Mangroves for the Future
INVESTING IN COASTAL ECOSYSTEMS

Scientific and Technical Symposium on Sustainable Mangrove Ecosystem Management

22 - 25 November 2008, Ranong, Thailand

สถาบันสิ่งแวดล้อมไทย
Thailand Environment Institute

GSEI

Organisers:

Department of Marine & Coastal Resources (DMCR)
Ministry of Environment and Natural Resources, Thailand
www.dmcr.go.th

Mangroves for the Future (MFF)
www.mangrovesforthefuture.org
symposium@mangrovesforthefuture.org

Co-sponsors:

Asian Institute of Technology (AIT)
www.ait.ac.th

cenTER (University of Aarhus)
mit.biology.au.dk/cenTER

Good Governance for Social Development and the Environmental Institute (GSEI)
www.gsei.or.th/home_en.php

International Society for Mangrove Ecosystems (ISME)
www.mangrove.or.jp

Thailand Environmental Institute (TEI)
www.tei.or.th/AboutTEI/aboutTEI.htm

Wetlands International (WI)
www.wetlands.org

The Symposium

The *Scientific and Technical Symposium on Sustainable Mangrove Ecosystem Management* will address the sustainable management issues affecting mangrove ecosystems throughout the Indian Ocean Region, and how local communities can be better informed and involved in sustainable mangrove management as a way to protect their traditional livelihoods.

The objective of the Symposium is to improve the ability and national capacity of Thailand and the other MFF focal and dialogue countries to share information and experiences on how to apply knowledge more effectively to support management in a way that is both sustainable and beneficial to local people. This encompasses knowledge derived both through scientific research, and from traditional/local sources of knowledge.

Department of Marine and Coastal Resources

The Department of Marine and Coastal Resources (DMCR), Ministry of Environment and Natural Resources, Thailand, plays a distinct role in the conservation, rehabilitation and management of marine and coastal resources in Thailand. The goal of the DMCR is to promote sustainable use of marine and coastal resources while ensuring social and economic equity. The marine and coastal resources conservation activities are the responsibility of multiple government agencies. These agencies have developed their own regulatory and enforcement mechanisms, so coordination is an important priority. Innovative and effective approaches are therefore needed to address these issues rationally.

The DMCR is also the lead implementing body of the MFF initiative in Thailand. The National Coordinating Body (NCB) is chaired by the Director General. This committee oversees many of its activities conducted under MFF in Thailand.

Mangroves for the Future

Mangroves for the Future, (MFF) is a unique partner-led initiative to promote investment in coastal ecosystem conservation for sustainable development. It provides a collaborative platform among the many different agencies, sectors and countries who are addressing challenges to coastal ecosystem and livelihood issues, to work towards a common goal. MFF builds on a history of coastal management interventions before and after the 2004 tsunami, especially the call to continue the momentum and partnerships generated by the immediate post-tsunami response. It focuses on the countries worst-affected by the tsunami; India, Indonesia, Maldives, Seychelles, Sri Lanka, and Thailand. MFF also include other “dialogue” countries in the Region that face similar issues, with an overall aim to promote an integrated ocean wide approach to coastal zone management.

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Ranong Symposium Overview

Friday 21 November		Arrival of Participants
Saturday 22 November	07:45	Registration
	08.30	Opening Ceremony
	09:00	Session I: Regional Perspectives on Mangrove Ecosystem Management
	12:30	Lunch Break
	14:00-16:30	Workshops on the Use of Scientific and Local Knowledge to Better Support Mangrove Ecosystem Management- outcomes from workshops
	18:30	Welcome Dinner hosted by DMCR
Sunday 23 November.	08:30	Session II: Applying Local and Scientific Knowledge to Better Support Mangrove Ecosystem Management
	10:30-16:00 approx.	Field trip to Ranong Mangrove Forest Research Centre & Biosphere Reserve
	18:30	Dinner hosted by MFF
Monday 24 November	08:30	Session III: Knowledge-based Management - Case Study of the Ranong Mangrove System
	12:15	Lunch Break
	14:00	Session III, continued
	16:00-17:00	Discussion and end of Session III
Tuesday 25 November	09:00	Session 4: Future Knowledge and Management Needs
	09:30-12:00	Working Groups, Presentation and Discussion (5 working groups will discuss key issues)
	12:00-14:00	Symposium Closing Ceremony and Farewell Lunch
	14:00	Departure Ranong Airport / Post-symposium field trip

Symposium Programme

Friday 21 November	Arrival of participants, check in to Tinidee (formerly Ranong Princess) Hotel
Saturday 22 November	**DAY 1**
0745:	Registration
08:30	**Opening Ceremony** Welcome Address on behalf of DMCR (Director-General) Welcome Address on behalf of MFF (Co-chairs/Coordinator) Welcome Address by Governor of Ranong Province Opening Address by Permanent Secretary, Ministry of Environment and Natural Resources
08.45	**Introduction to SESSION I:** **Regional Perspectives on Mangrove Ecosystem Management** *Dr. Donald Macintosh, MFF Coordinator and Dr. Sonjai Havanond, DMCR*
09:00	*Joint Mangrove Management in Andhra Pradesh, India* R.Ramasubramanian and V. Selvam
09.25	*Post-Tsunami Sustainable Coastal Environmental and Livelihoods rehabilitation- A case study* Bart, A.
09.50	*Key lessons learned from community-based rehabilitation of mangrove ecosystems and livelihoods in post-tsunami Aceh, Indonesia* Wibisono, Y.
10:15	*Strategies for post-tsunami development of coastal ecosystem and livelihoods – a review of Sri Lanka's approaches* R. Mahindapala, A Premaratne, and H D L U Nirodhawardene
10:40	Coffee Break
11:00	*Rehabilitation of Mangroves along the Arid Coast of Pakistan* Mr. Tahir Qureshi, IUCN Pakistan
11.25	*The Social-Ecological Resilience of Urban and Rural Mangroves Ecosystem in Zanzibar, Tanzania: present status and future strategies* Soud M. Jumah[1], Wahira J. Othman[2] and Yussuf H. Kombo[1]
11:50	*Demonstrating Ecosystem Rehabilitation and Management using a Reef to Ridge Approach: field experience from the North Andaman Coast of Thailand* Soonthornowaphat, S., Sukpong,. P and De Silva,. J.

12:30 LUNCH BREAK

14:00-16.30 **WORKSHOP 1: Using Local Knowledge to Better Support Mangrove Ecosystem Management** – experiences & opportunities in Thailand" (Organised by TEI & GSEI – workshop language: Thai)

Discussion paper- **Local Wisdom for Mangroves Management** *Chaired by Prof. Sanit Aksornkoae, President, TEI, and Thanpuying Suthawan Sathirathai, Chair, GSEI*

14.00-16.30 **WORKSHOP 2: "Using Scientific Knowledge to better support Mangrove Ecosystem Management** – experiences & opportunities from the Asian Region" (Organised by MFF – workshop language: English)

Chaired by Dr. Barry Clough, ISME

NOTE: Workshops 1 and 2 will be conducted in parallel. Participants should select which workshop they would like to attend.

18.30 Welcome Dinner hosted by DMCR

Sunday 23 November DAY 2

08:30 **INTRODUCTION TO SESSION II:**

08:45-10.00 **Applying Local and Scientific Knowledge to Better Support Mangrove Ecosystem Management**

Report and discussion on outcomes from Workshops 1 and 2

Chaired by Prof. Sanit Aksornkoae and Prof. Don Macintosh

10.00-10.30 Coffee break

10.30-16.00 approx. Fieldtrip to the Ranong Mangrove Forest Research Centre and Biosphere Reserve, mangrove fishing village, and "Sea-Gypsy" village; includes a boat trip and lunch.

(the field trip itinerary is provided on page 6)

18.30 Dinner hosted by MFF

Monday 24 November **Day 3**

09.00 **INTRODUCTION TO SESSION III**

Knowledge-based Management - Case Study of the Ranong Mangrove Ecosystem

Chairman and facilitators

Review & Contributed papers:

09:15 *History of Mangrove Research in Ranong and Lessons Learned*

S. Havanond, and D. Macintosh

09:45 *Forest Ecology & Management*

Clough, B. Aksornkoae, S. and Havanond, S.

10:15 Coffee Break

10.45 *Mangrove Animal-Plant Interactions and their Application to Management*
Offenberg, J.

11:15 *Mangrove Fauna and its Utilization in Fisheries & Aquaculture*
Macintosh, D. J., Ashton, E.G., and Paphavisit, N.

11.45 *The Ranong Biosphere Reserve: History, Objectives and Management Experiences*
H Thulstrup and W. Meepol

12.15 *Floral Biology and Pollination Ecology of Rhizophora mucronata in the Gulf of Kachchh, Gujarat, India*
Pandey, C. N. and Pandey, R.

12.45 Lunch Break

14:00 *The potential for eco-tourism development as a means to support mangrove conservation efforts*
Yakupitiyage, A.

14:30 *Approaches for Embedding Stakeholder Realities in Coastal Planning Processes: Cases from Mangrove Restoration and Rehabilitation in South East Asia*

M. Osbeck and N. Powell

15:00 *Governance in a Spatial Context: Analyzing and Mapping Regulatory Regimes Governing Natural Resources in Kuraburi, Phang Nga, Thailand*
Knight, R., Watson, K., Dill, J. and Moore, P.

15:30 *Mangrove rehabilitation through community involvement in post-tsunami Maldives, Thailand and India: an example of South-South cooperation*

Asae Sakaya and Mr. Chaman Trisal, Wetlands International and WISA

16:00 *Rehabilitation of Cyclone Nargis Affected Areas in Myanmar and Prevention from Future Natural Disasters*

U Win Maung, Forest Department, Myanmar

16.30-17.00 Discussion and end of session III

Tuesday 25 November **Day 4**

09:00 **Introduction to Session 4**

Future Knowledge and Management Needs

Presentation of the format for Session IV: Working group analysis and review of key issues, leading to recommendations at regional and country levels

09:30 Breakout into five small working groups.

09:30-11.00 **WORKING GROUPS**

Symposium participants will split into five working groups. Each group will discuss knowledge needs and other key issues in relation to sustainable management objectives, and will present its conclusions at the final Plenary Session. A chair person and rapporteur will be nominated by each group.

Working Group subject areas and key issues:

1. Valuing mangrove ecosystems to support sustainable management.
2. Mangrove ecotourism – potential and constraints
3. Post-tsunami and other disaster preparedness issues
4. Trans-boundary Protected Areas involving mangrove ecosystems
5. ”Reef to ridge” management approaches

11:00-12.15 Presentation and Discussion of Working Group recommendations

Close of Session IV

12:15 Symposium Closing Ceremony

12:30 Farewell Lunch

14.00 Depart for Ranong airport / Post-symposium field trip

Ranong Symposium Field Trip Sunday 23 November

IMPORTANT INFORMATION
The Symposium fieldtrip will start from Tinidee Hotel on Sunday 23 November at 10.30hrs. It is very important that we leave on time because of the tide table, so please be ready in the hotel lobby by 10.25hrs.

We expect to return to the hotel around **17.15 hr**s, but this will depend on the weather. Those taking the Ranong-Bangkok flight at 16.45 and those who wish to return to the hotel earlier can do so, provided you inform the Organising Committee in advance.

Please wear suitable field clothes including a **long-sleeved shirt** or blouse, at **hat**, **suitable shoes** that you can use in the mud and rainwear. **Sun-block** is also a good idea.

Most of the visit will be done by boat, so please ensure you have something waterproof to carry and protect your camera, mobile telephone, notebook, etc.). There will be five groups and each group will be assigned to one particular boat. Please **stay with your boat throughout the field trip**, as each boat will follow a slightly different itinerary.

Those who will take the afternoon Air Asia flight to Bangkok will have to be in Group 1.

ITINERARY

10.30 -11.00 By road to Ranong Mangrove Forest Research Center (all groups).

GROUPS 1 and 2:

11.00-12.30	Groups 1 and 2 visit the Ranong Mangrove Forest Research Centre, Biosphere Reserve and walkway.
12.30-13.45	Groups 1 and 2 travels by boat down Klong Ngao, visit former tin-mining area and mixed forest plantation site, new plantations, fish cages, etc. Return to the Mangrove Centre for lunch.
14.15-15.15	Option to stay in Ngao, visit temple and waterfall, or return to Ranong to visit Hot Springs and forest reserve area.
15.15	Travel to Ranong Airport for flight FD 3174 departing 16.45hrs.

GROUPS 3, 4 and 5:

11.00-12.30	Groups 3, 4 and 5 travel by boat down Klong Ngao, visit former tin-mining area and mixed forest plantation site; continue to Had Sai Khao and stop to see the “giant mangroves.”
12.30-14.00	By boat to Koh Lao (Lao Island) to visit a traditional Thai Moslem fishing community and Moken (Sea-Gypsy) village. See mangrove-based livelihood activities (push-net fishing, shrimp-paste making, oyster collecting, cage aquaculture).
14.00-14.30	Lunch on Koh Lao
15.00-16.00	Return to Mangrove Research Center and Biosphere Reserve HQ.
16.00-17.00	Visit Ranong Hot Spring and forest reserve area.
17.15 approx.	Return to hotel

About the Ranong Biosphere Reserve (RBR)

The Ranong Biosphere Reserve (RBR) was created in 1997, as the fourth Man and Biosphere Reserve (MAB) to be established in Thailand, and the first Biosphere Reserve to include coastal habitats and mangroves. It covers about 30,000 hectares, of which 40% is marine habitat. Even prior to the declaration of Ranong as a Biosphere Reserve, the Ngao mangrove area was already assigned as a special experimental area to test sustainable use and management of mangrove ecosystems by the National Research Council of Thailand. A mangrove forest area of 2,000 hectares was established in 1981 as the Mangrove Forest Research Center (MFRC) Ranong, by the Royal Forest Department (RFD). The RBR headquarters and management unit is located within the MFRC complex.

The RBR consists of a narrow coastal plain characterized by many waterways and fringing mangroves; it extends seawards towards seagrass beds at a depth of 10 meters. This represents the largest and comparatively the most undisturbed mangrove area in Thailand. It adjoins the Ka Poe Estuary which is recognized internationally as a RAMSAR site and Laem Son National Park, thus forming part of a large contiguous area of protected habitats along the north Andaman Sea coast.

The mangroves in Ranong form a diverse ecosystem of forest and tidal channels, supporting about 300 animal species and 54 plant species, including about 24 true mangrove species. Formerly managed by the Royal Forest Department, the mangroves now have conservation forest status under the jurisdiction of the Department of Marine and Coastal Resources (DMCR). The DMCR also manages the RBR and has been involved in rehabilitating the mangrove forest after many decades of destructive exploitation, mainly for charcoal production, tin-mining and shrimp farming.

In summary, the three main functions of a Biosphere Reserve under the UNESCO Man and the Biosphere Programme are:

1. To use Biosphere Reserves to conserve natural and cultural diversity.
2. To utilise Biosphere Reserves as models of land management and of new approaches to sustainable development.
3. To use Biosphere Reserves for research, monitoring, education and training.

There are about 4000 people living inside the Ranong Biosphere Reserve whose major sources of livelihood are fishing and aquaculture. The local communities have retained their rights to utilize mangroves in a sustainable manner without significantly disturbing the ecosystem. The management of the Ranong Biosphere Reserve is inclusive of community participation, but it is also recognized that more should be done to promote the RBR's development function to foster sustainable economic and human development.

Post-symposium Field trip 25-26 November 2008

Ranong and Phang Nga Provinces

The post-symposium field trip will depart from Tinidee Hotel in Ranong at **13.45, Tuesday 25 November**. It is important that everybody make an effort to be punctual. The bus will not wait.

The post-symposium fieldtrip is THB 4,500 (not applicable for MFF sponsored participants). The price includes all transportation, food and accommodation. The payment can be made in Ranong during the Symposium.

There are only 23 rooms available at the Greenview Resort and participants are asked to share. A list for room sign ups will be available on the first day of the Symposium.

There are **two options** for the field trip on the 25th November: Option 1 will focus on the **Livelihoods and Community Participation in Coastal Resource Management.** Option 2 will focus on **Conservation Research** and **climate change indicators**.

The first option showcases conservation activities mainly driven by community-based tourism. The second part of this option will be a visit to a post-tsunami intervention which illustrates sustainable livelihood approaches.

The second option focuses on conservation organizations which have adopted eco-tourism to support conservation objectives. The second part of this option will visit Ranong Coastal Resource Research Station which uses community environmental monitoring tools, such as involving coastal communities in data collection and monitoring of local climate change indicators.

Note: Both groups/options will be together on 26 November, departing from Greenview resort at 9.30 am and ending in Phuket Airport at 17.30. For those with earlier flight departures, transportation will be available to take participants to Phuket Airport.

(Please see detailed schedule below)

Post-symposium Field trip Itinerary

25-11-08	**Livelihoods and Community Participation in Coastal Resource management Group**	**Conservation Focused Research Group**
Time		
13.45	Depart from Tinidee Hotel, Ranong	Depart from Tinidee Hotel, Ranong
15.00-16.30	Arrive at Suk Sam Ran Visit **Ban Tha Lae Nok Centre**, see community products, meet with Community-Based Ecotourism Group and Andaman Discoveries staff to discuss community-based ecotourism.	Arrive at Suk Sam Ran Visit **Na Ca Center** and meet with Na Ca Conservation Group to see how a community conservation group protects an endemic “Water Lilly” species.
16.30-17.15	Travel to the Green Building (**Kam Puan Community Learning Center**) established by USAID/AIT Project	Travel to **Ranong Coastal Resource Research Station**
17.15-18.45	**Ban Kam Puan** and meet with KCLC staff	Meet with EU Project staff and visit exhibition center
18.45	Leave for Green View Resort	
19.15	Check-in	
19.30	Joint Dinner at Greenview Resort	
26-11-08		
09.00	Departure from Greenview Resort	
09.30-11.30	Visit **KMK community forest** and meet with KMK Conservation Network	
11.30-13.30	Travel to **Ban Bang Tip** and have lunch with local people	
13.30-14.30	Visit Bang Tip Conservation Group which won the Green Grove Award in year 2003 from PTT and see community mangrove forest.	

About the Ranong and Phang Nga Province

During the post-symposium field trip, you will get a chance to see how different types of stakeholders are implementing conservation and management initiatives in coastal ecosystems. This will include work conducted by academic institutions such as Kesetsart University, as well as community-based organizations (CBOs) that have developed partnerships with various government non-governmental institutions. The field trip will highlight different aspects of the ecosystem approach where conservation, management and livelihoods play a key role.

Ban Tha Lae Nok
The Ban Tha Lae Nok community has effectively developed community-based tourism activities that integrate conservation. These activities include; homestay host families, livelihood workshop groups, village tour guides, boat guides, a handicraft cooperative, and an Environment Group.

Kam Puan Community Learning Center
The Kam Puan Community Learning Center or the “Green Building” is a learning center set up through a USAID post-tsunami intervention. The building which serves as an information communication technology centre serves as learning node for communities. The center also has a tsunami memorial museum.

Na Ca River and Na Ca Center
Na Ca River is located in Na Ca Sub district of Suk Sam Ran District. The river is home to a rare and endemic species – the Na Ca Water Lilly. This fresh-water plant has unusually long leaves and delicate white flowers that bloom from October to December. Locals have been actively conserving the water lily for over 10 years, but ongoing threats include commercial collection, habitat loss due to river excavation and changing land-use patterns, and a lack of government legislation to protect the Water Lilly.
The Na Ca Centre focuses on conservation and has adopted eco-tourism to support conservation objectives.

Ranong Coastal Resource Research Station
The Ranong Coastal Resource Research Station uses community environmental monitoring tools, such as involving coastal communities in data collection and monitoring of local climate change indicators.

Mae Nang Khao community forest
Located in Bang Wan and Mae Nang Khao sub districts, the community forest comprises of 22,000 rai of land, the largest locally managed forest outside a protected area. There are 6 villages around the base of the mountain. Communities make use of the forest area for drinking water, and Non-timber Forest Products (NTFP) collection.
The major threats to forest are illegal hunting and logging, and encroachment for conversion into plantations.

Ban Bang Tip
On the second day, the field trip will focus on showing how community based organizations are working to support the conservation and management of coastal ecosystems. You will have an opportunity to interact with the Ban Bang Tip community members and learn more on why they began and how they implement their conservation and management actions.

SESSION I Regional Perspectives on Mangrove Ecosystem Management

Joint Mangrove Management in Andhra Pradesh, India

R. Ramasubramanian and V. Selvam

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ABSTRACT

This paper deals with the experiences gained from participatory mangrove management in the Godavari and Krishna mangrove wetlands of Andhra Pradesh, India. Participatory management of coastal resources has gained greater importance in recent years. Community participation in mangrove conservation and management was implemented in the Godavari and Krishna mangroves of Andhra Pradesh by the M. S. Swaminathan Research Foundation, in line with the Joint Forest Management (JFM) system in India. It involved multi-stakeholders, namely the State Forest Department, community-based organizations (village level institutions), and non-governmental organizations (NGOs) in the management and conservation of mangroves. Participatory rural appraisal (PRA) and other participatory tools were used to identify the status of the resources, their utilization pattern and the issues related to mangrove conservation and management. The degraded mangroves identified through remote sensing imageries were restored using nursery-raised mangrove saplings. The causes of degradation were studied and the degraded mangroves were restored through mangrove planting. Socio-economic development activities were undertaken for the mangrove dependent community. An area of about 640 ha of degraded mangroves was restored by understanding the hydrology of the area and the causes for degradation.

Key words: Community-based management, participatory approaches, mangrove management, PRA, mangrove conservation, JFM, Joint forest management

Post-Tsunami Sustainable Coastal Environmental and Livelihoods rehabilitation- A case study

Bart, A., AIT, Associate Professor

The Post-Tsunami Sustainable Livelihoods Program in Ranong (funded by USAID and implemented by Asian Institute of Technology (AIT), University of Rhode Island, Coastal Resource Center (URI CRC) and University of Hawaii at Hilo (UHH) was set up after the December, 2004, tsunami. The programme was designed as a field demonstration. The holistic approach involved an inclusive and on-going process with communities and local authorities to strengthen ecosystem stewardship, livelihood development, and disaster risk management. Recognizing that marine fisheries are overexploited, the project resisted the donor drive to recapitalize the fishery with boats, gear and engines. One of the headlines for coastal management after the disaster is that an opportunity to alter the path of overfishing was missed. The programme established a demonstration "green" Learning Center in Suksamran District that now serves as an excellent venue for demonstration of ecologically sound practices to local communities. Moreover, the programme provided intensive training to Lamson Marine National Park authorities and local community leaders on ecosystem management. Opportunity was provided to the community members also to learn about their ecosystem through hands-on training on habitat and importance of mangrove ecology while paying people to plant thousands of mangrove seedlings in areas denuded by the tsunami. The paper describes how the Ranong coastal communities learned the value of healthy ecosystem in post-disaster context and took matters in their own hands to become involved in its rehabilitation efforts.

Key words: post-tsunami reconstruction, community learning, mangrove management

Key lessons learned from community-based rehabilitation of mangrove ecosystems and livelihoods in post-tsunami Aceh.

By
Iwan Tri Cahyo Wibisono
I Nyoman Suryadiputra

ABSTRACT

Together with local communities, Wetlands International has been implementing community-based coastal restoration in Pesantren village, a degraded coastal area with abandoned shrimp farms in Pemalang District of-Central Java, since 1999. A key success factor has been the use of the so-called "bio-rights approach", an innovative pro-poor financing mechanism which is based on the concept of local people having 'user rights' over coastal resources and enhances local livelihoods.

Local communities receive capital in the form of a loan to start a small business or other economic activity and, instead of paying interest, they 'pay' with their environmental services, such as planting a specific number of mangrove seedlings and maintaining a replanted area. When after a set time period, the survival rate of the planted seedlings is > 75%, the loan will become a grant.

After six years of successful implementation of this approach in Pemalang, it was adopted and upscaled by Wetlands International (WI) in Green Coast (GC), a tsunami response programme of WI, IUCN, WWF and Both ENDS, funded by Oxfam Novib. In Aceh and Nias, WI-IP and WWF engaged in community-based coastal restoration through 50 local NGOs/CBOs (GC I, 2005 - 2007) and 16 local NGOs/CBOs (GC II, 2007 - 2009) who facilitated field implementation with local communities. During the period of GC I, as many as 1,004,000 mangrove seedlings and 187,650 beach plant seedlings were planted on 836 hectares of damaged and degraded coastal area along the Nanggroe Aceh Darusssalam (NAD) province. Average survival rate was 74.13 %. The project also supported local communities (43.637 beneficiaries) running their various economic activities to improve their income. Meanwhile, during the period of GC II, the project planted 566,800 mangrove and 45,087 beach plant seedlings on 555 hectares of degraded coastal land. The project also facilitated 16,382 beneficiaries within the local community, by assisting with their economic activities. Monitoring and evaluation is currently underway to determine the survival rate of tree rehabilitation programmes. Valuable experiences and lessons have been learned from this project on how to work efficiently with coastal communities.

Key words: mangrove rehabilitation, bio-rights, environmental services, finance mechanisms, Aceh

Strategies for post-tsunami development of coastal ecosystem and livelihoods in Sri Lanka -A Review of Sri Lanka's Approaches

R Mahindapala[1], A Premaratne[2] & H D L U Nirodhawardene[3]

ABSTRACT

The Sri Lankan coast was one of the most heavy impacted areas after the December 2004 tsunami. Severe damage to infrastructure and other major socio-economic impacts included salinisation of wells in the coastal zone and other fresh water sources affecting agriculture in a significant area; damage to wetlands; loss of livestock; set-back to tourism; and the pollution of the environment with rubble and garbage, which caused long-term damage to ecosystem health.

The policy adopted by the Government, and supported by many non-governmental organizations, was to promote long-term sustainable coastal management to benefit both local communities and ecosystem restoration needs. This was done by mainstreaming sustainable land management objectives and ecological values into development strategies, land restoration and reconstruction programmes.

A number of agencies were involved in post-tsunami reconstruction and rehabilitation work in Sri Lanka. Ecosystem restoration actions included clearing of debris, establishing coastal vegetation belts, restoration and rehabilitation of mangrove ecosystems, introducing initiatives to increase productivity of coastal ecosystems (by restocking lagoons, removal of alien invasive species, and 'greening' new settlements). Alternative livelihood approaches to affected communities included introduction of new income generating activities to wean people away from natural resources exploitation, developing home gardens for food, and ecotourism ventures. Concomitantly, education and awareness programmes were developed to support joint approaches in the management of coastal areas, canals systems and lagoons including improved vegetation cover, species diversity and beach and coastal stabilisation, improving access to fresh water resources, and effective monitoring of ecosystem restoration by the communities.

Of particular interest is the success of a small grants programme to community organisations to undertake work at the local level by the communities themselves, creating 'ownership' of the supported actions. The experiences from Sri Lanka indicate that ecosystem restoration requires concerted long-term sustained efforts, whereas alternative livelihoods were easier to introduce, replicable and more easily adopted by the communities. This paper highlights some of the key lessons from these approaches which will be useful for future reference in developing approaches for ecosystem restoration and livelihood improvements.

Key words: ecosystem restoration, alternative livelihoods, education and awareness raising

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Rehabilitation of Mangroves along the Arid Coast of Pakistan

by
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ABSTRACT

Pakistan is an arid/ semi-arid country which has a diverse landscape, including high ranges, fragile watersheds, alluvial plains, sandy deserts and coastal mangroves. Its 1000km long and 40/50 km wide coastline, shared by two provinces, borders the North Arabian Sea. The Sindh Province has a sheltered coast studded with dense growth of mangroves, whereas Balochistan Province has an open and barren coast with scattered mangroves at seven geographical locations.

Reduction in inflow of fresh water from the Indus River on account of diversion of water for other purposes, inflow of pollutants from industries, and shipping activities, plus human and livestock population pressures for fuel wood and fodder collection have exposed the mangrove ecosystem to severe environmental and socio-economic stress in the form of loss of habitat and biodiversity, decline in fish productivity and social problems for coastal communities.

It is impossible to completely rehabilitate destroyed mangrove forests to their original conditions due to other human-induced changes which take place at the ecosystem level. However, efforts have been made in Pakistan to re-vegetate deforested areas. IUCN's collaborative work for mangroves restoration has continued since early 1991and so far over 30,000 ha of mangroves have been replanted along the coast of Pakistan. The restoration builds on research studies on mangroves ecosystems. A social forestry programme was initiated under a private fishermen groups initiative achieved success and recognition throughout the country. Over 1000 ha private mangroves wood lots have been established in the coastal villages of Sindh and Balochistan. Coastal community development work was started with the aim of improving the environmental conditions of the villages and increasing awareness about threats to their natural resources. Several initiatives taken include user group formulation, introduction of energy efficient stoves, apiculture and ecotourism. These activities are alternate income generating activities intended to reduce dependence on mangroves resources.

This paper documents the efforts made to conserve, restore and manage mangroves ecosystems in Pakistan and the lessons learned, particularly regarding community participation.

Keywords: Mangrove Ecosystem, Pakistan Coast, Threats, Rehabilitation

The Social-Ecological Resilience of Urban and Rural Mangroves Ecosystems in Zanzibar, Tanzania: present status and future strategies

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ABSTRACT

This paper discusses the social-ecological resilience of urban and rural mangrove forests and the associated coastal communities. The responsibilities of various management regimes and different organisation are examined in relation to the accomplishment of healthy social and ecological systems.

A survey was conducted to collect primary and secondary data. Wood cutters, fishermen and mangroves products users provided the main information through unprompted questionnaires and focus group discussion. The head of households, traders, government officials and key informants were randomly sampled and surveyed. Forest resource assessments were also conducted using systematic sampling techniques to assess the distribution and abundance of mangrove tree species and associated macro-fauna. The data were used for detailed resilience analysis using a conceptual framework for social-ecological resilience and the adaptive cycle.

The study findings revealed that the mangroves of urban and rural coastal communities of both Unguja and Pemba Island have been controlled by contrasting management regimes which have impacted their resilience differently. The rural mangroves forest of Chwaka-Bay, Menai Bay and Makoba in Unguja has been heavily degraded in recent years and the mangrove ecosystem has shifted from a mature tree-dominated mangrove forest to a stump dominated mangrove stand, thereby seriously undermining the resilience of the social-ecological system.

This is explained by the high degree of dependence of rural communities on mangroves, the scarcity of other sources of income, and the Government's lack of legitimacy in the area. In contrast, in the urban mangrove ecosystems of Kinazini-Maruhubi, Kiembesamaki-Chukwani in Unguja and Chakechake, Wete and Mkoani in Pemba, where town-dwellers are not officially involved in the management system, the forest is flourishing and the ecosystem is shifting into a more resilient ecological state. This has been attributed to the relative economical stability of the surrounding community who attach less value to the mangroves resources leading to a low level of dependence on these mangroves.

The study identifies the need to improve management regimes for resilience of mangroves on the islands of Unguja and Pemba, permitting local communities to play a great actual role in executing forest resources management plans, including more realistic restrictions to mangrove harvesting, and more effective support from the Government for implementation of plans and development of alternative sources of income. The study calls for more effective collaborative plans which will involve all participating stakeholders in the management and utilisation of mangroves ecosystem of Zanzibar.

Key words: mangrove management, social-ecological Resilience, urban, mangrove harvesting

Demonstrating Ecosystem Rehabilitation and Management using an Reef to Ridge Approach: field experience from the North Andaman Coast

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IUCN. Thailand Programme

ABSTRACT

Following the December 2004 tsunami, one of the important lessons learned in relation to environmental issues was the recognition of poor ecosystem outcomes that had resulted from weak planning and implementation of ecosystem rehabilitation interventions. As a result, the ecological and socio-economic benefits of ecosystem rehabilitation were not fully realized in many countries affected by the tsunami. In response to this situation, IUCN in conjunction with the Mangroves for the Future Initiative developed a project that aims to demonstrate how degraded and threatened coastal ecosystems can be rehabilitated and conserved using ecologically and socio-economically sound methods.

Under this project Sri Lanka and Thailand were selected as countries to implement demonstration sites. In Thailand, the Ranong Northern Phang-Nga region was identified as the target area for demonstration purposes. The selection of this area was made in conjunction with the Department of Marine and Coastal Resources, Government of Thailand. Key factors that resulted in the choice of this coastal area was its high biodiversity value; a lower level of post- tsunami rehabilitation investment than in other tsunami affected areas of Thailand; the presence of a good network of community-based organizations (CBOs) involved in natural resource management. In addition, the area is also covered by a network of protected areas that includes a UNESCO Biosphere Reserve, a RAMSAR site, national parks, wildlife sanctuaries, forest reserves, and community managed areas.

This paper summarizes the learning gained midway through the implementation of this project. Specifically, this paper aims to capture the learning on how the "reef to ridge" approach has been applied to coastal rehabilitation and management using a bottom up process. Based on the ecosystem approach, a suite of stakeholders ranging from CBOs, NGO's and government have been involved in identifying interventions that would be implemented through investment via a set of small grants. The paper also highlights how capacity building for stakeholders can be built into the assessment approach, and some of the major challenges in implementing ecosystem management where political boundaries do not match those of the ecosystems.

Key words: tsunami, lessons learned, reef to ridge approach, ecosystem rehabilitation

Local Knowledge for Mangrove Management in Thailand

By

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ABSTRACT

Most local knowledge of mangrove management is tacit knowledge, carried in people's minds, or shared collectively among a group or community members. This study, initiated by the Department of Marine and Coastal Resources (DMCR), Government of Thailand, and conducted by the Thailand Environment Institute, sought to compile, analyze and categorize such knowledge, aiming to create a systematic record which can be disseminated and put to practical use. The study was based on eight participatory case studies of coastal communities in different socio-economic and geographic contexts in Thailand.

The study found that local knowledge of mangrove management is increasingly absorbing and blending with outside knowledge. Some topics are restricted to certain communities; others are common to several communities, but may differ in detail from community to community. Broadly speaking, local knowledge of mangroves, including knowledge, beliefs and practices, can be divided into four interrelated categories: 1) knowledge of mangrove ecosystems; 2) knowledge of mangrove rehabilitation and conservation; 3) knowledge of mangrove utilization; and 4) knowledge of forming community groups and other organizational aspects related to mangrove management.

The daily use of local knowledge plays an important part in adapting it to changing conditions and ensures its persistence. Developing the capacity of community organizations to manage mangroves is another important mechanism for passing on local knowledge. To support the use of local knowledge, government agencies and other concerned bodies should work together to promote community mangrove management, develop local sources of knowledge, integrate local knowledge into the education and research systems, and develop knowledge management systems.

Key words: mangrove management, local knowledge, community participation, knowledge management

SESSION II Applying Local and Scientific Knowledge to Better Support Mangrove Ecosystem Management

This Session is based on the conclusions and recommendations derived from the two parallel workshops held Day 1, 22 November 1) "***Using Local Knowledge to Better Support Mangrove Ecosystem Management*** – experiences & opportunities in Thailand" (Organised by TEI & GSEI – workshop language: Thai), and 2) ***Using Scientific Knowledge to better support Mangrove Ecosystem Management*** – experiences & opportunities from the Asian Region" (Organised by MFF – workshop language: English).

Written reports from the five working groups will be available on the morning of Day 2.

SESSION III Knowledge-based Management - Case Study of the Ranong Mangrove Ecosystem

Mangrove Ecosystem Research in Ranong: History and Research Achievements

Don Macintosh

Coordinator, Mangroves for the Future initiative

ABSTRACT

The coastal province of Ranong features the largest single mangrove ecosystem in Thailand. Here th Kra Buri River Delta forms the border between Thailand and Myanmar. This area receives prolonged rainfall, and more than 4 metres tidal range, creating ideal conditions for mangroves. The Ranong area and its mangrove ecosystem has been a focus for Thai and international research for more than 25 years. The first Mangrove Research Centre in Thailand was established in Ranong in 1981, under the Royal Forest Department (RFD).

In 1982, a first international long-term research cooperation, by a Thai-Japanese Joint Research Project Team investigated mangrove productivity and forest development. Thai-Japanese cooperation continued for many years, including the use of Ranong as a case study site for assessing the impact of sea level rise on mangrove forests (1998-2000). Two regional mangrove projects supported by UNDP and UNESCO represented the first regional effort to create a group of well-trained mangrove scientists in Asia to increase awareness about the values of mangroves throughout the region. Both UNDP and UNESCO projects used Ranong as a base for mangrove training and research activities. National Mangrove Committees were also formed in each participating country, and some of these committees are still in existence today.

During the 1990s international research collaboration in Ranong continued with the support of Japan, Denmark and the European Union, and the RFD. These various research achievements, which are detailed in the paper, created a platform of knowledge.

The Ranong Biosphere Reserve, have continued to be used for research and education by both Thai and international mangrove experts, universities and schools, such as students from Thailand, Bangladesh and Vietnam studying at the Asian Institute of Technology (AIT, Bangkok), along with many Danish PhD research students.

The December, 2004 tsunami struck Ranong, causing most damage in the south of the province. Several tsunami recovery projects were launched by the Government of Thailand and Thai NGOs, and with international assistance from USAID, BMZ (Germany), UNDP and many other organizations. In particular, the importance of achieving ecologically and socio-economically sound coastal ecosystem rehabilitation was recognized after the tsunami. This situation created a new impetus to combine the existing in-depth scientific knowledge of how the Ranong mangrove ecosystem functions, with local knowledge and a better understanding of the socio-economic conditions that are also required to support sustainable ecosystem rehabilitation.

Key words: mangrove research, biosphere reserves, mangrove ecosystem rehabilitation

Forest ecology and management

Clough, B.[1], Aksornkoae, S.[2] and Havanond, S.[3]

ABSTRACT

Mangrove forest ecology has been widely studied over the past thirty years, including the Ranong mangroves, where a number of studies were conducted during the 1980s on the floristics, ecology, growth and productivity of the mangrove forest, particularly in Klong Ngao, which are summarized in the UNDP/UNESCO project report of 1991. It was found that, despite the high rainfall experienced in Ranong, the mangrove soil salinity remained high (35-45 ppt), even in the wet season. The high soil salinity could explain why the measured net primary productivity, stem incremental growth and photosysnthetic rate of the mangrove trees in Ranong were somewhat lower than equivalent values reported for other mangroves in the Asia Pacific Region.

At that time the Ranong mangroves were also under severe pressure due to previous disturbances, including tin-mining, and especially logging of *Rhizophora* trees for charcoal production. The preferred species for charcoal, *R. apiculata*, did not regenerate well, partly due to a high abortion rate among the flower buds and competition from other species of lower value. Because much of the Ranong mangrove forest grows on a high levee reached only by the highest tides, non timber plant species like the creeper *Derris* and the mangrove fern *Achrostichum* were able to flourish, making conditions very difficult for natural regeneration of mangrove trees.

From 2002, all mangrove charcoal concessions in Ranong were terminated and the mangroves received conservation status. A number of projects also started to rehabilitate the forest by planting *Rhizophora* seedlings, including planting along the banks of Ranong's numerous mangrove channels and creeks. This recovery and change in forest ecology and status regarding forest conservation management opens up new opportunities for mangrove research and monitoring. In particular, in the aftermath of the December, 2004 tsunami, it will be valuable to study the relationship between the maximum size of individual trees, stand density, and species composition, in the Ranong mangroves in relation to the effectiveness of the mangrove forest to provide coastal protection.

Key words: mangrove ecology, replanting of mangroves, mangrove management, *Rhizophora*

Mangrove Animal-Plant Interactions and their Application to Management

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Interactions between animals and plants contribute significantly to the value of mangroves and management. Mangrove plants are the foundation of the mangrove and provide various habitats for the fauna. Together the two components shape a unique ecosystem and form the basis of all other mangrove returns. As a transition zone between terrestrial and marine life forms the mangrove offers strangely adapted species and interactions seen nowhere else, advocating for ecotourism and ecological learning. Within the system herbivores negatively affect yields of plant derived products. Insects, crabs and monkeys feeding on foliage and developing reproductive tissue lead to losses in primary production, undesirable tree branching (affecting timber value) and reduced production of propagules. Wood boring beetles may attack stored wood and wood constructions in the mangrove and root boring isopods can damage mangrove roots. Furthermore, seedling establishment may be hindered by crab and monkey predation, adding costs to replanting programs. Compensating for the negative effects, crabs increase mangrove value by retaining nutrients, increasing nutrient recycling, fuelling fishery stocks and aerating the soil to the benefit of mangrove growth. Also, predatory insects (e.g. ants) may positively affect mangrove performance by controlling pest species.

Managing mangroves to maintain and promoting their diversity and value may provide a number of benefits. Mangrove plants and animals contribute to biodiversity and to research. It may also reduce insect pest damage via the proliferation of predatory biological control agents. Further measures against herbivores include the propagation of beneficial weaver ants, insect trapping and insecticide spraying. Replanting success may be secured by matching prevalent crab, monkey, gastropod and isopod populations with unpalatable species of propagules, or alternatively, by nursing propagules before planting. Since beetle borers peak during the rainy season, wood destruction may be reduced by limiting wood extraction and construction to the dry season. Lastly, the bioengineering services of sesarmid crabs should be preserved by avoiding over-fishing of this ecological important taxon.

Key words: animal-plant interactions, mangrove eco-tourism, bio-engineering

Mangrove Fauna and its Utilization in Fisheries & Aquaculture

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ABSTRACT

The Ranong mangrove ecosystem supports a diverse and abundant mangrove fauna. Many terrestrial and marine animals have been recorded as either mangrove resident species or visiting (mangrove-associated) species. There is a rich mangrove intertidal fauna, characterized by brachyuran crabs, mud lobsters and molluscs that play a significant role in detritus production and energy flow in the mangrove ecosystem. The Ranong mangroves are important nursery and feeding grounds for juvenile fish and crustaceans of many commercial species that support local fisheries and aquaculture production. Large amounts of food in the form of mangrove detritus and zooplankton, including mangrove crab larvae, are available to aquatic consumer species in the extensive system of mangrove fringed creeks along the coastline of Ranong. The mud crab (mainly *Scylla olivacea*) is particularly abundant as the mainstay of a traditional crab fishery in Ranong, as well as several forms of aquaculture including soft-shell crab production. Another important traditional mangrove fishery is based on the shrimp *Acetes*, which is netted from shallow water in front of the mangroves, then processed into shrimp paste (local name “kapi”).

This paper reviews the main studies that have been conducted on the mangrove intertidal and aquatic fauna in Ranong, especially in Klong Ngao and other parts of the Ranong Biosphere Reserve. The species diversity, distribution and life-cycles of some of the key species have been studied, as well as the many species of fish, crustaceans and molluscs that are utilized in Ranong by the local communities. Utilization of the mangrove-associated fauna ranges from subsistence hand-collecting, to commercial fishing and aquaculture.

The influence of past mangrove management practices in Ranong, including the effects of mangrove rehabilitation, on biodiversity (particular of crustaceans and molluscs), have also been researched. These and other studies provide valuable information to support the sustainable management of some of the important fisheries and aquaculture species associated with the Ranong mangroves.

Key words: mangrove utilization, fisheries, aquaculture, mangrove management, food webs

The Ranong Biosphere Reserve: History, Objectives and Management Experiences

By

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ABSTRACT

The Man and the Biosphere programme and the associated World Network of Biosphere Reserves were initiated at a United Nations conference in 1968. Since then, the programme has evolved considerably but has retained its key focus on research, management and education relating to the interaction between humankind and nature. The Ranong Biosphere Reserve was nominated in 1997, and was one of the first biosphere reserve nominations following the adoption of the Seville Strategy and Statutory Framework, which outline in detail the role and spatial organization of modern biosphere reserves. The Ranong Biosphere Reserve is home to one of the region's most extensive mangrove forests, as well as a number of other important coastal ecosystem types. The reserve is managed by the Ranong Mangrove Forest Research Center, which is active in conservation, research, rehabilitation and education activities. In order for ensure the successful implementation and further development of the Ranong Biosphere Reserve, a number of recommendations for management action at the local and national level are made.

Key words: Biosphere reserves, spatial organization, mangroves

Floral Biology and Pollination Ecology of *Rhizophora mucronata* in Gulf of Kachchh, Gujarat, India

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ABSTRACT

Rhizophora mucronata is a viviparous mangrove species of the Family Rhizophoraceae. The species is reported to be wind pollinated. However, the floral biology and pollination ecology of the species has not been studied in detail in Gulf of Kachchh. Therefore, the present work has been has involved detailed field and laboratory investigations regarding the flower biology and pollination ecology of *R. mucronata*. The study has been a part of a research project sponsored by the Ministry of Environment and Forest, Government of India. The objective of the research was to document the floral biology and pollination ecology of *R. mucronata* by examining the temporal relation between the anthesis, anther dehiscence, stigma receptivity and pollinator visitation pattern. Further, the chemical nature of floral exudate was also examined. The work has been carried out at two islands in Gulf of Kachchh viz. Pirotan and Bhens Bid Islands and one coast site at Sikka. The observations were made during the flowering season of the candidate species on the reproductively matured trees. The visitation pattern of floral visitors was observed at different levels to classify them into floral visitors and pollinators. The chemical nature of the floral exudate was examined by the chromatography method.

The flowers of *R. mucronata* have been clearly found to exhibit protandry. Further, the flower is inverted and exhibits herkogamy. These features facilitate cross pollination increasing the possibilities of cross breeding over self breeding. The corona of petals was found to regulate the pollen dispersal for a longer period after anther dehiscence. Further, the observed asynchrony between the anther dehiscence and stigma receptivity also appear to be promoting cross fertilization. Wind and water appear to be major pollinators. However, some insects have also been found to definitely play the role of pollinators. The floral exudate contains sugar indicating it to be the nectar which is also strongly suggestive that floral visitors also play a key role as pollinators.

Key words: pollination, mangrove ecology, floral biology, Rhizophoraceae, protandry

The potential for development of eco-tourism as a means to support mangrove conservation efforts

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Abstract

Nature-based tourism has been proposed as a means to achieve sustainable management of common property mangrove forests. Several models exist, such as community based eco-tourism (CBET), community-based tourism (CBT), private sector involvement in CBT. This paper reviews the characteristics of those tourism activities and their potential for attracting conventional tourists. Based on a literature review, this paper examines the successes and failures of the current projects, and constraints and opportunities to promote mangrove-based ecotourism in Asia.

Several case studies from Thailand suggests that CBET is an effective mechanism for enhancing the local knowledge on mangrove ecology and its conservation process, but there is no single model that can be applied to all areas. The offerings of CBET in Thailand include services such as home-stays (include learn to speak Thai and Thai cooking), guided tours (board walks, boat tours), cultural performances and products (local drama and cultural site visits), wildlife (fireflies, birds, monkeys etc.). The community organizations or private sector tour operators reserves a certain percentage of income for financing the conservation activities. Some government agencies such as local offices of Department of Coastal Marine Resources (DMCR) (e.g. the DMCR local office in Welu wetland, Chanthaburi Province) are eager to develop ecotourism but there are significant barriers.

The barriers include limited access to external tourism resources, lack of information, training in ecotourism, inexperienced guides, official control, regulations and financing mechanisms, and experience in tourism business and marketing. The results showed that in some cases, it is crucial for the communities to seek outside help for the development of effective ecotourism strategies, and to provide initial support and leadership e.g. Coastal Habitat and Resource Management (CHARM) project assisted ecotourism activities in Leeled sub-district near Ban Don Bay in the Surrathani province.

The paper analysed the issues, problems and constraints, and concluded that four pillars suggested for successful co-management of fisheries by FAO (2005) are applicable to mangrove-based ecotourism development i.e. (1) Development of an enabling policy framework; (2) Participation and empowerment of communities (capacity building); (3) Effective linkage between institutions; and (4) A resource worth managing, to supplement the conservation effort of the state agencies. The development of attractive mangrove-based ecotourism packages focusing on its ecological, medicinal, and biodiversity values is recommended. These packages should be promoted via country-based wholesalers and ground handlers to both eco and conventional tourists. Building local capacity to manage ecotourism business is also recommended.

Key words: capacity building, sustainable finance mechanisms, eco-tourism, mangroves

Approaches for Embedding Stakeholder Realities in Coastal Planning Processes: Cases from Mangrove Restoration and Rehabilitation in South East Asia

By Osbeck, M and Powell, N., SEI

Mangroves are situated within contexts in which the historical legacy is characterized by conflicting interests in terms of the management, governance and use of coastal resources. They often serve as arenas for discord but also in some cases reconciliation. The MANGROVE project serves as a platform providing insights, tools and approaches in these contexts as a means for fostering reconciliation. In the series of stakeholder interactions in Tien Hai, Vietnam, Nakhon Sri Thamarat, Thailand and Mahakham Delta, Indonesia platforms now exist to critically reflect upon the management, governance and use of coastal resources from both the stakeholder and the researcher's perspective.

The results in this paper suggests that the legacy of researcher interaction has focused on defining Mangroves as a hard system and thereby focusing primarily upon situations in which the normative assumption, imposed by policy, is that mangroves should be restored and re-planted. Underlying this research approach has been the bio-monitoring of the ecological services derived from the change in bio-physical status of Mangroves. MANGROVE added an additional prespective on inter-connections with rural livelihoods. It supported the facilitation of stakeholder interactions in the three country cases. The paper examines the underlying conflicts of interest in restoration and replanting of mangroves. Further insights from institutional and policy analysis suggest a trend in Vietnam and Thailand where the promotion of mangrove replanting and restoration is being intensified.

Based on the outcomes of stakeholder interactions, a pragmatic course for MANGROVE would be to adopt a strategic action planning process where the restoration and replanting activity could, be shaped and managed through the reconciliation of the multiple interests in the system. Reconciliation at a local scale would include planning issues such as site selection for replanting and restoration, species composition of restored/replanted forests, user rights, land rights, tenure regulations and management regimes. The reconciliation at an institutional and policy scale would include for example, that the appropriate mechanisms were in place to ensure that user rights were upheld and management regimes were feasible and efficient.

Preliminary recommendations for the selected sites would be to proceed with stakeholder orientated research approach that facilitates interactions to support the identification of appropriate sites and species composition for replanting/restoration. This identification should be undertaken in such a way that it is outcome of a reconciliation of (1) the environmental services promoted by the researchers (2) the livelihood interests promoted by both local people and different levels of governance and (3) the reduction of climate change intensified hazards promoted nationally.

Key words: reconciliation, mangrove replanting, stakeholder participation, mangrove restoration, environmental services

Governance in a Spatial Context: analyzing and mapping regulatory regimes governing natural resources in Kuraburi, Phang Nga, Thailand

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ABSTRACT

The coastal stretch between Ranong and Phang Nga provinces on Thailand's Andaman coast is a priority area for investing in coastal rehabilitation and management using a participatory approach under the Mangrove for the Future (MFF) Initiative. Under MFF, and supported by the German Federal Ministry of Economic Cooperation and Development (BMZ), IUCN is implementing a project on Coastal Ecosystems Conservation and Rehabilitation in Sri Lanka and Thailand (BMZ Project). The Thai National Coordinating Body (NCB) and IUCN Thailand is developing a management framework to identify funding investments under the BMZ Project that promote participatory effective coastal rehabilitation and management. The governance assessments that supported the development of this framework identified the critical need to review, analyze and disseminate information on the numerous environmental laws and institutional arrangements to local stakeholders.

The sub-project *Governance in a Spatial Context* aims to identify, analyze and map the existing jurisdictions and application of environmental law in relation to key environmental issues in Kuraburi, Phang Nga, Thailand. The aim is to improve local stakeholder awareness and understanding of the laws and institutional arrangements and provide access to further information to promote effective investment in coastal rehabilitation and management.

The principal sub-project output is a booklet targeted at local stakeholders that outlines the key environmental issues in Kuraburi, explains the formal laws, informal rules and institutional arrangements that apply and includes GIS maps of the jurisdictions of the various agencies, which illustrate where conflicts can arise at the overlap of jurisdictions and agencies. Importantly, the maps allow local stakeholders to easily understand the application of the laws to their communities. The sub-Project's simple methodology may be easily integrated into planning to ensure effective investment in ecosystem rehabilitation and management. It also contributes to improved local stakeholder awareness and understanding of governance and supports future initiatives to improve governance for spatial planning and natural resource management.

This paper discusses the sub-project scope, methodology, outputs, and findings to date, which focus on the content and consistency of the formal laws and informal rules that apply to environmental and natural resource management issues in Kuraburi.

Key words: governance, coastal resources, spatial planning, reef to ridge approach, stakeholder awareness

Mangrove rehabilitation through community involvement in post-tsunami Maldives, Thailand and India: an example of South-South cooperation

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ABSTRACT
The December 2004 tsunami tragically highlighted the role of coastal ecosystems, particularly mangroves in protecting population and assets from destructive natural hazards. Recognizing this, the Green Coast (GC) Initiative, led by Wetlands International (WI) focused on ecosystem-based livelihood reconstruction which led to the establishment of a south-south cooperation model. This mode facilitates rapid sharing of expertise, knowledgebase, local capacities and conservation-development approaches that emerged in the post-tsunami context.

In India, the implementation focused on ecosystem-based livelihood restoration in tsunami affected areas through assessments, policy and communication and support to community based livelihood restoration initiatives. The project involved 24,000 households in 164 villages, and restored 58.5 ha of mangroves; 521 ha of agricultural lands; and diversification of livelihoods through establishment of 151 eco-enterprises. The initiative also developed a rich knowledgebase on coastal ecosystems and livelihood linkages to support restoration, planning and decision-making.

In the Maldives, restoration focused on Hurra, one of the 1190 coral islands located south of the North Male atoll. The local communities with the support of the initiative were enabled to clear mangrove areas of debris; conduct vegetation mapping and zonation; develop nursery and rehabilitation through plantation. A community education and awareness infrastructure was also developed through establishment of an environment education kiosk, local language publications, capacity building and training.

Implementation in Thailand focused on Pattani Bay, a wetland of international importance. Together with local communities in three villages, severely degraded sites of former mangroves along the bay were restored, adopting an approach of combined environmental rehabilitation and socio-economic improvements, placing greater emphasis on the process than on outputs and facilitating initiatives of the community rather than ideas of the project team. The project was able to support several income-generating activities of the communities, successfully replanted 60 ha of community forest with a community-based management plan.

This paper discusses some of the challenges faced in during the south-south cooperation, such as, partnership development, conservation effectiveness monitoring and evaluation, and linkages with policy and decision making at multiple levels. The lessons learned are applicable to other regional ecosystem conservation initiatives in the Indian Ocean.

Key words: community-based management, south-south cooperation, post-tsunami reconstruction, mangrove planting

Rehabilitation of Cyclone Nargis Affected Areas and Prevention from Future Natural Disasters

By
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ABSTRACT

The Ayeyawady Delta covers an area of 33,670 km^2 and is composed of a large network of creeks, streams and rivers. Due to its low altitude (maximum 3 meter above sea level), this region is frequently flooded by tides and rains during the rainy seasons The tidal action in the Delta region together with various other conditions constitutes an ideal ecological environment for mangrove vegetation. The Ayeyawady Delta alone once encompassed about 300,000 ha of mangrove forest in 1980. By 2002 this had been reduced by almost 50 % to around 150, 000 ha.

A five-year Integrated Mangrove Rehabilitation and Management project in the Ayeyawady Delta in cooperation with Japan International Cooperation Agency (JICA) was launched in April 2007. The project targeted local people's socio-economic development and rehabilitation of mangrove forests. Major activities of the project were construction of nurseries and extension canters, community forestry, and income generating activities for local people through agro-forestry and aqua-agro-forestry. The implemented activities in the first year were devastated by Cyclone Nargis including the selected villages for community Forestry.

After Nargis, the Project launched a Quick Damage Survey with the objectives of assessing the damages on project activities and the environmental and socio-economic impacts of project area. The impact assessment survey showed severe damaged to; mangrove ecosystems, forest floor vegetation, individual species, soil and landscape, as well as on the socio-economic condition of the project area as a whole.

The paper concludes that mangrove forests in the cyclone affected areas will have to be rehabilitated to obtain both tangible and intangible benefits from the mangroves, protect human lives and livelihoods, provide basic needs of local people, and to achieve socio-economic development of the region. Each Township, will also need short-medium and long-term plans. Restoration and international projects should include; designation of prevention zones, establishment of private plantations, community forestry, tree planting along the river banks with people participation, windbreaks, reviving the livelihoods of local population, awareness raising and extension, and cooperation with local NGOs**.**

Key words: cyclone, ecosystem restoration, awareness raising, community forestry, prevention zones

SESSION IV Review and Contributed papers for working groups

Post-Tsunami Rehabilitation and Community Development Experiences in Thailand

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Outline:

- Impact of the 2004 tsunami on mangroves and coastal communities
- Assistance provided to rehabilitate mangroves; other coastal environmental restoration and improvement activities after the tsunami
- Assistance provided to restore/improve the livelihoods of coastal communities and strengthen community participation in natural resources management: e.g.
    - Community organization and networking
    - Training and awareness raising
    - Technical and financial assistance
    - Promotion of gender equality, youth groups, etc.
- Case study of a community in Thailand which has benefited from support since the tsunami, e.g. via stronger organization, leadership, empowerment, but explaining remaining difficulties and constraints in relation to fulfilling the articles of the new constitution regarding community participation in management.

Mangroves for the Future
INVESTING IN COASTAL ECOSYSTEMS

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