Management of Natural Resources
in the Coastal Zone of Soc Trang Province

Protection and sustainable use of coastal wetlands through co-management and mangrove rehabilitation with emphasis on resilience to climate change

Klaus Schmitt

As of 1 January 2011:
giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

gtz

COOPERATION
FEDERAL REPUBLIC OF GERMANY
SOCIALIST REPUBLIC OF VIETNAM

KIỂM LÂM

Soc Trang Province
People's Committee

Published by
Deutsche Gesellschaft für
Technische Zusammenarbeit (GTZ) GmbH
Management of Natural Resources in the Coastal Zone
of Soc Trang Province

Author
Klaus Schmitt

Cover photo
R. Lloyd 2008

Protection and sustainable use of coastal wetlands through co-management and mangrove rehabilitation with emphasis on resilience to climate change

Klaus Schmitt

November 2009

About GTZ

As an international cooperation enterprise for sustainable development with worldwide operations, the federally owned Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH supports the German Government in achieving its development-policy objectives. It provides viable, forward looking solutions for political, economic, ecological and social development in a globalised world. Working under difficult conditions, GTZ promotes complex reforms and change processes. Its corporate objective is to improve people's living conditions on a sustainable basis.

The German Federal Ministry for Economic Cooperation and Development (BMZ) is its major client. The company also operates on behalf of other German ministries, the governments of other countries and international clients, such as the European Commission, the United Nations and the World Bank, as well as on behalf of private enterprises. GTZ works on a public-benefit basis. All surpluses generated are channelled back into its own international cooperation projects for sustainable development.

GTZ has been working with its partners in Viet Nam since 1993 and promotes sustainable development in the three priority areas of Sustainable Economic Development, Management of Natural Resources including Water Supply, Wastewater and Solid Waste Management and Health. Additional projects are situated within the cross-cutting sector Poverty Reduction, implemented on behalf of other German ministries or realised by GTZ International Services. The Centre for International Migration and Development (CIM), a joint operation of GTZ and the International Placement Services (ZAV) of the German Federal Employment Agency (BA) currently has 29 integrated experts working as professionals for partner institutions in Viet Nam.

Table of contents

List of figures and tables

Acronyms

CZM	Coastal Zone Management Project
FIPI	Sub-Institute of Forest Inventory and Planning
GPS	Global Positioning System
GTZ	German Technical Cooperation, Deutsche Gesellschaft für Technische Zusammenarbeit
ICAM	Integrated Coastal Area Management
MARD	Ministry of Agriculture and Rural Development
PMU	Project Management Unit
USD	US Dollar
VND	Viet Nam Dong

1. Introduction and background

The project “Management of Natural Resources in the Coastal Zone of Soc Trang Province” was initiated by the Forest Protection Sub-department of Soc Trang Province to provide pilot solutions to solve the conflict between economic development and sustainable management of natural resources in the coastal zone of Soc Trang Province.

The Mekong Delta, although relatively small in size compared with the entire country, plays an important role as “rice bowl” for the whole of Vietnam. Rapid expansion of shrimp farming in the Mekong Delta has contributed to economic growth and poverty reduction but has been accompanied by rising concerns over environmental and social impacts.

The lack of an integrated approach to sustainable management, utilisation and protection of the coastal zone and economic interests in shrimp farming have led to the unsustainable use of natural resources in the coastal zone, threatening the protection function of the mangrove forest belt and reducing income for local communities.

The coastal zone is not only at risk from the negative ecological consequences of shrimp farming and the destruction of the protection function of the mangrove forests, it will also be affected by the impacts of climate change (global warming). Climate change will cause increased intensity and frequency of storms, floods, saline intrusion, higher rainfall during the rainy season, droughts and rising sea levels.

The GTZ (German Technical Cooperation, Deutsche Gesellschaft für Technische Zusammenarbeit) project “Management of Natural Resources in the Coastal Zone of Soc Trang Province” aims **to protect and sustainably use the coastal wetlands for the benefit of the local population**.

In order to take the impacts of climate change into consideration, the project must therefore also address the question **how can management of natural resources contribute to the protection of the coastal zone from the negative impacts of climate change**? To answer this question one must first look at the ecosystem services provided by mangrove forests and the specific situation of the coastal zone in Soc Trang Province.

2. Ecosystem services provided by mangroves

Mangroves provide a wide range of ecosystem services (benefits people obtain from ecosystems). The Millennium Ecosystem Assessment (2005) groups these services under four categories:

- Regulating Services: protection of beaches and coastlines from storm surges, waves and floods; reduction of beach and soil erosion; stabilisation of land by trapping sediments; water quality maintenance; sequestration of carbon dioxide; and climate regulation.
- Provisioning Services: subsistence and commercial fisheries (food, habitat and nursery ground for aquatic life); aquaculture; honey; fuel-wood; building materials (timber); and traditional medicines.
- Cultural Services: tourism and recreation; and spiritual appreciation.
- Supporting Services: cycling of nutrients; and habitats for species.

In Soc Trang Province, mangrove forests form a narrow belt which protects the coast and the sea dyke from storm surges, waves, floods and which reduces erosion. Mangrove forests also provide food, shelter and nursery grounds for a wide range of aquatic life.

The effect of mangrove coastline protection has been demonstrated by Mazda *et al.* (1997) who showed that a 1.5 km wide belt of 6 year old mangroves reduced the height (and energy density) of incoming waves from 1.0 m to 5 cm (at the coastline/dyke). In areas without mangroves the waves were reduced to 75 cm in height, due to bottom friction. Wave height is reduced by mangroves due to the much higher drag force of the dense network of trunks, branches and above ground roots as compared to plain soil.

This protection function also has clear financial benefits. 1.1 Million USD invested in mangrove rehabilitation in northern Vietnam saved 7.3 Million USD annually for dyke maintenance (Brown *et al.* 2006).

The ecosystem services provided by mangroves have implications on food security and income. Up to 80% of global fish catches are directly or indirectly dependant on mangroves (O’Sullivan 2005) which provide food, shelter and nursery grounds. A poster produced by the GTZ-Philippine Development Cooperation (Mangroves: Ecological & Economic Benefits) states that one hectare of mangroves

produces up to 3.6 tonnes[1] of litter fall per year which provides food for marine life; and that with every hectare of mangrove destroyed 1.08 tonnes of fish harvest are lost per year.

The importance of mangroves for fisheries has further been highlighted through a recent study by Aburto-Oropeza *et al.* (2008) which states "... in the Gulf of California, fisheries landings are positively related to the local abundance of mangroves and, in particular, to the productive area in the mangrove–water fringe that is used as nursery and/or feeding grounds by many commercial species. Mangrove-related fish and crab species account for 32% of the small-scale fisheries landings in the region. The annual economic median value of these fisheries is US $37,500 per hectare of mangrove fringe."

3. Integrated coastal area management (ICAM)

Mangroves form a narrow belt along most of the coastline of Soc Trang Province. This belt cannot be managed effectively through a sectoral approach with only one sub-department looking at the mangroves in isolation from what happens on either side of the mangrove belt (i.e. the mud flats on the sea side and the dyke, shrimp farms and agricultural areas on the land side). It is also essential to consider what happens along the entire coastline of the province when planning and carrying out interventions and not just looking at one spot along the coast in isolation.

Along the coastline of Soc Trang Province a dynamic process of accretion and erosion is created by the flow regime of the Mekong River, the tidal regime of the South China Sea and by coastal long-shore currents driven by prevailing monsoon winds. In some areas loss of land, due to erosion, of up to 40 m per year has been recorded, while in other areas land created through accretion can reach up to 45 m per year (Sub-FIPI 2009a). Examples of accretion and erosion are illustrated in figure 1.

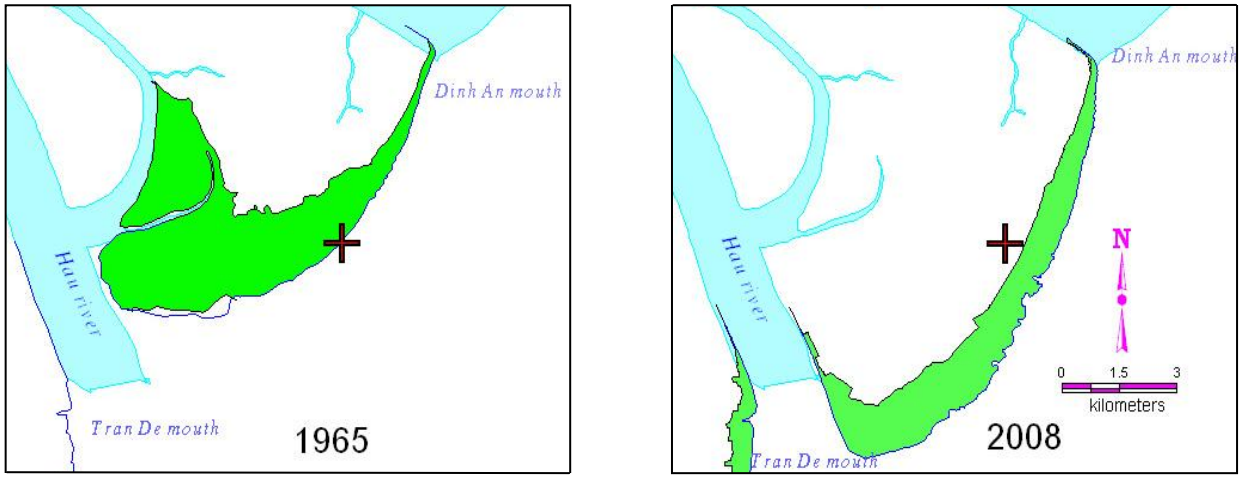

Fig.1 Examples of accretion and erosion along the coastline of Soc Trang Province.

The two maps above show accretion in Cu Lao Dung island between 1965 and 2008 of about 20 km^2. The green areas show the extent of the mangrove forests. The cross indicates the same position on both maps.

The Google Earth satellite image on the left shows the coastline in Vinh Tan Commune in April 2007. The white line shows the coastline 17 months later based on GPS recordings. The erosion of up to 30 metres is clearly visible.

[1] Values of up to 18 tonnes per hectare per year have been recorded from Tanzania (Shunula and Whittick 1999).

Mangrove management must be part of an integrated coastal area management (ICAM). This requires institutionalised co-ordination and cooperation of local authorities from all levels, and participation of all affected stakeholders. ICAM must include integrating adaptation measures to climate change. To achieve this the project is applying the ecosystem approach, a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. The ecosystem approach is the primary framework for action under the Convention on Biological Diversity (Shepherd 2004).

ICAM also requires risk management over space and time. This can be achieved by looking at the coastal zone as a whole - and not for example only at isolated erosion sites - and by considering different options depending on site specific conditions. Different options means that there is not just one solution which can be applied in all settings along the entire coastline, and that it is not always the best option to maintain the status quo at all costs. It means considering site specific interventions such as

- hold the line: shoreline protection using sea dykes combined with mangrove protection;
- managed realignment: allow land to erode and flood based on natural processes of erosion and accretion and build the sea dyke further inland; and
- limited intervention: adjustments such as raising coastal land and buildings, or to protect land through the encouragement of natural succession as part of the dynamic coastal accretion process.

In order to protect, effectively manage and sustainably use the coastal wetlands for the benefit of the local population **as part of an ICAM strategy, the project pilots mangrove rehabilitation and management with emphasis on resilience to climate change**.

Before piloting approaches to effective mangrove management and protection it is essential to analyse how this was done in the past and whether it has been successful or not. The analysis must look for the reasons for success or failure, and based on this, new approaches to mangrove management can be developed.

The testing of new approaches to effective mangrove management must also include the application of risk spreading strategies due to uncertainties when dealing with potential negative impacts of climate change. The project is therefore piloting both, new approaches to mangrove rehabilitation/planting and to effective mangrove management and protection. These key activities are supported by capacity building and environmental awareness raising for staff of local authorities and people living in the coastal zone.

4. Effective mangrove management

4.1 Testing new approaches to mangrove rehabilitation/planting

Mangrove planting has been carried out along the coastal zone of Soc Trang Province since the 1980s but planting success has varied significantly. The project, therefore, initiated a detailed survey by the Southern Sub-Institute of Forest Inventory and Planning (FIPI) from Ho Chi Minh City to analyse the reasons for success and failure of mangrove plantings carried out in the past. Based on the lessons learnt from past experience, national and international best practice examples, FIPI produced a detailed report about the history of the mangrove forest of Soc Trang from 1965 to 2008 and a mangrove management tool box consisting of 3 parts: Mangrove Nursery, Mangrove Planting and Management, and Monitoring.

Based on lessons learnt the selection of species for the different sites along the coast of Soc Trang Province and the best planting times are described in detail in the tool box. In addition to traditional planting techniques, the tool box covers testing of new approaches for mangrove planting which mimic nature, i.e. imitate the successful regeneration of nature. It also includes techniques which can be used to transform existing even-aged plantations into more diverse forests. These techniques aim to create diverse coastal forests in terms of species composition as well as horizontal and vertical structure and thus increase their resilience to the negative effects of climate change.

When testing new techniques the project follows the precautionary principle[2] thereby addressing the fact that there is no scientific proof of the successfulness of the new approaches to mangrove planting. In

[2] The precautionary principle in the context of environmental protection is about the management of scientific risk. It is a component of the concept of ecologically sustainable development and has been defined in Principle 15 of the Rio Declaration. “Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.” (United Nations Conference on Environment and Development, Rio, 1992).

addition, the project applies risk spreading strategies to address uncertainties related to the impacts of climate change which means not to depend on one solution only. The project is therefore using a number of different approaches and will monitor their success of failure.

Details of the new approaches to mangrove rehabilitation/planting are included in the mangrove management tool box (Sub FIPI 2009b).

4.2 Testing new approaches to mangrove management

In order to protect and effectively manage mangrove forests the project again started with an analysis of success and failure of mangrove management approaches in the past.

In 1992 and 1993, the government launched decisions 327/CT and 264/CT about incentives of forest rehabilitation on fallow land and new accretion land. In 1998, the 661 Programme was launched. Under these policies, forestlands along the coast can be allocated to farmers and protection contracts made with payments of 50,000 to 100,000 VND per hectare per year. In Soc Trang Province, forest protection contracts were made between 2000 and 2007 with individual households and with local social associations (An Thanh Nam commune); the annual payment was 50,000 VND per hectare.

Assessments by Joffre and Luu (2007) and Sub-FIPI (2009a) concluded that individual household based forest protection contracts do not work in the narrow mangrove belt of Soc Trang Province. This form of mangrove management has not only been unsuccessful it also has been financially unsustainable.

The project therefore introduced co-management as a new form of mangrove management. Co-management is based on contracts made with groups of people rather than individual households. Co-management has been used successfully for management of natural resources worldwide (Borrini-Feyerabend 2004).

4.2.1 Co-management

Co-management is based upon negotiation, joint decision-making, a degree of power-sharing and fair distribution of benefits among all stakeholders. The different forms of control and power-sharing in co-management compared with state and community management are shown in table 1.

Table 1: Schematic representation of the co-management concept

State management	Co-management		Community management
Control by Government Agency	Shared control (government agency and stakeholders)		Community control
	Negotiating specific agreements	Sharing authority and responsibility in a formal way	

Co-management in the context of natural resource management is a partnership arrangement in which a resource user group gets the right to use natural resources on a defined area of state owned land along with the responsibility to sustainably manage the resources (including protection).

The resource users and the government (and other stakeholders) **share the responsibility and authority for the management of a given area** or set of natural resources. Resource users and local authorities jointly negotiate a **formal agreement on their respective roles, responsibilities and rights** in management.

The aim is to provide local communities with **benefits** through legal and secured access to natural resources in protection forests and at the same time to ensure **sustainable use** of the resources and **effective protection** of the mangrove forests.

The co-management process begins with a number of surveys, followed by a 4 step process, during which 4 principles must be applied.

The 4 steps are:
- consultation and organisation
- negotiation and agreement
- implementation
- monitoring and evaluation

The 4 principles are:
- ICAM
- participation
- zonation
- monitoring

Benefits of co-management, which transfers (resource-use) rights and responsibilities to local people, include: effective protection of mangrove forests through zonation and ownership, livelihood improvement through secure and sustainable resource use, resource users are involved in effective monitoring-based management decision-making, reduced workload for authorities and benefit sharing as part of an ICAM approach.

Before the co-management process starts, a number of surveys must be carried out. These surveys include stakeholder analysis, natural resource use and socio-economic surveys (Joffre and Luu 2007). Based on these Au Tho B village (Vinh Hai commune, Vinh Chau District) was selected as the pilot site for co-management. Details of the steps and principles followed by the project are described below.

4.2.2 Steps of the co-management process in the pilot site of Au Tho B village

Consultation and organisation

The initial phase of co-management in the Soc Trang coastal zone began in mid-2007 with **capacity building** of local authorities at the provincial, district and commune levels. An understanding and acceptance of co-management concepts and process were developed through workshops, a study tour, meetings and coaching (Primmer 2007, PMU CZM 2008).

A prerequisite for the start of the co-management process is its **acceptance** by local authorities at all levels. Once local authorities agreed a pilot site was selected. The village of Au Tho B in Vinh Chau District was selected because it has a lot of poor, landless people from ethnic minority groups, who rely on the collection of natural resources from the mangrove forests for their livelihood.

An information poster on the co-management process was developed and **awareness raising** meetings with the local community were held. Data of land use and natural resource use were collected as part of a participatory land-use mapping exercise (Dang 2008). Collection of additional natural resource use data continued after the land-use mapping.

In late 2008, a **start-up group** was established, comprising project staff and local authority representatives, with the aim of building upon previous work with a more structured approach. The start up group held a number of consultation meetings with local authorities to improve their understanding of the process and assisted the Au Tho B resource users to organise themselves into a formally recognised resource user group through further community consultation meetings.

Between the end of 2008 and the beginning of 2009, 11 meetings were held to

- introduce co-management concepts,
- identify resource users and organise user group membership and leadership,
- wealth rank participants into categories very poor, poor, medium and rich, and
- identify resource use problems.

Through the consultation meetings 240 households were identified as using resources from the mangrove forests for their livelihood. In order to manage such a big group, six resource user sub-groups were established for the village of Au Tho B along geographic criteria (see fig. 2).

Once the sub-group leaders and group leader were selected further meetings were held with these representatives to finalise sub-group boundaries and the process for the resource user group to become formally established under Decree 151 (MARD 2007). In January 2009 the resource **user group** was **formally established**, after which the negotiation with the local authorities could begin.

Negotiation and agreement

In early 2009, the second step of the co-management process commenced, in which the resource users group and local authorities negotiated acceptable ways to manage the natural resources within the mangrove forest area of Au Tho B village.

Twelve negotiation meetings were held over a 6 months period between the resource user group and local authorities to negotiate an agreement regulating resource use including zone establishment and monitoring requirements in the mangrove forest of Au Tho B. Based on these meetings a draft regulation was developed and disseminated to resource user group members for understanding and comment before the final negotiation meeting. On 4 September 2009 the

resource use agreement was signed between the resource users group and Commune People's Committee.

The "Regulations on the rights in forest protection and natural resource use by the Co-management Group in the coastal area of Au Tho B Village, Vinh Hai Commune" have the objective: "To enable co-management practice to protect the forest and rationally and sustainably use natural resources within the Au Tho B coastal area." The aim is to achieve the vision "The forest and fishery resources are well managed, protected, developed and reasonably used in accordance with the Law; there are no poor households, people have stable incomes and children attend higher school levels; and there is a clean and beautiful environment and less impact from natural disasters."

The agreement contains 7 Chapters: Objectives; Where and to Who this Regulation Applies; General Provisions; Natural Resource Management; Rewards and Penalties; Report Schedule; and Implementing Provisions. Article 10 covers regulations on what can and cannot be done in each zone. It specifies the 6W: who can do what, where, when, how and how much. For an example see zonation in chapter 4.2.3.

In parallel with the negotiation process, the project carried out capacity building activities through the provision of training for leaders from the resource users and staff of local authorities (Trinh and Hoang Đinh 2009, Phan *et al.* 2009).

Implementation

Implementation of the regulations is now going on in accordance with the resource user agreement.

Part of the early stages of the implementation is the dissemination of the regulations, setting up of information panels and demarcation of the forest/zone boundaries.

Awareness raising about environmental issues, as well as clear and effective communication between stakeholders, are important prerequisites for the successful implementation of co-management activities.

The project is therefore implementing a communication, education and public awareness strategy which will reach staff of local authorities and local communities via a range of communication channels and approaches. The strategy has been designed to facilitate, rather than dictate, behavioural change towards protection of the environment.

This strategy is also supported by the development of an environmental sanitation model which is being carried out in Vinh Hai commune (Vinh Chau district) by the Environmental Protection Sub-Department of the Department of Natural Resources and Environment.

Monitoring and evaluation

Participatory resource use monitoring by the resource users themselves is currently being field tested.

This monitoring programme uses two indices[3] to monitor compliance with the co-management agreement and sustainability of the resource harvest. The results of this monitoring will indicate whether natural regeneration can sustainably support the current harvest volume.

The objective for resource-use monitoring is to detect, record and present to the resource users and the local authorities in a comprehensible form any changes and trends in the amount of resources harvested and the effort required for the harvest in different zones of the mangrove forests of Au Tho B.

Two indices are required to monitor the impact of the harvest on the resource base: (1) the amount of resources harvested, and (2) the effort required for the harvest of a defined quantity. If the amount harvested per month remains more or less constant over time (or closely follows a seasonal harvest pattern) one might conclude that there is enough natural regeneration to sustainably support the current harvest volume. If at the same time the effort to harvest a given amount (i.e. the time needed) increases significantly this may indicate that natural regeneration

[3] Indices provide measures of relative density. They can be used in comparisons for monitoring without the need for expensive baseline data. Indices can be calculated using non geo-referenced data.

does not support the current harvest volume and that the resource off-take is therefore unsustainable. In other words, if the same amount of a resource takes longer to collect it indicates a decrease of that resource; if the same amount of the resource takes less time to collect it indicates an increase. The information obtained from monitoring enables decisions to be made on the effective management and protection of the resources being collected.

4.2.3 Key principles of the co-management process

The co-management process needs to incorporate four key principles in its application to maximise its potential for success.

Integrated coastal area management

Integrated coastal area management (ICAM), in contrast to a traditional sectoral approach to management, is a holistic, cross-sectoral, multi-disciplinary approach in which land and sea areas of the coastal zones are managed as an integrated unit.

The co-management of resources must be looked at from a landscape/eco-system perspective and not a purely site-specific point of view. Co-management needs to consider what other land/resource uses or controls are present in the vicinity of the site itself and their interactions with the co-management. Co-management must also be part of an integrated coastal area management strategy which looks at the coastal zone as a whole and which considers different management options depending on site specific conditions. **A single management solution will not be suitable for the entire coastal zone of Soc Trang Province**.

One example for considering land/resource uses in the vicinity of the co-management site is commercial farming of clams on sandbanks adjacent to mangrove forests. Here it is essential to look at how people access the sandbanks through the forest and that those local authorities in charge of the sandbanks are involved in the co-management process and access planning.

Furthermore, benefit sharing as part of an ICAM approach should be implemented in such a setting. Details are covered in chapter 4.2.4 benefits of mangrove co-management.

Participation

The co-management process must be undertaken in a participatory manner with all stakeholders being continually involved. The exclusion of any stakeholders will significantly weaken any resource use agreements that are made. Trying to develop and implement a resource agreement for a mangrove forest without the involvement of either a resource user group or a key local authority for example would risk making the agreement ineffective as the excluded party would probably not take much notice of the agreement.

Zonation

Co-management, in contrast to household-based contracts, involves fairly large areas of land which can be divided into zones (areas) in which different management regimes are applied. This increases the effectiveness of management and protection.

Certain areas can be set aside for protection to allow natural regeneration to take place. The regeneration of aquatic species will contribute to an increase of species for sustainable harvest in the other zones of the co-management area. Furthermore, protection of mangroves in specific zones will contribute to a better protection of the coast from the negative impacts of storms, flooding and erosion.

The zones must be identified by the resource users and local authorities during the negotiation step of the co-management process. The stakeholders must ensure they delineate areas where certain resources are in need of some level of protection, rehabilitation or can be sustainably used.

Specific rules are attached to each of the zones in terms of who can do what where, when, how and how much, to ensure the main aim of the zone is achieved and to enable the effective protection, rehabilitation and sustainable use of resources.

The zonation is not a static concept. Monitoring the sustainability of resource-use and monitoring the condition[4] of the mangrove forests will provide important information about possible changes in the zonation over time. Such changes need to be included in participatory negotiations.

Figure 2 shows an example of a zonation concept. It includes 4 zones, the paths for access to the mud flats and sandbanks, the location of the dyke and the 6 sub-group areas.

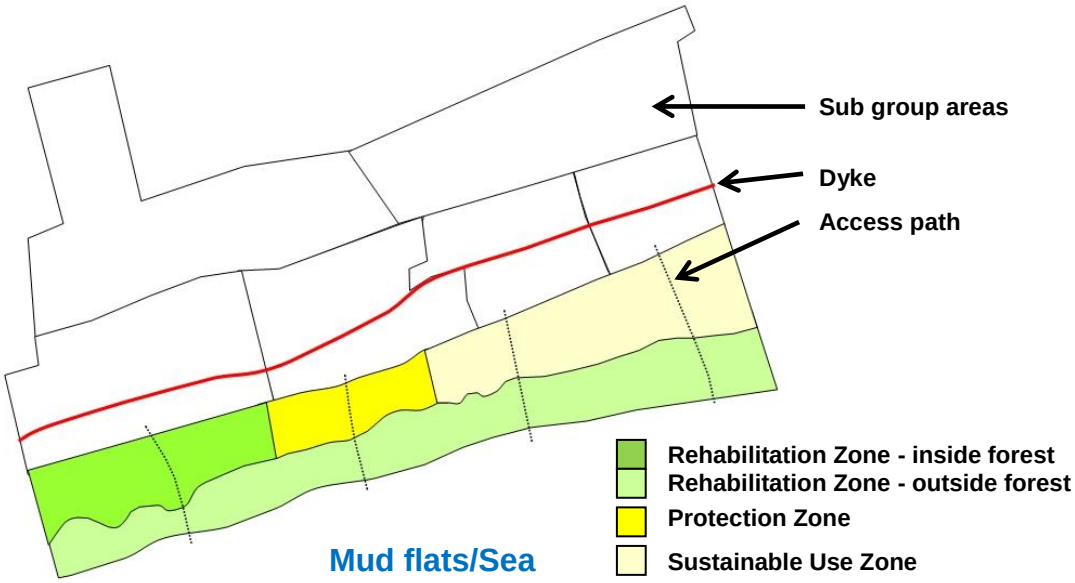

Fig. 2 Zonation of the mangrove forest of Au Tho B village.

The list below gives an example of what is allowed and what is prohibited in the rehabilitation zone outside the forest.

Permitted:

- Only members of co-management group can enter to catch fish
- To catch juvenile crabs, elongated gobies and cockles when the tide is low and mud is visible
- Catching by hand or round nets (with diameter less than 50 cm)
- Using long hooks to catch crabs
- Using bamboo trapping basket (chúm) for *Periophthalmus schlosseri* (cá thòi lòi) collection

Prohibited:

- Non-members of co-management group to enter
- Entering the forest when mud is not clearly visible
- Damaging small trees
- The use of chemicals and electric fishing devices
- Round nets bigger than 50 cm in width
- Use of long nets

Monitoring

Monitoring is one key principle of the co-management process. At the same time it is part of the 4 steps described above.

To ensure sustainability of any monitoring programme it is essential that all monitoring data are stored in easily accessible databases and that clear protocols for data collection and easy to use

[4] This kind of monitoring will be carried out by the Forest Protection Sub-department with the objective to detect, record and present in a comprehensible form any changes, trends or impacts in the area and condition of the mangrove forests of Soc Trang to the Department of Agriculture and Rural Development.

tools for data analysis are available. In addition, the results of the monitoring must be reported regularly to all stakeholders.

Summary of the 4 steps and 4 principles

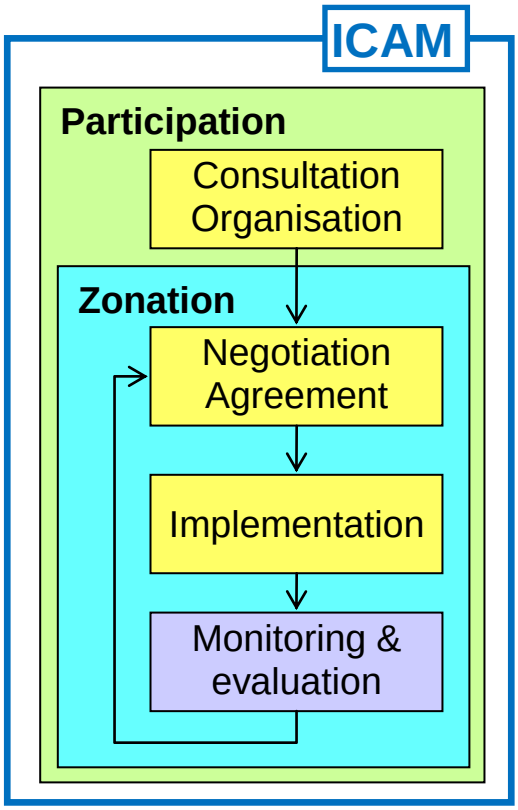

Fig. 3 Overview of the 4 steps of the co-management process and the 4 key principles

Figure 3 gives an overview of the 4 steps of the co-management process and the 4 key principles which must be applied during the process.

Everything has to happen within the framework of an integrated coastal area management approach (ICAM), and whatever is done must be done in a participatory way (Participation).

Step 1: consultation (this includes surveys, information about the process, getting acceptance for co-management, capacity building and awareness raising) and organisation. This step will end with the formal establishment of a resource user group under decree 151.

Step 2: a series of negotiation meetings which will end with a formal agreement between the local authorities and the resource users. The agreement specifies who can do what, where, when, how and how much and must apply the key principles of zonation and monitoring.

Step 3: implementation of the agreement.

Step 4: monitoring and evaluation involves a feed-back loop to re-negotiations (adaptive management) and must be applied throughout the co-management process.

4.2.4 Benefits of mangrove co-management

Co-management will ensure the effective management and protection of mangrove forests through the inclusion of the key elements rights, responsibilities, ownership, zonation and monitoring.

- Ecosystem services are key benefits of effectively managed and protected mangrove forests. They include:
  - protection from waves, erosion, storm and flooding (particularly important in the context of climate change) and
  - food, shelter and nursery ground for aquatic species.

Further benefits are:

- Effective protection of mangrove forests
- Livelihood improvement
- Resource users involved in resource management decision-making
- Reduced workload for authorities
- Benefit sharing as part of an ICAM approach

Effective protection of mangrove forests

Through the jointly agreed co-management regulations the resource users are given agreed clear and secure user **rights** to sustainably use resources and the **responsibility** to manage the resources sustainably and protect the mangrove forests. This increases the sense of resource

ownership by the resource users and results in improved and more effective protection of the resources.

Under co-management, resource users manage an area large enough to allow implementation of an effective management strategy which uses **zonation** to apply different resource management regimes in different areas. Specific rules are attached to each of the zones in terms of who can do what where, when, how and utilise how much to enable effective protection, conservation and sustainable use of resources.

The implementation of a systematic **monitoring** programme further contributes to the effective management and protection of the mangroves providing the results from the monitoring are used for adaptive management decision-making.

Rights, responsibilities, ownership, zonation and monitoring are the key elements of co-management which will ensure the effective management and protection of the mangrove forests.

Here is a brief example of how co-management is used in mangrove plantation protection. The first step is to identify areas where mangrove rehabilitation has not been successful due to people inadvertently destroying mangrove seedlings when gathering resources, particularly trawling nets when gathering crabs. Then rules are developed for this area or zone which ensure that the seedlings are protected and allowed to grow undisturbed for a period of time through certain restrictions including limiting who can enter the zone, when it can be entered and what types of fishing gear can be used (see page 9 for an example of what is prohibited and what is allowed in the rehabilitation zone outside the forest in Au Tho B).

Once the seedling trees have matured enough not to be threatened by fishing activities the area can then be rezoned to perhaps a sustainable use zone in which the resource use rules are less restrictive. Monitoring of seedling establishment and forest growth will show when the objective of rehabilitating the forest area has been achieved.

Livelihood improvement through secure sustainable resource use

The more effective protection of mangrove forests and the exclusion of resource use in the protection zone leads to an increase in aquatic resources[5]. This secures the long-term availability of natural resources if combined with the sustainable use of resources in accordance with the negotiated agreement.

In addition to the increase in resources for harvest, which is a clear and tangible benefit of co-management, restriction of legal access to only members of the resource user group further contributes to reducing overexploitation particularly if coupled with the resource users increased sense of ownership and monitoring.

Resource users involved in resource management decision-making

Co-management enables resource users to be directly involved in decision-making through negotiation and agreement with the local authorities. Resource users can express their views on how the resources they use should be managed and can negotiate the content of the resource use agreement. Management decision-making must be based on the results of monitoring.

Reduced workload for authorities

As management and policing of resources and forests is increasingly undertaken by resource users as a result of their vested interest in the resources, the workload of the authorities and costs are reduced. Individuals become increasingly concerned not only with their own plot of land but also the resources around them through a wider sense of ownership and responsibility, thus improving sustainable management and protection.

There is also less need for conflict resolution as clear resource use rules, which include comprehensive resource use monitoring, have been jointly agreed between the resource users and authorities

[5] For example, 1 hectare of mangroves destroyed equals a loss of just over 1 tonne of fish harvest per year (source: poster produced by the GTZ-Philippine Development Cooperation).

Benefit sharing

The aim of mangrove co-management is to ensure sustainable use of resources for the benefit of the local population with effectively protecting the mangrove forests. The resource users who manage the mangrove forests do this primarily with the aim of protection, while sustainable resource use is mainly for subsistence. Resource users therefore have limited options for getting financial benefits from the co-management of mangroves. At the same time others benefit from the ecosystem services provided by effectively managed and protected mangrove forests. This includes storm, flood and erosion protection for all people living in the coastal zone as well as food, shelter and nursery ground for aquatic species.

The project will therefore pilot a benefit sharing scheme for the sustainable financing of the protection of mangroves through co-management using benefits from clam cooperatives on sandbanks in front of mangrove forests.

Following the principles of ICAM involves looking at mangrove forests (and co-management thereof) and sandbanks and clam management together. Both are part of the coastal zone and non-monetary benefits (i.e. ecosystem services) flow from a well managed and protected mangrove forest to those who utilise the sandbanks commercially for clam farming. In exchange, financial benefits must flow from the commercial farming of clams to those who manage the mangroves, who by protecting the mangroves, restrict their options for getting direct financial benefits from the forest (e.g. no harvest and sale of timber).

Therefore, a percentage of the benefits from the clam cooperative should be used to pay for the operational costs of mangrove co-management. This requires that local authorities in charge of the sandbanks and in charge of the mangrove forests as well as the mangrove resource user groups are involved in the participatory process of development of a clam cooperative and benefit sharing scheme[6]. Such a payment scheme will contribute to sustainability by involving the private sector and does not put a burden on the budget of the districts for the payment of forest protection contracts.

The main aim of mangrove co-management in Soc Trang, where there is only a narrow belt of mangroves along a highly dynamic coast line, is maintaining the protection function of the mangroves while at the same time permitting sustainable use of resources. Because they cannot profit from timber harvest, it is therefore important that all members of the mangrove co-management group can become members of a clam cooperative so that they can also gain direct financial benefits.

4.3 Conclusion

Co-management is an effective way of maintaining and enhancing the protection function of the mangrove forest belt and at the same time providing livelihoods for local communities. In addition, involving local communities in mangrove rehabilitation using new approaches, which increase the resilience of mangrove forests to the negative impacts of climate change, further enhances the protection function and other ecosystem services provided by mangrove forests.

For co-management to be successful, it is essential that there is full political support from all levels (province through districts to commune) and that there is agreement from all stakeholders.

The co-management process itself must follow the four steps described in this report and must apply the four principles of integrated coastal area management, participation, zonation and monitoring. Only then can the key benefits of co-management be achieved, namely ecosystem services of effectively protected mangrove forests, livelihood improvement, involvement of resource users in effective management decision-making, reduced workload for authorities and benefit sharing as part of an ICAM approach.

[6] This form of benefit sharing can be considered as a payment for ecosystem services on a small scale. Payment for ecosystem services is a key project activity which has not been covered in this report. Other key activities will be covered in a separate report and include capacity building, environmental awareness raising and education, dyke rehabilitation, support to the shrimp sector through income generation along aquatic value chains and set up of an institutional body for the integrated planning and management of the coastal zone.

References

Aburto-Oropeza, O., Ezcurra, E., Danemann, G., Valdez, V., Murray, J. and Sala E. (2008) Mangroves in the Gulf of California increase fishery yields. - Proceedings of the National Academy of Sciences of the U.S.A. 105: 10456 – 10459.

Borrini-Feyerabend, G., Pimbert, M., Farvar, M. T., Kothari A. and Renard, Y. (2004) Sharing Power. Learning by doing in co-management of natural resources throughout the world. - IIED and IUCN/ CEESP/CMWG, Cenesta, Tehran. 456 pp.

Brown, O., Crawford, A. and Hammill A. (2006) Natural Disasters and Resource Rights: Building resilience, rebuilding lives. - International Institute for Sustainable Development, Manitoba, Canada. 28 pp.

Đang, T. L. (2008) Process and results of participatory land use mapping in Au Tho B. - GTZ Project Management of Natural Resources in the Coastal Zone of Soc Trang Province, Vietnam.

Joffre, O. and Luu, H. T. (2007) A baseline survey in the Coastal Zone of Soc Trang Province: Livelihood Assessment and Stakeholders analysis. - GTZ Project Management of Natural Resources in the Coastal Zone of Soc Trang Province, Vietnam.

Millennium Ecosystem Assessment (2005) Ecosystems and Human Well-being: Wetlands and Water Synthesis. - World Resources Institute, Washington, DC. 68 pp.

Mazda Y., Magi M., Kogo M. and Hong P. N. (1997) Mangroves as a coastal protection from waves in the Tong King delta, Vietnam. - Mangroves and Salt Marshes. 1, 127-135.

Mazda Y., Magi M., Ikeda Y., Kurokawa T. and Asano T. (2007) Wave reduction in a mangrove forest dominated by *Sonneratia* sp. - Wetlands Ecology and Management. 14, 365-378.

Minister of Agriculture and Rural Development (MARD 2007) Decree No. 151/2007/ND-CP October 10, 2007, on the Organisation and Operation of Cooperative Groups (NGHỊ ĐỊNH Về tổ chức và hoạt động của tổ hợp tác). - Minister of Agriculture and Rural Development, Hanoi, Vietnam.

O'Sullivan, C. (2005) The Importance of Mangroves. - Department of planning and natural Resources, Division of Fisheries and wildlife. U.S.V.I. Fact Sheet 28 http://bcrc.bio.umass.edu/vifishandwildlife/Education/FactSheet/PDF_Docs/28Mangroves.pdf

Phan, T. G., Hoang, H. C., Nguyen, Q. B. and Nguyen, T. K. T. (2009) Training Workshop on Communication and Natural Resource Co-management. - Nong Lam University of Ho Chi Minh City Department of Social Forestry and Agroforestry. GTZ Project Management of Natural Resources in the Coastal Zone of Soc Trang Province, Vietnam.

PMU CZM (2008) study visit on "co-management of mangrove forest resources" in Koh Kong province, Cambodia. - GTZ Project Management of Natural Resources in the Coastal Zone of Soc Trang Province, Vietnam. [PMU CZM: Project Management Unit Coastal Zone Management]

Primmer R. (2007) Report on the workshop for the introduction to the concept of co-management. - GTZ Project Management of Natural Resources in the Coastal Zone of Soc Trang Province, Vietnam.

Shepherd, G. (2004) The Ecosystem Approach: Five Steps to Implementation. - IUCN, Gland, Switzerland and Cambridge, UK. vi + 30 pp.

Shunula, J. P. and Whittick, A. (1999) Aspects of litter production in mangroves from Unguja Island, Zanzibar, Tanzania. - International Conference on the Biology of Coastal Environments, Bahrain. Vol. 49. 51-54.

Sub-FIPI (2009a) Mangroves of Soc Trang 1965-2008. - Southern Sub-Institute of Forest Inventory and Planning, HCMC. GTZ Project Management of Natural Resources in the Coastal Zone of Soc Trang Province, Vietnam.

Sub-FIPI (2009b) Tool Box for Mangrove Rehabilitation and Management. - Southern Sub-Institute of Forest Inventory and Planning, HCMC. GTZ Project Management of Natural Resources in the Coastal Zone of Soc Trang Province, Vietnam.

Sub-FIPI (2009c) Mangrove Nursery Manual. - Southern Sub-Institute of Forest Inventory and Planning, HCMC. GTZ Project Management of Natural Resources in the Coastal Zone of Soc Trang Province, Vietnam.

Sub-FIPI (2009d) Monitoring of Mangrove Forests. - Southern Sub-Institute of Forest Inventory and Planning, HCMC. GTZ Project Management of Natural Resources in the Coastal Zone of Soc Trang Province, Vietnam.

Trinh, H. and Hoang Đinh, Q. V. (2009) Results of training course and learning experience on “Methods of Multi-Stakeholder Dialogues”. - GTZ Project Management of Natural Resources in the Coastal Zone of Soc Trang Province, Vietnam.

Deutsche Gesellschaft für
Technische Zusammenarbeit (GTZ) GmbH

Management of Natural Resources in the Coastal Zone
of Soc Trang Province
134 Tran Hung Dao Street,
Soc Trang City, Viet nam

T + 84 79 3622164
F + 84 79 3622125
I www.gtz.de
www.czm-soctrang.org.vn