselves regularly. And, most importantly, they cared more for some specific self-help groups like savings groups, conservation groups, and occupational groups. .

Studies on socio-economic issues were conducted in the 2 project areas: the Kapur Bay and Koh Kor Khao Island. A comparison of the 2012 data with those of 2009 data showed that

Key issue	2009	2012
Proportion of coastal fishermen (%)	22-35	18-32
Average income from fishery production (baht/household/year)	350,550	383,235 (+10%)
Proportion of community member realize on the importance of mangrove at the high score (%)	> 80	> 80
Proportion of community member frequently participated in conservation activities (%)	30-75	60-80

- The number of fishermen was 3-4% less than the previous survey, while the coastal resource beneficiaries were 20 – 35 % less than expected. This was because a certain number of those affected by the 2004 Tsunami moved into the main land where their better incomes could be assured.
- Based on their knowledge and awareness, more than 75 percent of community members readily accepted the regulations on coastal resources utilization.
- Local people were ready to participate in reforestation and.
- More than 60 percent of community members have participated in coastal resource rehabilitation and management, much higher than database statistics.

Based on the workshop held on November, 2012, when 45 participants - government officials, academics, representatives from non-governmental organizations, tambon administrative organizations, and local community leaders - were present to discuss about the project's outcomes and achievements and to exchange experience, it was concluded that

- Forested areas have been increased and enlarged.
- The project's reforested areas are more abundant.
- The life quality of the various communities has been improved.
- Local people care more about the sustainable natural resource management.
- The project's achievement has been ensured with local people's active participation in almost all steps of the project's activities.
- Local people are ready for the next step of the sustainable natural resource conservation in their project area.

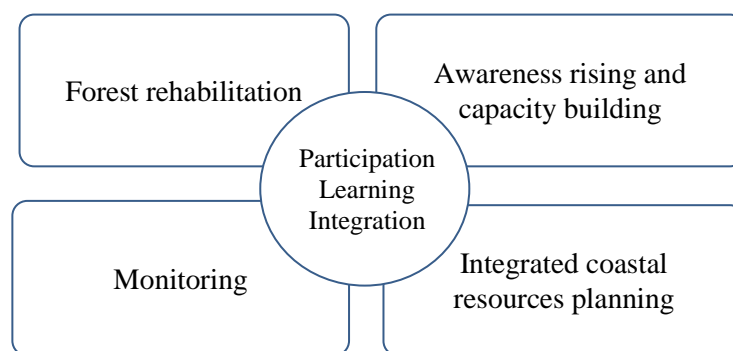
That workshop also recommended for the community's quality of life development should promote and apply the concept of sufficient economy to all residents to reduce their dependency on natural resources and to use them effectively by value-added approach for those natural resources within their community groups and individual. Also, they should concern about the sustainable production processes and sharing some benefits to the natural resources preservation. Moreover, the community-based environmental monitoring procedures should be emphasized on networking with collaboration among those coastal communities with supports for tools and equipment from involving government units.

4. Analysis



A local forum for sharing lesson learned

Refer to project objectives requiring contribution on the long-term rehabilitation of the coastal forest resources and the livelihoods of local communities, thus the community-based forest management initiation was determined as one of the specific objective with 4 implementation frameworks and 3 principal guidelines.



Analysis of activities result

The results of project implementation in the 3 target site which affected by the 2004 Tsunami in Ranong Province and Phangnga Province, Southern of Thailand can be summarized and analysed as below table.

	Participation	Learning	Integration
1. Forest rehabilitation	<ul style="list-style-type: none"> - 97 participants from various sectors joined the lunching workshop to exchange lesson learnt and point out the ways for sustainable forest management - 3 government agencies and 2 communities prepared seedling - more than 7,000 local participants joined the planting activities for 751 ha - set up the community forests covered 3,688 ha 	<ul style="list-style-type: none"> - TNA and training programs developed for operational staff and community leader - Forest data surveyed and its demarcated - Community forests regulation formulated 	<ul style="list-style-type: none"> - Species selected as suitable for objective of planting such as reduce impact of wave/wind, reduce coastal erosion, food, material for produce goods and local handicraft etc.
2. Awareness rising and capacity building	<ul style="list-style-type: none"> - Community networks in Koh Kor Khao island and Kapur Bay 	<ul style="list-style-type: none"> - Community data and coastal resources surveyed and disseminated to community forums - 3 study visits, 2 workshops and 2 training courses organized for 154 attendants - Produced various material and publications; leaflets, signboards, maps, etc. - Shared experiences to the forums organized by project and other agencies 	<ul style="list-style-type: none"> - School curriculum - Environmental study
3. Integrated coastal resources planning	<ul style="list-style-type: none"> - Local forums to acknowledge local situation, problems and needs - Stakeholders validation forum 	<ul style="list-style-type: none"> - Core group members attended the training workshop on planning formulation - Data reviewed and analysis 	<ul style="list-style-type: none"> - Promoted sustainable coastal resources utilization - Integrated of social, economic and environmental aspects - Integrated

	Participation	Learning	Integration
			upstream and downstream management - Linked to local development plan and CSR program of business sector
4. Monitoring	- Participatory monitored with community leader and youths.	- Monitoring results disseminated and shared to communities and stakeholders to acknowledge local resources situation	- Presented the high planting survival rate, capacity of ecosystem maintaining and higher participation of local community

It can be seen from the table above that the 4 activity frameworks of the project can be associated with every principal guideline. Despite the different weight to each of the operations are linked to each other. In particular, the implementation of forest rehabilitation and awareness rising and capacity building, which has designed the project to be operating simultaneously will affect the output of the operational part of the integrated coastal resources planning and monitoring to help increase efficiency and sustainability of operations.

However, forest restoration activities that can cause learning from the consultation. Planning, implementation, operations and activities which are not official. The awareness and capacity development is the same. Not arise from events held officially and unofficially. As well as the exchange of experiences with community leaders in the area including units from abroad. The activities are planned Many stakeholders have an understanding of the situation in the same direction. Understand the mission and programs of the agencies involved. Contribute to the support of international agencies from obvious that the integrated coastal resources plan is to integrate land use management in the future. Both the ecosystem Reducing pollution and intrusion in coastal areas. Fisheries Productivity and sustainable use including the development of communication and networking.

Analysis of process and overall result

Process and the overall performance of the three year project with 1.5 years extended of operation by the Thailand Environment Institute, and the Department of Forestry Local government organizations local agency and local communities in the project area and analyzes can be summarized as follows.

- **Site Selection** by considering the conditions which have been damaged by the tsunami and has no agency into action or plan to carry out to reduce redundancy. I

also consider the opinions and needs of local authorities and community leaders. This work by restoration process and local resources that contribute to sustainability. In addition, the boundaries of the district have taken a number of target areas, including the 7th District in connection with the plan and the mission of the District Office is responsible for the development of the area.

- **The scoping the "coastal forest"** is defined to include the mangrove forest, beach forest and terrestrial forest in the coastal areas. This has helped to link the relationship of water from upstream to downstream ecosystems, however. Operating mainly in the mangrove areas. The area beach; It is privately owned by Travel And in the park It is likely that the community will be involved in managing low.

However, the community-based planting activity normally with 30-60 people get involved and capable to plant maximum 2,000 seedlings or 20,000 pods. While another planting activity for special occasion(s) can mobilize at least 100-300 local people get involved with.

- **Purpose and selected species for planting** - The restoration of forest ecosystem restoration actions to address alone. It can take into account any other purpose or incorporating many. Objectives together in one area of the restoration. In project implementation Local plant species were selected to be consistent with the purpose of cultivation.

Objective	Mangrove forest	Beach forest	Terrestrial forest
Reduce impact of wave/wind	<i>Rhizophora</i> sp.	<i>Casuarina equisetifolia</i>	
Reduce coastal erosion	<i>Rhizophora</i> sp.		<i>Vetiver Grass</i>
Utilization	<i>Nipa</i> sp.		Bamboo, Cossod Tree, Pakria, Tamarind, Mahogany, Ironwood, etc
Enrich ecosystem	<i>Rhizophora</i> sp., <i>Nipa</i> sp., <i>Burquiera gymnorrhiza</i> , <i>Eugenia curtisii</i> , <i>Avicenia alba</i> , etc		
Landscaping		<i>Barringtonia asiatica</i> , <i>Cerbera odollam</i> , etc.	
Demarcation		<i>Casuarina equisetifolia</i>	Bamboo

- **Patterns of planting** in the project were the weed elimination prior to planting, replanting in the destroyed forest areas, and replanting in bared areas. It could be planned for the methodology and budget to suit each area.

- **Awareness rising and capacity building** has performed well as a personal level, community level covering community leaders and young people in schools and students also develop a network. To co-driven management of coastal resources in the area. A framework for awareness and capacity building, which includes the knowledge, attitude and skill. The activities were taken many forms, including classroom-based learning, out of classroom learning, including learning by doing. The appropriate period for local people seems a short course of 2–5 days which do not disturb to their occupation. Training activities in the project had combined different formats, for example study tours to relevant areas, discussion and group work, ice-breaking activities and team building, and so on. Participants can also be helped to form networks to communicate and exchange information after the training has finished.
- **Integrated coastal resources planning**, which was implemented in this project. Has been the focus of local governments and local government agencies. But it seems to rarely get much attention from the community. The role of the community in the planning process. Mainly to provide information about resources and career. The proposal needs Prepared this map Found that directly benefit the organization. That has led to the local development plan and budget for the year, however, found that this plan has a broad range of issues involving many agencies, including the related disasters and climate change. Which should have specific plans in this field. To study the details and implementation of the system, however.
- **The monitoring of forest rehabilitation** through community participation found that no operation is very structured those involved in reforestation. To focus constantly monitors the area which has been planted forests. Except for hard to reach areas, it has a group of people who gather in the woods, fisherman, ecotourism group can help take care of them. There were observe the survival rate of afforestation and climate change, forestry, youth groups also have an important role in the monitoring of various ecosystems. This has caused the learned and cherished resource. And it is important to takecare treatments.

Analysis of key factors of success

Overall the project achieved the goals set forth. By a factor of 5 main pillars.

- 1) **Good communication and coordination**, which provided field staff with experience accessible to the community and to build understanding and cooperation with other agencies. Providing information to the media and to understand more sporadic.
- 2) **Combination of knowledge and wisdom**, by a panel of experts and researchers, including silviculture planning. Information technology and social work with community and local agencies closely.
- 3) **Flexible programs and activities in accordance with local conditions and social**, This is a very important part in co-operation with the community. Which NGOs can work in this way is better than the public sector. You have to adjust plans and activities to the career season and cultural practices of the community.

- 4) **Variety of activities appropriate to the target group.** Because the goal of the operation with the community leaders. Community members Local government organizations Agencies, local government and youth who are interested and want to be different. Each activity has a different story to the audience. In particular, awareness and capacity building in the implementation of activities targeted to these participants may have different roles according to the mission and interests.

However, the overall performance is slower than planned. Due to the two objectives, namely, participation and decision-making with the community and its related entities. Have spent more than you planned. And natural disasters in the project area and the area of the country, making it difficult to carry out. The agencies involved in the community and has dedicated resources and time in order to solve immediate problems for the hunt.

5. Conclusion and Recommendation



Overall

The project results of forest rehabilitation in areas affected by the Tsunami by the “community-based management” are summarized below.

- The replacement planting was implemented by 118 items for terrestrial, beach and mangrove forest with 7,693 participants as the 751.72 hectare of total area. Moreover, community forest management was promoted in 12 communities covered the 3,688.2 ha of coastal forest, and 48,500 aquatic animals were released to the nature.
- The community leaders and youth’s capacity were developed through various activities as sharing experience in the national seminar, study tour and training to learn the community forest management etc.
- The two workshop training courses; 1) Understand–Access–Develop the Forest management and 2) Professional on Forest Resources Management were conducted with 82 participants who community leaders and local government officer.
- A member of raising awareness materials produced for community leader and youth in form of leaflet, signboard, map, and documentation.
- A survey of carbon storage evaluation for 16.5 ha at Klong Tone forest area found 4,097.6 ton of carbon sink that is equivalent to CO₂ storage of 15,024.53 ton.
- A survey found the production of 1,772 kg/ha of Semi-grooved venus and Spotted babylon at Bang Hin can provide total benefit of Baht 2,890,450 per year and net

benefit of Baht 2,255,670 per year. At the meanwhile the production amount of fishery at Bang Kuay Nok can provide total benefit of Baht 31,459,793 per year and net benefit of Baht 24,625,687 per year

- Community data records at Thung La-ong can help to develop natural resources mapping and disseminate the data on community's resources change
- Two local networks at Kapur Bay and Koh Kor Khao were developed with the two integrated coastal resources plan.

► Recommendations

Recommendations for the further project including reforestation in areas affected by the disaster, by community-based management should consider the project's success factors and constraints. There are also other recommendation are;

- 1) More focus on learning about climate change and reducing the impact of different types of natural disasters which likely to occur in the area.
- 2) Consider on biodiversity both cognitive and species survey, develop biodiversity database at the local level, and set up the guideline for conserving local species of flora and fauna, including rare species and endangered species.
- 3) Link their career and income to the coastal resource conservation and sustainable utilization.
- 4) Collect and disseminate lessons and experiences arising from operating by community-based management in different areas. It should be presented by initiative step, operation, expansion and sustainability.
- 5) Establish a plan to develop the capacity of local government officials and government agencies operating in the area. About the process of working with the community and communication system.
- 6) Focus on role of the private sector took part in the operation and management of timber resources in various formats. As well as strengthen their understanding of the concepts and methods of social work for the Swiss for a social enterprise.
- 7) Establish a plan to develop the capacity of local government officials and government agencies operational staffs in the area about the process of working with the community and communication system.
- 8) Increase the role of private sector involvement in forest management and operational support resources in different ways. As well as strengthen their understanding of the concepts and methods of social enterprise.
- 9) Initiate the forest management and coastal resources fund in the community and sub-district levels with reliable committee and clear rules.
- 10) Increase understanding of the laws, regulations and agencies responsible for forestry, and be clear about the area and boundary of forest.

► Ways for Sustainability

As project realized on the sustainability after project completed, the activities on raising awareness and capacity for local community were continually devoted along with the supportive factors/conditions were set up such as community revolving fund, integrated coastal resources management plan, cooperation with local government administrative and government agencies, and school curriculum on local natural resources.

Consequently, the project was implemented in line with national development strategy, especially concerning the management of natural resources for the development and improvement of the quality of life of local people. At the same time, the project implementation was linked to strategies for climate change adaptation that a global priority.