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MANGROVE COLLABORATIVE MANAGEMENT IN VIETNAM AND ASIA

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Executive Summary

In recognition of the importance of mangroves and coastal forests to coastal resilience and livelihoods, Vietnam has prioritized their planting and protection over recent years. These coastal forest areas are extremely valuable for commercial and subsistence uses across Asia, particularly related to aquaculture and net/catch/gleaning fisheries. Managing mangroves presents different challenges than managing terrestrial or upland forests given the unique tidal dynamics, forest architecture, and livelihood needs. Due to the range of overlapping interests in mangrove areas, they are particularly suited to co-management arrangements that bring together government, private sector, and community stakeholders to develop and implement mutually beneficial management agreements. For Vietnam, this bottom-up, participatory approach represents a relatively new model for resource management. This report examines pilot experience with co-management approaches to mangrove management in Vietnam, and also highlights experiences from other Asian countries including India, Bangladesh, the Philippines, Indonesia, and Thailand. Report findings underscore the following:

Broadly speaking, most community members support mangrove conservation and understand their importance for protecting infrastructure and farms, supporting productivity, enabling food security, providing income-generation opportunities across communities, and addressing climate change adaptation and mitigation needs. However, aligning household incentives to mangrove management is an almost impossible challenge. Given the donor-driven and project-based agenda for these pilots, most have lacked a long-term financing mechanism. Even in cases where the private sector has been engaged with price premiums, incentives have not been adequate to compete with alternative land uses.

Confusing and overlapping authority among different government agencies for managing mangrove areas can result in open-access situations. In many cases, no single authority is responsible for ensuring that coastal management rules are harmonized within or across jurisdictions. This calls for improved spatial planning and coordination both among sectors and from national to commune levels.

Co-management as a process permits a valuable two-way communication between government and communities that allows for each to better understand each other's needs and constraints. This can be an important step to build trust and is a particularly new approach in the Vietnamese context.

Individualized management agreements that are devolved to certain members of communities or particular user groups can lead to the exclusion of some individuals or other user groups who have overlapping use rights.

While mangrove co-management agreements and institutional pilots can provide valuable momentum for communities, they also require formal or legal recognition by government, which can be slow to materialize. Where authority for rule development and implementation largely lies in the government's hands, community members often lack the enthusiasm and interest to support mangrove conservation. All too often, contracts issued by the government are not clear on benefit-sharing details or dispute resolution systems.

In sum, mangrove co-management institutional structure and rules need to be designed to suit the local context. All too often, the focus has been on mangrove planting and protection, which is a tree-oriented perspective. Instead, a mangrove ecosystem perspective needs to be facilitated so that the linkages between various types of livelihood systems and the health of the ecosystem become

more prominent. This underscores the need for assessments of community needs through the design of strategies for mangrove management and protection that include a participatory coastal spatial planning approach and adaptive co-management.

Chapter One: Lessons from Mangrove Collaborative Governance

1.1 Introduction

The Government of Vietnam (GVN) is highly interested in improving coastal forest management, especially for mangrove forests. Decree 119/2016/ND-CP, approved by the GVN in August 2016, focuses on policies for the sustainable management, protection, and development of coastal forests to support adaptation to climate change. To implement this decree, Vietnam is on the path to design and pilot mangrove governance institutions that can address the unique needs of mangrove ecosystems in the context of climate change. Mangrove forests provide multiple benefits to local communities and the government by protecting the coastline, supporting diverse livelihoods, bolstering biodiversity, and enabling both mitigation and adaptation to climate change. In Vietnam, there have been a number of pilots to develop collaborative mangrove management institutional structures with local communities.

Co-management embraces a wide range of collaborative forms of natural resource governance in which the government and a local community (as well as other resource users, if any) share responsibility, authority, and benefits in order to manage a specific natural resource or area (e.g. mangrove forest, mudflats, or fishery products). Co-management assumes multi-level and multi-faceted collaboration among concerned stakeholders, particularly government agencies, communities, mass organizations, and non-governmental organizations (NGOs) (Borrini-Feyerabend, 2011; Swan, 2011) (Figure 1.1).

FIGURE 1.1. MULTIPLE STAKEHOLDERS INVOLVED IN COASTAL AND MANGROVE CO-MANAGEMENT

Table 1.1 summarizes the distinguishing characteristics of co-management compared with other forms of natural resource management.

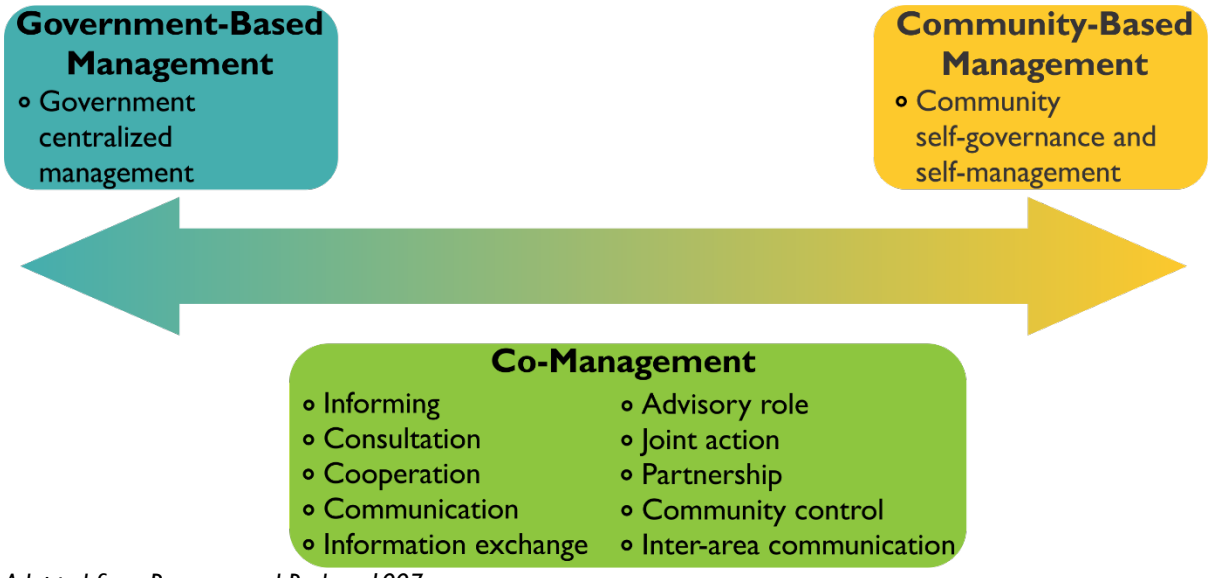
TABLE 1.1. CONCEPTUAL FRAMEWORK FOR COLLABORATIVE NATURAL RESOURCE GOVERNANCE

MAIN CHARACTERISTICS	State-led management	Co-management	Community-based management
DISTINGUISHING CHARACTERISTICS	State-led conservation. State directly organizes planning, management and monitoring to achieve its objectives.	State-led conservation includes community livelihood goals/agenda. State-community partnership formed through formal negotiation of specific management agreements.	Community's livelihood goals/agenda. Conservation outcomes through sustainable uses. Community-driven processes. Transferal of authority to communities.
ROLE OF THE GOVERNMENT	**Controlling**: management functions, mandates, responsibilities, and benefits are not shared.	**Leading**: some management responsibilities, authorities and benefits shared with community.	**Facilitating**: limited to providing overarching legislative/regulatory frameworks.
ROLE OF THE COMMUNITY	**Minimal**: little contribution to regulating resource use.	**Supporting**: shared responsibilities, authorities, and benefits mutually agreed through negotiation.	**Leading**: determination of their own rules and responsibilities within an enabling legal or policy framework established by the government.

Source: Adapted from Swan, 2011, p 42

Co-management is an umbrella term for a collaborative approach that includes many different types of interactions between the government and local communities. This spectrum ranges from those forms of engagements that are purely informative at one end to those where joint decision-making is the norm (Figure 1.2).

FIGURE 1.2. SPECTRUM OF CO-MANAGEMENT APPROACHES



Adapted from Pomeroy and Berkes, 1997

Ideally, co-management is based on participatory negotiation, joint decision-making, a degree of power-sharing and fair distribution of benefits among all stakeholders (Borrini-Feyerabend, 2011).

Typically, co-management involves a participatory and inclusive approach that leverages local knowledge even as it draws on expert knowledge. There is no fixed approach: rather, it is an adaptive process that is fine-tuned through learning. "Learning by doing" is a key characteristic of co-management approaches.

Natural resource co-management is on the rise for a number of reasons. One primary reason is that all too often, government agencies are unable to manage, regulate, and patrol areas such as forests, conservation zones, or coastal landscapes because they do not possess sufficient manpower or technical capacity. In this context, working with local community members who regularly engage in resource use activity, have good knowledge of its ecological dynamics, and understand the social context makes management more effective.

Co-management approaches have been used in many different natural resource management contexts such as terrestrial forests, irrigation systems, and small-scale fisheries. Increasingly, as governments prioritize the importance of protecting coastal forests, the value of co-management is starting to be recognized. Its value in complex landscapes such as coastal areas is clear. Where there is critical infrastructure that can be damaged by intense storms and tidal surges, multiple types of resource users accessing different parts of the coastline, and multiple types of benefits provided by the mangrove ecosystem, the details of regulatory management are best developed collaboratively with all key local stakeholders. In this way, conflicts between overlapping uses can be minimized.

In practice, the collaborative governance of mangroves, or mangrove co-management, is still an evolving concept, particularly in Vietnam. It is a broad category that both leads to significant hopes of achieving effective mangrove governance and instills a sense of confusion as to its precise details. The varied mangrove co-management pilots in Vietnam have been initiated for different reasons ranging from substantial post-typhoon damage, loss of mangroves for shrimp aquaculture pond conversion, biodiversity conservation of mangrove habitat, and rehabilitation of mangroves through certified organic shrimp production. For this report, the Tenure and Global Climate Change program distilled key lessons from five different sites in the Red River Delta and Mekong Delta:

- Xuan Thuy National Park, Nam Dinh province
- Da Loc commune, Thanh Hoa province
- Soc Trang province
- Mui Ca Mau National Park, Ca Mau province
- Nhung Mien Protection Forest, Ca Mau province

In addition to these selected sites, there continues to be ongoing experimentation with mangrove co-management in other locations along Vietnam's coastline. Most of these began around 2005 or thereafter: as such, the time is ripe to review the disparate experiences to understand the diverse innovative processes they have set into motion. This study follows in the footsteps of an earlier study that aimed to identify the different types of stakeholders involved in mangrove governance in northern and north-central Vietnam (MCD, 2015). Added to the analysis of five Vietnamese sites in this study is a summary of the collaborative mangrove governance experience in five Asian countries. This helps to identify the broad trajectory of mangrove co-management in Asia and situate the breadth and content of the co-management approaches being utilized in Vietnam.

1.2 Legislation Governing Mangrove Management in Vietnam

Although there has been a push to protect mangroves in the face of rapid conversion to shrimp aquaculture ponds in the early 1990s, the development of regulations on "mangrove-to-surface-water ratios" (Decision 178/2001/QD-TTg) seeking to curtail mangrove deforestation in the early 2000s were narrowly targeted on this one productive sector. Beyond that, there was no national strategy on coastal forest or mangrove management. Management of mangroves falls under the broader existing legal framework of forest management in Vietnam. Mangrove forests are classified based on the three main categories in the 2004 Law on Forest Protection and Development (LFPD): protection forests (PtFs); special-use forests (SUFs); and production forests (PdFs). Each of these classification categories has different objectives and therefore uses different types of management modalities.

PtFs mainly serve to protect water resources and soil, prevent erosion and desertification, and mitigate against natural disasters. As it relates to coastal areas, PtFs includes forests that help provide a buffer against powerful sea waves, strong winds, and sand storms (Article 4, LFPD 2004). SUFs are mainly established for nature preservation, standard models of national ecosystems, forest biological gene resources, scientific research, and preservation of historical and cultural relics. They include national parks, nature reserves, species and habitat reserves, landscape protected areas, and experimental and scientific research forests (Article 4, LFPD 2004). There are specific zones that can be created within SUFs: core or strictly protected zones, ecological rehabilitation zones, administration and service zones, landscape protected areas, and buffer zones (Article 19 of Decree No.117/2010/ND-CP on Organization and Management of Special-Use Forest System). Each of these zones has stipulated restrictions in terms of management practices. For example, in ecological rehabilitation zones, natural regeneration can be combined with cultivation of native species, whereas in strictly protected zones, only strict conservation takes place. In buffer zones, interventions to support livelihoods and sustainable socioeconomic development are carried out to prevent encroachment into zones with higher protection status (Article 32 of Decree No. 117/2010/ND-CP).

PdFs are mainly used for production and trading of timber and non-timber forest products (NTFPs) in combination with environmental protection. PdFs includes natural PdFs, planted PdFs, and seedling forests (Article 4, LFPD 2004). For PdFs, forest owners must develop sustainable forest management plans under the Ministry of Agriculture and Rural Development (MARD) guidelines and submit to the Department of Agriculture and Rural Development (DARD) for appraisal and monitoring of plan implementation (Article 6 of Decision 49/2016/QD-TTg on Promulgating Regulation on Production Forest Management).

Over time, there has been growing interest within the GVN to addressing the unique needs of coastal forests in order to ensure their protection and sustainable management. It has become clear that not only do mangroves and other coastal forests provide a cost-effective way to protect coastal infrastructure and communities, but also they play a critical role in both adapting to and mitigating against climate change.

As such, the GVN issued Decision No.120/2015/QD-TTg on Approving Projects for Coastal Forest Protection and Development in Response to Climate Change in the Period 2015-2020. Decision 120 promotes the allocation of coastal forest protection contracts to all economic sectors, communities, and households for coastal forest protection and development, encouraging the formation of associations to protect the forests.

Soon after, in 2017, Decree No.119/2016/ND-CP on Policies for Management, Protection and Sustainable Development of Coastal Forests to Support Adaptation to Climate Change was approved; it focuses on the development of coastal PtFs. Decree 119 states that the central government budget will pay for coastal forest development under approved projects.

As the GVN increasingly prioritizes coastal forest protection, it is becoming clear that the most effective way to achieve sustainable coastal forest management is to consider the role of economic development and climate change through the creation of future spatial scenarios for coastal spatial planning purposes. The main reason for this is to navigate the multiple set of different users of the coastal landscape, who at times work in a complementary or conflicting way. In light of this, an integrated coastal resource management approach is being promoted in Vietnam that involves multi-sectoral coordination. The passage of the Planning Law in late 2017 provided an enabling framework through which marine and coastal spatial planning can provide an overall vision, and subsequently provide scenarios where coastal forest management can be pursued.

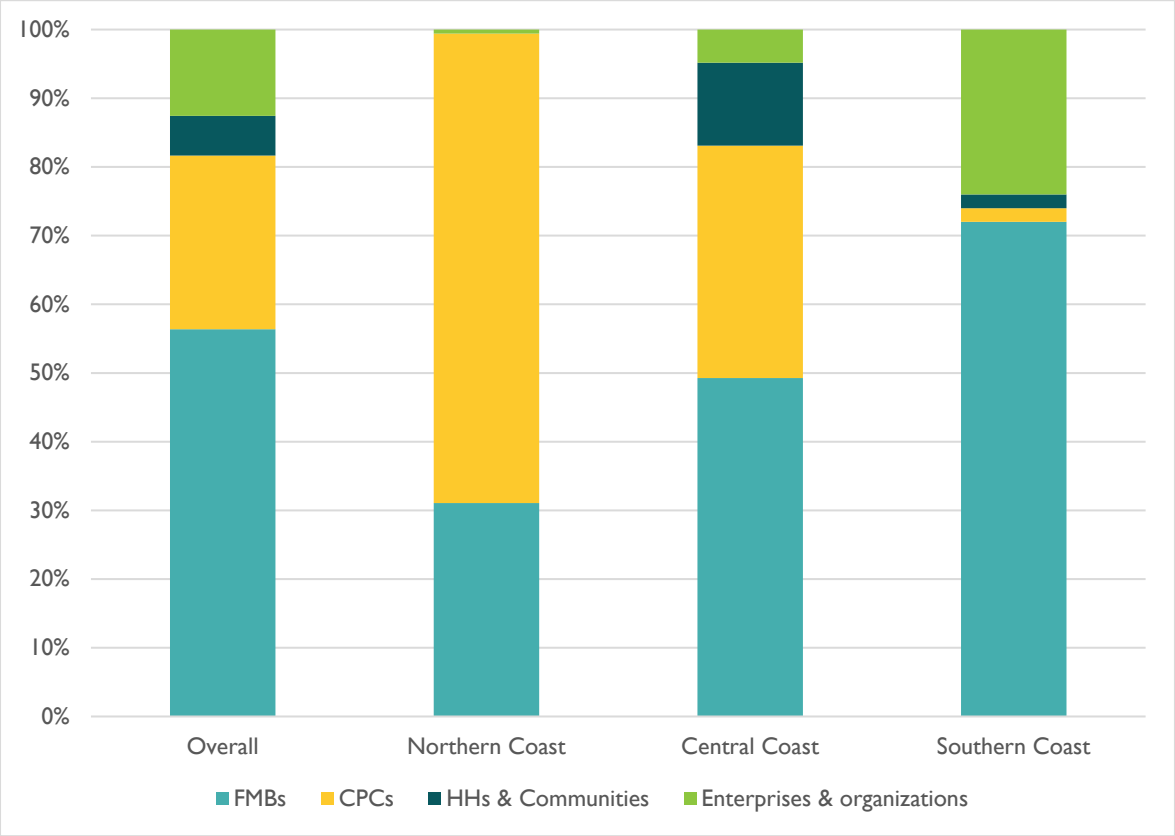
1.3 Land and Resource Tenure in Vietnam's Coastal Landscapes

Beyond the issue of regulatory frameworks provided by the GVN for managing coastal forests and mangroves, creating collaborative forms of mangrove governance requires attention to local tenure conditions within the coastal landscape. Who has the authority to manage the land and coastal waters for different purposes is of pivotal importance in developing an integrated approach to coastal forest protection and management.

Vietnam's average population density in coastal zones of 448 persons/km^2 is 1.6 times higher than the nationwide population density; coastal zones are characterized by limited land resources. Nationwide, by the end of 2014, 387,043 ha of land (20 percent of the total coastal area) were classified as coastal forests across 29 coastal provinces (MARD, 2014). Within this area, PtFs constitute 58 percent, SUFs 15 percent, and PdFs 27 percent. Within each of these forest type classifications, there is a complex distribution of tenure rights to coastal forest lands across Vietnam's long coastline. Who holds the tenure rights over coastal forest land has a significant influence on how forest land allocations and contracting take place.

As shown in Figure 1.3, most of the coastal forest land is under direct government management through state-owned forest management boards (FMBs) and commune people's committees (CPCs) controlling 55 percent and 25 percent of the forest land area, respectively, for an unlimited duration. Enterprises (both state and non-state) and organizations (e.g., the army and Youth Union through their former land reclamation programs) both have tenure rights to 13 percent of this area for a 50-year duration. Only six percent of forests are held by households and communities (MARD, 2014).

FIGURE 1.3. COASTAL FOREST AND FOREST LAND TENURE (2014)



Source: (Developed from data provided in MARD, 2014, 2)

It is important to note that there are stark differences in this pattern from north to south. CPCs and FMBs absolutely dominate in the northern and central coasts, while FMBs, enterprises, and organizations dominate in the southern coast. However, although CPCs as the state's executive body at the grassroots level have the mandate for overseeing forest management, they mostly have neither the capacity nor the incentives effectively guide forest management. In reality, forest land has fallen under the control of CPCs because it had not been allocated to users as originally planned and often became open access area.

Chapter Two: Collaborative Mangrove Governance across Vietnam's Coastline: Five Case Studies from the Red River Delta and Mekong Delta

2.1 The Case of Xuan Thuy National Park, Nam Dinh Province

Xuan Thuy National Park (XTNP), located within the Red River Delta, was originally recognized as the first Ramsar site in Southeast Asia in 1988. Although most of the park was converted to shrimp aquaculture ponds due to heavy demand, this vast wetland area still contains some of the last remnants of the Red River Delta coastal ecosystem (V. C. Nguyen, 2012). After being designated a wetland nature reserve in 1995, it was upgraded to XTNP in 2003. Then in 2004, the United Nations, Educational, Scientific, and Cultural Organization (UNESCO) recognized the park as a core zone in the Red River Biosphere Reserve. The park has international significance as a migratory bird habitat, particularly for the globally threatened black-faced spoonbill (*Platalea minor*).

The park has a total area of 15,100 ha with 7,100 ha in the core zone and 8,000 ha in the buffer zone. The park's main challenge is managing its core and buffer zones where some half of its 46,000 resident households are dependent on harvesting the park's wetland resources such as shrimp, clam seed, and clam, all of significant economic value. The government's main objective for XTNP is to manage the mangrove forests to conserve the unique ecosystem and to become a site for ecological research and learning. The secondary objective is to protect the area's coastal infrastructure and communities and contribute to local socioeconomic development. Therefore, in the early 2000s, the coastal forests were classified by MARD into three types: SUFs; PtFs; as well as a small area (200 ha) of PdFs in the buffer zone (Figure 2.1).

XTNP is located in an economically dynamic area, as road construction has increased access to markets for aquatic products. Aquaculture (particularly, clam farming), fisheries, and services (trade and labor migrants) have become the main drivers of economic growth in the area, with their share in the annual total value of production increasing from 15 percent (aquaculture) and 19 percent (fisheries and services) in 2004 to 36 percent and 25 percent in 2016 respectively. In the same period, the share of annual value of production made up of crop production and animal husbandry have been reduced from 50 percent and 16 percent to 32 percent and seven percent. Local living standards have improved remarkably with the average annual per capita income growing from 6 million Vietnamese dong (VND) ($264) in 2008 to 37 million VND ($1,628) in 2016 while the poverty rate reduced from 10 percent to 2.3 percent over the same period. Electricity and gas have replaced straw and firewood for cooking, thereby reducing pressure on coastal forests (Xuan Thuy National Park & VCF, 2013; Vu, 2009). Even so, about 60 percent of the population are still dependent on mangrove resources for livelihoods and household food security.

As shown in Figure 2.1, visually it is clear that there has been a tendency towards coastal forest improvement in terms of both quantity and quality of forests. The specifics of forest cover area and rate of change, however, are less clear. A time series study of satellite images indicated that the area of mangroves increased from 14,000 ha in 1975 to 16,000 ha in 1986 before declining to just 6,000 ha in 1992 and then later recovering to 13,000 ha in 2002 (V. C. Nguyen, 2012; for earlier studies see Tran et al., 1996). Other studies engaging in a micro-analysis of mangrove changes by zone in the Giao Thuy coastal areas (of which XTNP is a part) covering the period 2005 to 2014 also indicates overall patterns of mangrove increase (Thinh & Hens, 2017). Mangroves shifted southeast to the

strictly protected area in Con Lu islet and southwest to the protected area. This expansion was attributed to the large areas of mangroves re-planted in Bai Trong and Con Ngan islet and newly planted in Con Lu islet under various NGO-funded mangrove planting programs. At the same time, there was some continued loss of mangroves due to the conversion of extensive shrimp ponds to clam farms starting in 1996 as well as some damage from a 2012 typhoon. All in all, the mangrove zone has moved towards the sea and the accretion of deposits from the Red River has led to the formation of Lu islet, which is parallel to the coast.

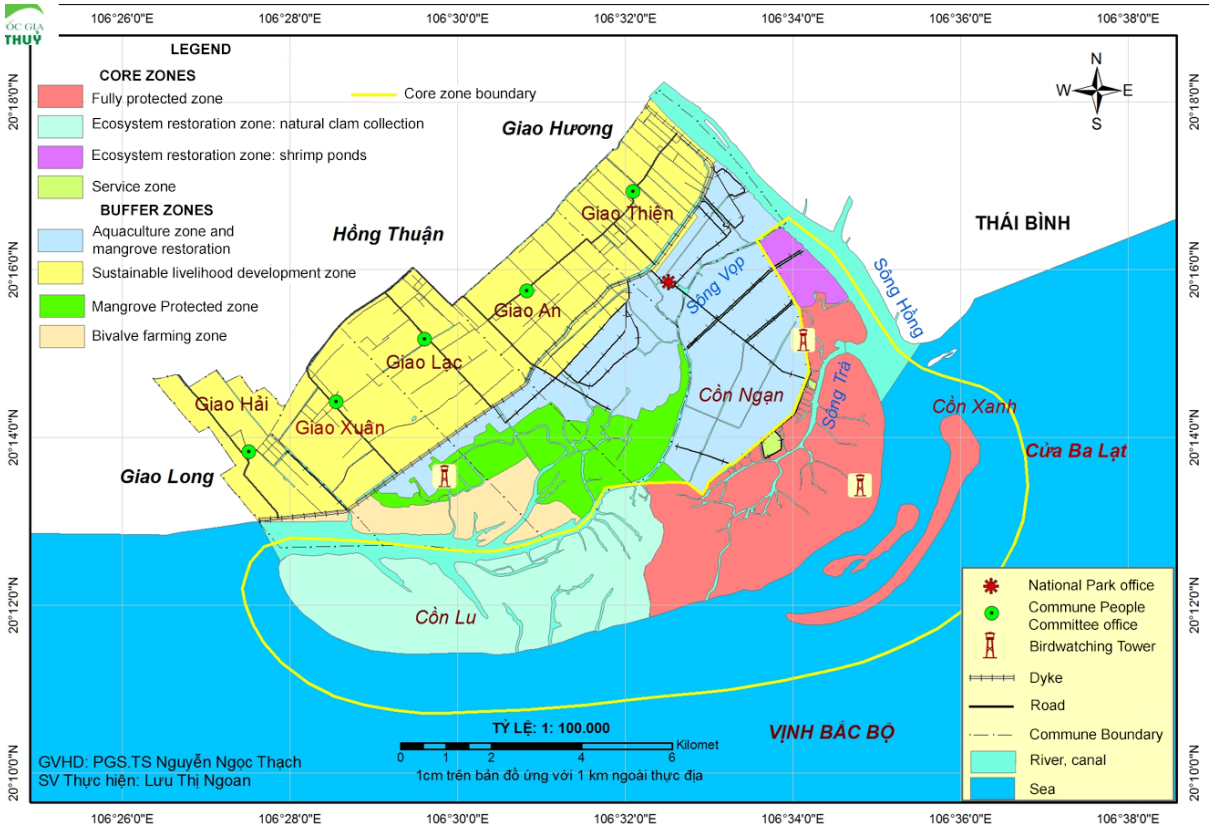
Today, the mangroves are dominated by *Kandelia candel (Trang, Vẹt thang or Vẹt dìa)* and *Aegiceras corniculatum* (*Sú*) mixed with *Sonneratia caseolaris (Bần chua* or *Bần sẻ)* and *Rhizhophore apiculate (Đước vòi)*, while *Casuarina equisetifolia (Phi lao*) occupies sandy land in Con Lu islet. These species form large mature mangroves and onshore forests with great ecological and protective values supporting rich fishery resources, despite some indication of the depletion of particular high-value fish, crab, and shrimp species (V. C. Nguyen, 2016b; Tran, Le, Le, Le, & Chu, 1996; UNEP, 2009).

FIGURE 2.1. CHANGE IN AREA OF MANGROVES IN XUAN THUY NATIONAL PARK

Source: Satellite images from Our Coast – Our Future *pilot project*

In XTNP, the mangrove and resource governance situation is very complex not only because of the dynamic economy and changing coastal landscape, but also primarily because of the segmented and sometimes overlapping authority and responsibilities among the various government agencies involved. The Nam Dinh Provincial People's Committee (PPC) is responsible for management of coastal land and forest in the core zone of XTNP, while the CPCs of the five coastal communes in the park are responsible for management of coastal land and forest in the buffer zone (see Figure 2.2). The District People's Committee (DPC) provides oversight and its Section of Agriculture, Forestry, and Fishery provides technical guidance. Under contracts with XTNP, forest rangers patrol the mangrove forests and border guards patrol the coastal water space. The XTNP Management Board works under the ultimate authority of the Nam Dinh PPC. As a result of this complex governance structure, in a practical sense, the mangroves remain an open, ownerless area. Even though the coastal forest and land in the core zone were allocated to the XTNP through a decision of the Prime Minister in the early 2000s, the respective land use rights have not yet been granted to the XTNP. There has been no coastal forest and land allocation to individuals, households, or the community as a whole in XTNP.

FIGURE 2.2. FOREST AND LAND ZONING IN XUAN THUY NATIONAL PARK AS OF 2008



Source: V.C. Nguyen, 2016a

Hundreds of people are regularly involved in harvesting aquatic resources under the mangrove canopy in the core zone. The core zone is *de facto* a open access area. National law, however, does not allow for any kind of use within any national park's core zone. Although the harvesting activities do not strictly comply with the existing laws and regulations, because local people are heavily dependent on the wetlands for their livelihoods and income the XTNP Management Board is unable to take clear action. The last decade has seen a considerable increase in the level of harvesting because of the economic value of these resources. In the early 2010s, the average revenue from clam culture was about VND 10 -20 billion per year (US$ 0.5 to 1 million). There have been no readily available solutions to resolve the conflicts among different fisher groups, end destructive fishing practices, or engage local households in support of mangrove protection. All in all, the park authorities were unable to exert significant regulatory influence and as such, the mangrove ecosystem have become degraded and local communities have become more exposed to related vulnerabilities.

From the mid-2000s onwards, within this complex governance context, various mangrove co-management initiatives have been undertaken. Nearly all the co-management projects have been primarily framed as "benefit-sharing" arrangements. The first pilot focused on the sustainable and equitable management of natural clam seed resources in the Red River estuary within the XTNP and developed a working model of collaborative management within the existing policy and institutional frameworks (see details below).

Its achievements partially became the basis for the Prime Minister's Decision 126/2012/TTg on benefit sharing among SUFs. In turn, XTNP was one of two national sites chosen to pilot this

decision. Thereafter, another series of co-management pilots were initiated over the period 2007-2009 that became operational in 2012-2015. These pilots included those put forward after the successful completion of large-scale mangrove planting programs funded by the Danish Red Cross, Japanese Red Cross, and Australia Red Cross in 1997-2012 that urgently sought to identify effective ways of protecting and conserving the newly planted mangroves. All these pilots are still operational today. A list of existing co-management initiatives includes the following:

10-year old mangroves in Xuan Thuy National Park. Credit: Nguyen The Dzung

A. First pilot on co-management for clam seed production.

The first attempt to apply a co-management approach was a response to social unrest in 2005 with casualties that occurred among the clam resource harvesters over the 2003-2004 period together with heavy losses created by 2005 Typhoon Damrey in areas from Ha Tinh to Nam Dinh not protected by mangroves. To defuse the significant tension between local households and the XTNP Management Board, a pilot project (funded by XTNP) to carry out benefit-sharing of income from lucrative natural clam seed harvesting was initiated. The agreement was made between the clam seed collectors, the local government, and the Management Board. In August 2006, the Nam Dinh DPC approved the project that was implemented by the Management Board from 2006 to 2010. The total area of clam seed beds was 1,000 ha (700 ha in the Red River Delta and 300 ha in Lu islet). During the April to July clam seed collection season, this area was leased out to collectors under short-term leases. Clam seed collectors bought exclusive harvesting rights through an auction system and were required to implement self-monitoring and enforcement. For these access and harvesting rights, they paid 0.5-3.0 million VND/ha/year depending on the mudflat quality. In addition to access and harvesting right, collectors were able to obtain credit and technical knowledge as well as contribute to regulation development and monitoring.

The XTNP Management Board developed and monitored the co-management agreement. Collectors were only able to use manual collection devices, and could not damage or convert any natural habitat, use destructive fishing practices, pollute the environment, hunt, or sub-lease the collection area. According to the park's analysis, there was a considerable increase in awareness and understanding of conservation issues among farmers, both men and women. The project succeeded in generating substantial income that partially contributed to local welfare service provision, but was unable to abate the over-harvesting of clam seed. Local authorities received a share of the revenue for local welfare service provision in exchange for providing technical knowledge to the community and park protection. Nevertheless, revenue declined over time because very few mother bed clam

shells remained in the area; clam seeds were collected when they were too small; and environmental factors may also have been changing the conditions under which clam seed production took place.

B. Co-management for sustainable use of natural clam seed resources in Red River estuary

Beginning in the late 2000s, 200 ha between Con Ngan and Con Lu islets were leased to 19 households for manual collection of clam seed with sustainable harvesting limits based on a formal decision by the PPC. The contract sets out the rules for protecting mangroves and aquatic resource use (see Box 2.1). In addition, a self-managed group and a Supervision Board (chaired by the National Park Director) were also created (V. C. Nguyen, 2016b; Xuan Thuy National Park & VCF, 2013).

BOX 2.1. A SUMMARY OF RULES FOR PROTECTION OF MANGROVE AND ITS ECOSYSTEM IN FOREST PROTECTION CONTRACT BETWEEN CPC AND FARMER/CONTRACTOR

Allowed activities:

a. Reserving the whole forest area assigned;
b. Strictly following regulations on protection of natural resources and environment of the buffer zone;
c. Harvesting some highly renewable aquatic products such as mollusks, fish and other aquatic products as approved by the CPC under the supervision the Management Boards or the national park;
d. Conducting monitoring and promptly reporting to the CPC or forest rangers any detected signs of environmental damage and related actions e.g. deforestation, destructive fishing, hunting and trapping of birds.

Prohibited activities:

a. Using wood and firewood as tools for harvesting aquatic resources;
b. Cutting down trees or cause forest fire;
c. Changing the landscape, pollute the environment or affect the ecological balance in the area;
d. Undertaking activities which may exterminate or deplete aquatic resources;
e. Hunting, trapping, or chasing birds and other wildlife;
f. Allowing other people to come to hunt or put nets to catch birds or harvest aquatic species in an exterminating manner.

Source: CPC-Farmer Lease Contract for harvesting natural clam seeds

C. Co-management for sustainable extensive clam farming in eco-restoration zone

1,101 ha of mud flats in ecological restoration zone were contracted for three to seven years to 273 farmers with about 2,000 wage workers in four communes for extensive clam farming on a sustainable basis. A number of the farmers organized into self-managed voluntary mangrove protection and benefit-sharing groups. The duration of the contracts was from three to seven years. A Supervision Board was also established, representing local authorities.

D. Sustainable use of mangrove resources to benefit poor women through a co-management pilot in the core zone of Xuan Thuy National Park.

Through its small grants program, Mangroves for the Future-Vietnam (International Union for the Conservation of Nature [IUCN]) supported a pilot over the period 2011 to 2013 to integrate a mangrove co-management approach into the XTNP management system for protecting about 1,000 ha in the core zone on Lu islet while sharing benefits with poor fisherwomen (Mangroves for the Future-Vietnam, 2011). The poor fisherwomen were gleaners who regularly accessed the core zone to collect a range of aquatic resources by hand to meet household food needs as well as generate

small levels of additional income (about $3 per day). About 300 gleaners, two-thirds of whom were women, were organized into five self-managed voluntary groups in four coastal communes. The gleaners were involved in developing regulations on what species could be caught, how (no mechanical devices), where, and when (no harvesting in reproductive season). The gleaners were able to access specified areas inside and outside the core zone. In exchange, gleaners had to support mangrove protection. Additional support came in the form of a revolving "local initiative fund" totaling 50 million VND for 50 female members in four communes. Through this, women could purchase chicken and pigs for alternative income generation. As a result of intensive communication work, there was a very substantial increase in awareness about the issues among the gleaners, and as a result, there was not a single instance of violation of the regulations set up by the co-management project (Mangroves for the Future-Vietnam, 2011).

E. Community management of protection mangroves in the buffer zone.

With support from the International Wetland Alliance Program, the CPC contracted out 567 ha of mangrove forests in Giao An commune to 28 farmers on an annual basis. A set of clear and easy-to-remember rules were created for mangrove forest protection. Farmers were organized into 14 voluntary mangrove protection groups for joint patrolling, experience sharing, and mutual help. In exchange for protecting the mangroves and its ecosystem, contract holders could continue to use the aquatic resources under the mangrove canopy according to contract terms. However, because the details of aquatic resource use were not clearly stated in the contracts, disputes occurred between forest protection contractors and resource users (Xuan Thuy National Park & VCF, 2013; V. C. Nguyen, 2016b).

F. Co-management for sustainable exploitation of traditional medicinal resources in Con Lu islet in the core zone.

Two self-managed groups were established in 2012 with clear rules for collecting four traditional medicines in Con Lu islet in a sustainable manner (following set methods, specified harvesting seasons, and set quotas): water chestnuts (*củ gấu*), earthworms (*sâm đất*), pandanus (*dứa dại),* and hare's ear (*sài hồ*). A supervision board was also established, chaired by the XTNP Director with participation by representatives from local authorities. However, illegal collection by non-participants remained a problem, especially concerning pandanus, due to ineffective control over access to the core zone.

Given the large number of co-management pilots and participating communes, a tiered management structure was created at the district, commune, and village levels in support of the various co-management pilots after the Prime Minister's Decision 126/2012/TTg. The structure was created with XTNP support after reviewing a range of documents including an overall needs assessment, mapping coastal resources, zoning their uses, and identifying options. Initial opinions and guidance from supervising government agencies such as the DPC, PPC, and MARD were also sought. NGOs, such as the Centre for Marinelife Conservation and Community Development (MCD) and CARE Vietnam, played an important role in setting out the conceptual foundations of the co-management approach.

A step-by-step consultation process was developed to build the management structure. A district-level benefit-sharing management board was established by a DPC decision in 2012 with responsibilities to identify co-management options and oversee their implementation. The management board is comprised of three working groups: (i) extensive clam farming and wild bird conservation in the ecological restoration subzone; (ii) mangrove resource use and traditional

medicinal resource collection in the core zone; and (iii) harvesting natural clam seed resources and mangrove protection in the buffer zone. The management board is chaired by the Director of the XTNP, with membership primarily consisting of CPC and government staff.

Three supervision groups were also set up based on resource type as well as conservation zone for: (i) monitoring and verification of agreement implementation by resource user groups; (ii) supervising problem resolution; and (iii) identifying and notifying the management board of agreement violations and proposing solutions. The supervision groups have a wide participation base that includes XTNP, border guards, and varied resource user group members.

Commune forest protection and monitoring groups were established to ensure that co-management agreements were properly implemented. This includes identifying and addressing violations. Members include XTNP staff, border guards, and resource user group members.

Voluntary resource user groups were organized by resource use and village (or cluster of villages) by the community to ensure implementation of the co-management agreements. The goals, membership, and rules governing the voluntary resource user groups were developed by the community with the group's head elected by its members. These were then recognized by a CPC decision. Most of the resource users and indirect beneficiaries, who made up more than two-thirds of the community, were only consulted towards the end of the consultation process leading to a low level of engagement during the implementation phase (V. C. Nguyen, 2016b; Xuan Thuy National Park & VCF, 2013).

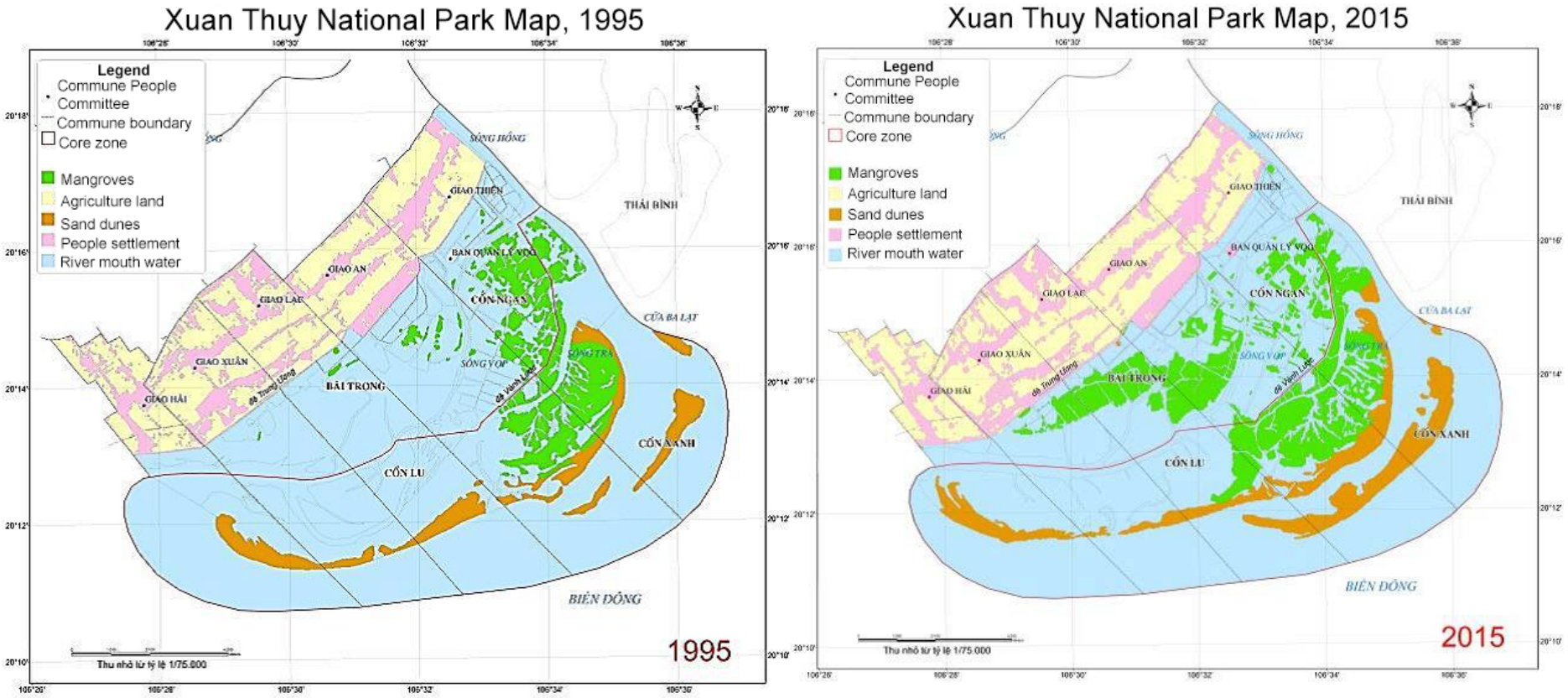
Although a formal evaluation has not been carried out to facilitate adaptive learning, it is clear to many that where the co-management initiatives took place, mangroves and ecosystems tend to be better protected and managed. Most of all, the level of knowledge, awareness, and experience-sharing among users has significantly grown, as has the sharing of information between the government, XTNP Management Board and resource users. As such, the level of mistrust between the different stakeholders has evolved into a situation of greater engagement and collaboration. However, there are different level of success depending on the particular resource and co-management pilot. For example, in the Mangroves for the Future project working with gleaners, there was significant success in developing a dialogue between the resource users in the core zone and park authorities because there were no cases of rule violations. In other cases, such as the first co-management project on clam seed collection, although there were a range of financial benefits, clam seed production itself declined over time due to overharvesting. It is clear that more careful consideration of institutional structure as well as the development of rules that are carefully tailored to resolve key tenure and management issues will help improve effectiveness of these diverse and innovative co-management pilots.

There are, however, several broader lessons from this complex co-management experience that need further exploration and careful consideration. The reality is that in XTNP, there is high population density with heavy resource use within the coastal and mangrove resources. As such, simply regulating access and use is insufficient for achieving improvements in biodiversity conservation. Identifying alternative income sources that are not dependent on the coastal natural resources is a pivotal part of an overall strategy for national park conservation. This points to the fact that, rather than approaching problems in a sectoral fashion, it is more efficient to address issues within XTNP through an integrated coastal resource management approach that builds a multi-sectoral understanding of the linkages between different resource uses in the context of both economic growth and climate change.

Secondly, the participation of the community in the co-management institutional structure was limited; they did not play an active role in needs assessment, design of co-management institution, or even rule-making. As such, they have relatively weak decision-making authority, resulting in low levels of enthusiasm and engagement for the co-management governance mode. The fact that contracts are not always awarded in a transparent fashion adds to the disengaged attitude of many farmers. If tenure rights could be allocated to communities over specific areas for longer duration, there would be greater incentives to manage these areas through sustained investments of time and labor. Moreover, only a small percentage of the total population of the area (about one percent) are involved in co-management agreements. This leaves most of the population only participating in awareness-raising and communication campaigns. This may explain why many of the agreements or contracts are generic, often lacking detail on important issues such as the need for a forest development plan, limiting outsider access to aquatic resources in mangrove areas, or methods for dispute resolution.

Thirdly, there is a lack of clarity as to the budget sources available for supporting co-management approaches. Presently, the costs of various activities are covered by the regular workplan and budget of various key stakeholders such as the government or the XTNP Management Board. However, in the long run, the sustainability of co-management approaches requires a more dedicated budget support system that community members can access to finance their engagement and rule implementation. Allowing co-management to move forward in a "low cost, low value" way could pose a major obstacle to achieving goals. One suggested option for changing the financial support for co-management is to transfer some activities, such as patrolling, from border guards to community-based patrolling. Only thinking in terms of a payment for environmental services mechanism may not generate a sufficient inflow of funds in the short term to support co-management adequately.

FIGURE 2.3. XUAN THUY NATIONAL PARK IN 1995 AND 2015



2.2 The Case of Mangrove Co-Management in Da Loc Commune, Thanh Hoa

The sea dike in Da Loc commune of Thanh Hoa province was broken after the exceptionally powerful Typhoon Damrey that hit the coastline in 2005 (Buffle, Nguyen, & Thomsen, 2010; CARE International, 2014). Although five to six storms annually hit this area, the intensity of Damrey led to a serious analysis of the storm damage such as flooding, sea dike destruction, and long-term agricultural productivity loss. The immediate crop destruction, and the resulting salinization of the soil, caused long-term agricultural problems and led many to leave the area in search of paid work. Unemployment, particularly among youth, significantly increased. In addition, over time, fisheries productivity also declined. Whereas in the past it was possible to earn enough in a day from catching fish within 1 km of the coastline, it became necessary for larger boats to go up to 100 km afield to obtain a reasonable catch.

Da Loc Commune has seen average annual per capita income grow from 6 million VND in 2008 to 30 million VND in 2016. Over time, the area has moved from a largely agricultural economy based on rice and vegetable production to one where non-agricultural sectors and aquaculture/fishery have become major drivers of economic growth, contributing 40 percent and 32 percent of total local production, respectively. The poverty rate has declined from 30 percent in 2005 to 13.5 percent in 2016. Even so, 30 to 40 percent of the commune population is still dependent on mangrove forest resources for their livelihoods and incomes.

In dissecting the problems after the storm, it became clear that where mangroves had been planted from 1986 onwards by the government and international NGOs (about 200 ha) and were still intact, the sea dike had not been damaged. Initially, in 1987, the government took the lead with 76 ha of mangroves planted under its National Program for Planting 5 Million Hectares of Forest (also called Program 661). This was followed by a series of mangrove conservation and planting projects funded by domestic and international NGOs as well as government organizations, such as Save the Children UK (100 ha in 1995); Vietnam Red Cross and Japan Red Cross (200 ha in 1998- 2005); CARE International (200 ha in 2007-2009); MARD/Dike Management Department (50 ha in 2009); and Fund for Calamities in Vietnam (126 ha in 2011-2015) (Tao & Nguyen, 2017).

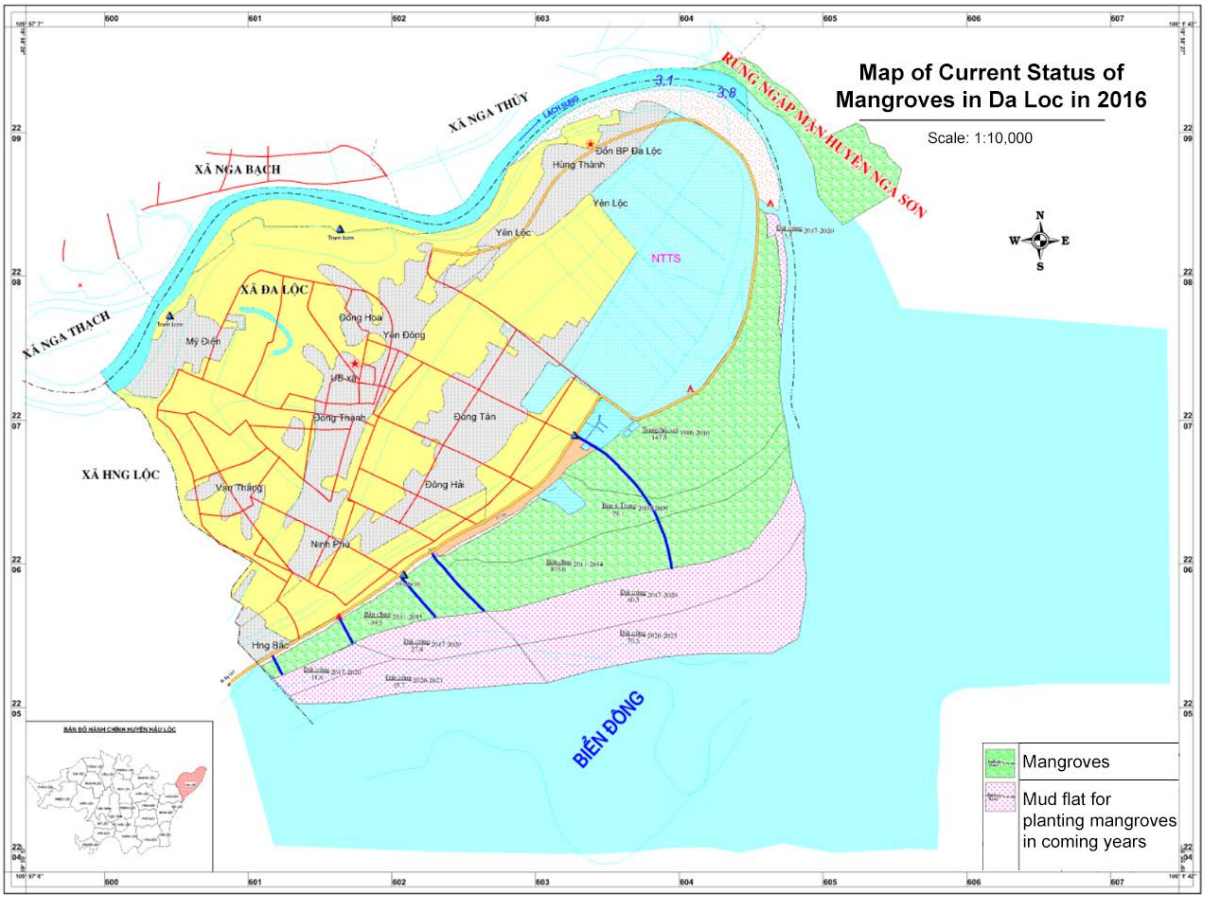
From 1996 onwards, the coastal forest and land was put under the direct control of the CPC with oversight by the DPC and technical guidance of its Section of Agriculture, Forestry, and Fishery. Although the casuarina forest was classified as a protection forest by MARD in the early 2000s, the mangroves remained unclassified. After Typhoon Damrey in 2005, it became clear that the mangrove management approach needed to be re-assessed. Up till then, only private contractors had planted mangroves. Local community members had little awareness of their importance. Moreover, these planted mangroves were only patrolled by the Border Army or guards. According to local villagers, this top-down approach had limited effectiveness.

As a result, in 2006, CARE Vietnam launched a project that aimed to improve mangrove management and restoration while supporting local livelihoods. Six coastal villages in Da Loc commune (Hau Loc district) were chosen as a pilot project site that ran through 2014. The project sought to restore and build a community-based and integrated approach that could: a) carry out participatory land use planning to determine zonation and uses of the coastal resources; b) establish mutually agreeable rules for managing mangrove forests and coastal areas; c) manage and supervise various activities related to mangrove nursery development, planting and protection; and d) promote acceptance of a community-based approach among local authorities and organizations. In particular,

the project aimed to improve livelihoods in order to increase the adaptive capacity of communities in the face of extreme events.

A central component of the institutional change created by the project included the establishment of a community-based mangrove management board (CBMMB) where decisions would be made collectively by a range of stakeholders. This board, formed in 2006, was a democratically elected body with members including local government staff, representatives of different mass organizations (such as Women's Union and Fatherland Front), and farmers. Forty percent of board members were women. Twenty members of the CBMMB (including local government staff) were provided with training on participatory land use planning. The planning process, carried out in three villages, involved an inventory of existing natural resources together with their socioeconomic valuation. The outcome was a coastal management plan together with a map (see Figure 2.4 on zoning) that set out sustainable harvesting quotas. Based on this, a set of commune-level regulations were developed on who could access which resources, where, at which time, as well as how the system would be enforced. Given that nearly one-third of resource users in this coastline were outsiders to these coastal villages, this required careful consideration of how these resources would be shared. This coastal land use planning work was further taken up by the Hau Loc DPC, Thanh Hoa DARD, Da Loc CPC, and village leaders.

FIGURE 2.4. COASTAL FOREST AND LAND ZONING IN DA LOC COMMUNE (2016)



Source: Vietnam Forests and Deltas Program, 2017

In addition, the board oversaw the implementation of specific tasks through activity-based groups as the "nursery group" for working on nursery management, "planting group" for organizing seedling planting, and "protection group" for cleaning and protection activities. Altogether, 277 ha were

planted starting in 2007 with a success rate of 70 to 90 percent by 2009. First, the native species *Kandelia candel* (*Trang, Vẹt thang, Vẹt dìa),* was planted; once it had stabilized, two additional species were added: *Sonneratia caseolaris* (or mangrove apple, *Bần chua* or *Bần sẻ*) and *Rhizophora apiculata (Đước vòi)* (Vietnam Forests and Deltas Program, 2017). Seeds and seedlings of these two species had to be brought in from Thai Binh province to begin the work. A local nursery was then established to continue raising new seedlings.

According to a Department of Natural Resources and Environment survey in 2016, there were 416 ha of coastal forests spread along five km of sea dikes. These were of decreasing width and maturity moving from north to south. These included 33 ha of casuarina forest (*Casuarina equisetifolia or Phi lao*) in sandy onshore areas in front of the sea dike and 382 hectares of mangroves a bit further towards the sea. The surviving mangroves are now strong enough to protect the whole length of Da Loc's five km sea dike, as well as one agriculture area (173 ha) and one aquaculture area (210 ha) (Tao & Nguyen, 2017). Broadly speaking, there is a very substantial level of support among all village members for protecting mangroves, and in that sense, managing mangroves is not an issue with competing interests.

FIGURE 2.5. DYNAMICS OF COASTAL FORESTS AND LAND OVER THE PERIOD 2003-2017

Source: Satellite images from Our Coast – Our Future pilot project

Once the project completed its first phase from 2006 to 2009, the Hau Loc DPC issued a decision confirming the establishment of a commune-level co-management system (funded by the CARE project) for the period 2009 to 2014 (Tao & Nguyen, 2017). The DPC temporarily allocated 412 ha of coastal forest and forest land to three coastal villages with the responsibility to manage and protect the mangroves and related resource uses. Following that, Da Loc commune established a mangrove co-management board, which had eight members, including a chairperson; accountant; two CPC representatives; representatives from the Commune Farmer's Union, Women's Union, and Youth Union; and three village heads. This board then directed the establishment of village co-

management groups, also called the community forest protection (CFP) group by villagers, in three villages. The CFP groups, which had five members and were led by the village head, established co-management regulations at the village level (see Box 2.2 for a summary of regulations while Annex 1 provides the full details of this Convention established in Dong Tan village).

Except for the mud flats that remained in the hands of the CPC for leasing to clam farmers on an annual basis, other parts of the mud flats and mangrove areas were available to the community for collecting aquatic resources. Under the CFP group, there was also a community forest protection team elected by villagers to patrol and monitor regulations. Violators were sent to the local authorities for further handling. The project provided the members of these committees with nominal payments, set at a subsistence level.

BOX 2.1. SUMMARY OF REGULATIONS CONCERNING COMMUNITY FOREST PROTECTION AND DEVELOPMENT IN DONG TAN VILLAGE OF DA LOC COMMUNE

Allowed activities:

a. Collecting dry firewood in planted forests that are seven-years old or above;
b. Trimming branches and forest trees according to silvicultural techniques;
c. Grazing ducks in planted mangroves two-months old and above;
d. Harvesting aquatic products in planted forests two-months old and above, but for not more than 5 days during each tidal period;
e. Harvesting small mussels from April to August, Kheu crab from April to October, and soft-shelled Kheu crab from May to August only; and
f. Harvesting restricted to plots allocated to each group of harvesters on a random basis and supervised by the CMMB and the CFP Team.

Strictly prohibited activities:

a. Catching birds in mangrove forests;
b. Grazing ducks in planted mangroves less than two-months old;
c. Harvesting, transporting, selling or purchasing mangrove aquatic products without prior agreement of the CMMB or CFP Group;
d. Digging small mussels with wide rakes or between two rows of trees that are less than 30-35 cm wide;
e. Walking or anchoring boats illegally;
f. Using explosives, electric shock, or electric three-phase currents to harvest mangrove resources;
g. Cutting down forests or harvesting firewood illegally;
h. Damaging forest protection infrastructure such as signboards, guard towers, and protection landmarks;
i. Leaving rubbish in the embankment, coastline, and planted forests; and
j. Committing other acts that harm the forest and forest resources.

Source: Community Forest Management, Protection and Development Convention of Dong Tan village, Da Loc commune

Despite significant village-level involvement in mangrove co-management and land use planning, the DPC decision was not renewed after 2014. This was due to the lack of formal legal standing for the co-management arrangement, as well as the absence of financial sustainability. Once the financial support from CARE ended, no other funds were available for continuing the institutional work. Currently the co-management groups are working in a voluntary fashion because the DPC went on to sign a contract for mangrove management with a coastal border guard unit based in the commune (Tao & Nguyen, 2017). This unit receives all forest protection fees provided by the state budget on an annual basis. Indeed, in 2016, even the availability of these forest protection funds was unclear.

Local households indicated that there was no mechanism available for establishing a payment for ecosystem or environmental services system. Decree 119/2016/ND-CP on coastal forest management does not provide any guidance on mangrove co-management, let alone financing. It has been suggested that if the co-management regulations were created in the form of an official village convention (as was done for mangrove co-management in Dong Rui commune of Quang Ninh province), then the collection of fees from shrimp farmers, clam farmers, and honeybee-raising households as well as companies in the commune could be facilitated. The village convention represents the set of informal rules governing a village under traditional community self-management in rural Vietnam and has been recognized by the government. While this was proposed in Da Loc commune for 2017, it has not taken place to date.

There were numerous benefits to the mangrove co-management Da Loc commune pilot. The distinguishing feature of this model is the very active role of village co-management groups, which undertook full responsibility and authority for mangrove protection and resource management in a sustainable and equitable manner that, to an extent, even overshadowed the commune mangrove co-management board during the implementation stage.

Women sorting fish for sale in the Da Loc commune market. Credit: Nguyen The Dzung

Additional benefits can be summarized as follows: (i) the 415 ha of coastal forest planted under this project had high success rates and were well-maintained; (ii) the 5 km coastline and sea dike as well as the population of about 2,800 were protected against typhoon impacts; (iii) 1,000 households benefited from various mangrove-related aquatic products, such as crabs, oysters, shrimp/fish, and fuelwood; (iv) the capacity of the local community and government to sustainably protect and develop mangroves was strengthened; (v) a strong role for women emerged in terms of leadership and ownership of the project; and (vi) 85 percent of vulnerable households were empowered by improving their awareness and their resource use practices (CARE International, 2014; T. Y. Nguyen, 2013).

2.3 The Case of Mangrove Co-Management in Soc Trang Province

In the Mekong Delta, the rapid growth of shrimp production from the late 1990s led to significant loss of mangrove forests. The Mekong Delta is considered Vietnam's "rice bowl" and as such, it has a high profile in national economic growth and poverty reduction. The government provided both

technological support as well as loans to facilitate this transition from rice production to shrimp farming. Such growth, however, came with negative social and environmental effects such as deforestation of mangroves. Today, the Mekong Delta is critical for national mangrove conservation as it has around 60 percent of Vietnam's mangroves, with most of them in Ca Mau province. Not only has loss of mangrove forests led to reduced income for local communities and lowered protection from storms and floods, but also it has reduced the ability of the area to adapt to climate change (Joffre & Luu, 2007). Shrimp farming has fundamentally transformed the local economy and ecology.

In response to such forest loss in the Mekong delta, a project was initiated by the Deutsche Gezellschaft für Internationale Zusammenarbeit (GIZ) in 2007 in Soc Trang province to support coastal zone management for sustainable development. Soc Trang is one of the Mekong Delta's 13 provinces. Some 16 percent of Soc Trang Province (3,310 km^2), located to the south of the Hau River, is devoted to aquaculture production. Shrimp farming grew from 7,800 ha in 1995 to 51,700 ha by 2006, with 32 percent of this area under semi-intensive and intensive systems of aquaculture shrimp production (Schmitt, 2009).

An important component of this project in its first phase was to promote co-management of the coastal zone between resource users (local communities and shrimp farmers) as well as the governmental authorities. One of the aims was to create a multi-stakeholder benefit mechanism that would ultimately result in better protection of the mangroves. This stood in contrast to approaches that are solely community-based. This participatory co-management approach was tested in three villages to see how best to achieve sustainable mangrove management through integrated land and resource use. The five main benefits from mangrove co-management, from the project's viewpoint, were (Lloyd, 2010):

- Effective protection of mangrove forests;
- Livelihood improvement through secure sustainable resource use;
- Involvement of resource users in resource management decision-making;
- Reduced workload for authorities; and
- Benefit-sharing as part of an integrated coastal area management approach.

The project area has a total coastline of 72 km, comprising a narrow belt of mangroves in front of aquaculture operations and farms. This is a coastline with a dynamic process of accretion and erosion created by the Mekong River's discharge regime. In Soc Trang, the general characteristics of the mangroves at the beginning of the project were mostly uniform plantation forests managed by state authorities at all levels. The Forest Protection Sub-Department managed the mangroves (formally classified as protection forests) while the Sub-Department of Capture Fisheries and Resource Protection managed the mudflats and sandbanks. According to previous surveys, the mangrove forest consisted mainly of *Avicennia, Rhizophora* and *Ceriops* species, with the GIZ mangrove rehabilitation work moving towards natural regeneration approaches to create a more natural mixed species forest (Schmitt, Albers, Pham, & Dinh, 2013).

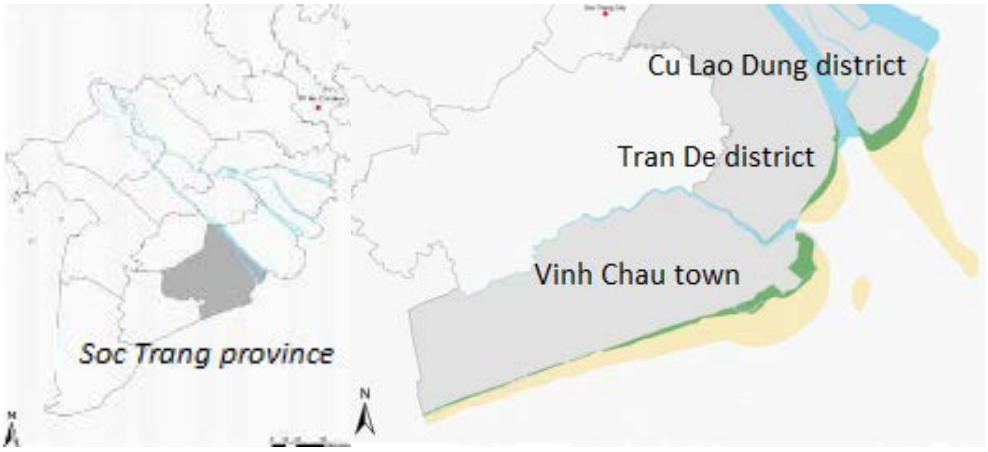
Mangrove resources in this area support local food security and livelihoods through such aquatic resources as goby, duckweed, crab, snake, and oysters among others that are nourished by the mangrove ecosystem (Lloyd, 2010). It is the poor who largely rely on these resources gleaned from mangrove areas and mud flats. In addition, mangroves also play a very important role in protecting

local agriculture against erosion, storms, waves, and flooding. However, irregular and illegal exploitation of the mangroves has led to their degradation (Eucker, 2009). Between 2000 and 2007, the government used forest protection contracts and forest land allocation (about 4 ha per household) along the coast with individual farmers. This involved annual payments per hectare of VND 50,000 for mangrove protection, but was not very effective (Pham, 2011; Schmitt, 2012). In addition, there was over-use of the aquatic resources, in particular over-exploitation of juvenile clams.

The project worked in all three districts within this coastal zone: Vinh Chau, Tran De, and Cu Lao Dung (Figure 2.6). Altogether there are 11 communes in the project area covering about 1,153 km^2, of which more than 10,000 ha are mudflats located in Cu Lao Dung and Vinh Chau districts. The local population in the project area in 2005 was around 188,567, composed of 38,149 households of which 32 percent were officially considered poor (Joffre & Luu, 2007).

With GIZ support from 2009, a co-management project was implemented in three villages. Three community-based start-up groups in Au Tho B (Vinh Hai commune, Vinh Chau town in 2009), Mo O (Trung Binh commune, Tran De district in 2013) and Vo Thanh Van (An Thanh Nam commune, Cu Lao Dung district in 2013) were formed to help resource user groups negotiate processes with the state agencies to reach mangrove co-management agreements for protecting 94 ha of forest and mudflat in Au Tho B); 214 ha forests in Mo O; and 1,200 ha forests in Vo Thanh Van. Culturally, Soc Trang is a diverse region particularly in the project villages (Lloyd, 2010).

FIGURE 2.6. MAP OF THE MANGROVE CO-MANAGEMENT PROJECT AREA IN SOC TRANG PROVINCE



Source: (Lloyd, 2010)

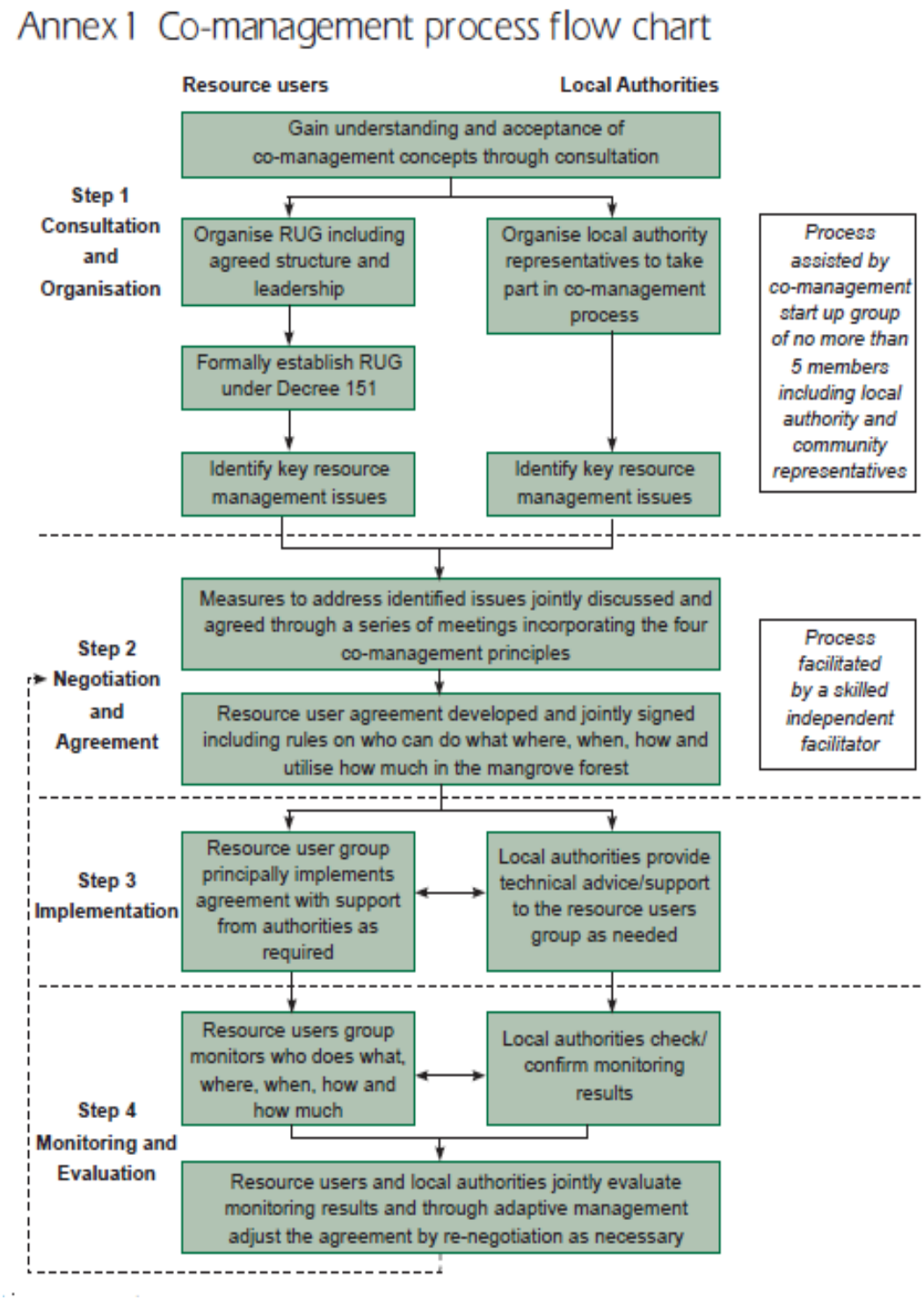
Three co-management arrangements were established based on four main steps (Lloyd, 2010):

- **Step 1** included conducting surveys and information sharing, obtaining political acceptance, building capacity, raising awareness, and organizing start-up groups of resource users and local authorities to prepare and position for equal negotiation partnerships. The formal resource user groups were also formed within this step;
- **Step 2** involved organizing a series of negotiation meetings to bring about formal agreements between the local authorities and resource user groups. The agreements regulated the functional zoning of the forests with rules on who can do what, where, when, how, and to what extent;
- **Step 3** involved implementing the legitimized agreements; and

- **Step 4** involved monitoring and evaluating the implementation of the agreements and the established co-management arrangements.

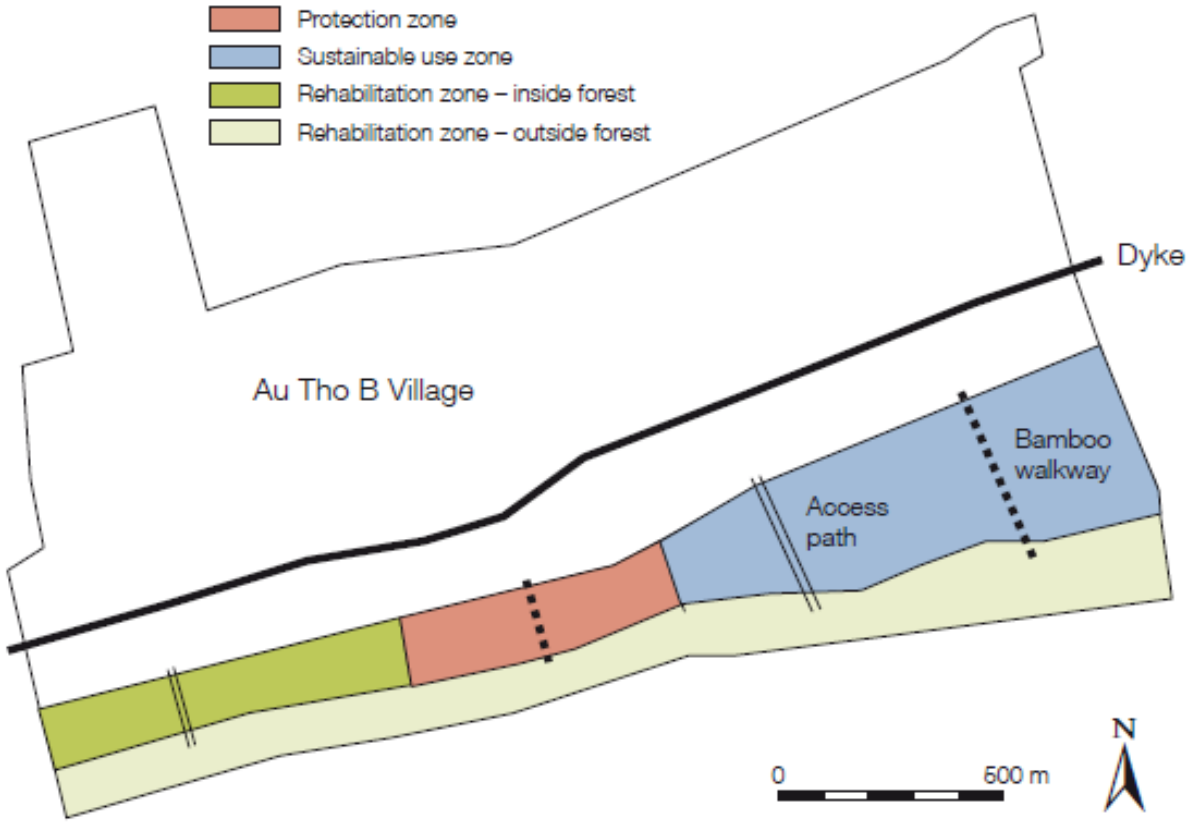
During the implementation of each step, four key principles were kept in mind in any activity design: a) integrated coastal area management; b) participation; c) zonation; and d) monitoring. The details of each step are explained in the following flow chart (Lloyd, 2010, 72):

FIGURE 2.7. CO-MANAGEMENT PROCESS FLOW CHART



One of the primary aims of the Soc Trang co-management model was to create a platform for stakeholders to engage in negotiations and share decision-making authority regarding how to manage mangroves across the coastal belt so that a formalized agreement could be reached (Lloyd, 2010). The agreements, also known as the mangrove co-management regulations, addressed the key issues relating to access, use, management, benefit-sharing, and exclusion rights (see Annex 2). This involved such developments as setting up zonation of different functional forest areas (see Figure 2.8) and monitoring/patrolling mechanisms. Regulations covered important issues such as how to protect young mangrove seedlings planted in the seaward edge by limiting who can go to the area during high tide, and regulating the size of fish nets. In addition, a payment for ecosystem services (PES) arrangement was set up to form a clam cooperative on the sandbanks in front of the mangrove forests (Schmitt, 2012).

FIGURE 2.8. MANGROVE MANAGEMENT ZONES IN AU THO B VILLAGE, SOC TRANG PROVINCE



Source: (Schmitt, 2012)

The local communities wanted to legitimize their access to the forest as well as determine harvesting levels and timing even as they worked to protect the sustainability of the forest and aquatic resources. Local government was interested in collaborating on mangrove management aiming for better results, even though perspectives on co-management were relatively new to them. In practice, both sides of the partnership were engaged in learning about the co-management concept and practices by themselves. Actual interactions with the stakeholders occurred primarily through the guidance of project consultants. Neither side fully understood co-management ideas, but both learned about what it involves as they moved through the process. Activities such as a study tour to a Cambodia mangrove co-management site enabled the local government and community members to understand how co-management works in another Southeast Asian context (Lloyd, 2010).

Ultimately, however, final decisions regarding mangrove co-management had to be made by the competent government authorities in accordance with the Vietnamese legal framework for coastal protection forests.

Clam collection in sandbanks beyond the mangroves in Au Tho B village, Soc Trang province. Credit: Nguyen Tan Phuong.

A range of key lessons were learned across the three pilots. Government remained in a leading role as it held the primary knowledge and resources (administrative, manpower, financial) on forest and coastal management, including aquaculture and fisheries. Even so, regular personnel changes within the local government meant that there was a loss of knowledge about co-management approaches and the various negotiations that were part of building up the co-management agreements.

Secondly, government remained solely responsible for ensuring that the rules were not violated; local forest rangers and commune authorities had to identify and impose sanctions on those who did not follow the rules, especially among those who were outsiders from the community. Local community members were not directly responsible for patrolling and identifying violators, leading to a certain passivity in the face of rule-breakers.

Thirdly, creating a stable financial source for maintaining co-management arrangements was a challenge. Within the government's existing forest management system there were no budgetary provisions for co-management bodies. As a result, it was suggested that greater attention should be paid to developing economic models to support co-management in the form of enterprises so that community members can obtain direct livelihood support while working to protect mangroves. In addition to the PES system that was set up for a clam cooperative, a mangrove snail farm was also established jointly by the community on a trial basis. The PES arrangement did not work here because the policies were unclear to the local authorities regarding practical implementation. Moreover, there were no identified sellers and buyers. With regards to the snail farm, people could

not protect the cultivated snails because of the pressure of exploitation. Ultimately, the existing co-management models were not sufficient to motivate the stakeholders. Because models of livelihood development and environmental services need to follow the objectives set out in the government's master plan for economic development as well as the regulations on PtFs at the central and provincial levels, it is the government who establishes the parameters for such enterprise activity. As such, the financial viability of co-management will largely depend on the support of the central and provincial authorities.

Another critical dimension related to financial viability concerns the fact that the organization of co-management resource user groups mimicked models of cooperatives which are based on cooperative group contracts. However, in practice, resource user groups differ significantly from cooperatives because the latter rely on member contributions of assets and other financial resources to support the group's goals. In the case of resource user groups, they have no formal rights or ownership over the mangrove resources through which they can build incentives for active engagement and support. Local community members do not have the right to transfer, sell, exchange, or donate local aquatic resources. The creation of the resource user group was carried out under the Civil Law of 2015, Article 191 as well as Article 151/2007/ND-CP of October 2007 on the Organization and Operation of Cooperative Groups which does not result in the vesting of any resource use or ownership rights in the coastal landscape. At the same time, Civil Law 2015's Article 197 clearly states that resource ownership rights vest with the provincial government. The lack of legal and therefore tenure clarity regarding the authority of the resource user groups together with their weak organizational capacity made it difficult to ensure member accountability, leading to a low sense of responsibility for implementing mangrove protection rules.

In terms of the role of the local communities within mangrove co-management, there were several positive developments (Nguyen, Le, & Tran, 2016). The process of negotiation and finalization of agreements enhanced the sense of responsibility among government authorities towards the needs of local stakeholders in terms of long-term planning for livelihood development, local capacity enhancement, and integrated natural resource management. In parallel, through the process of participation, the awareness and capacity of the community were strengthened, even though the community ultimately remained too passive to become a strategic partner for effectively interaction with the government, mass organizations, or outsiders. In addition, by garnering local and international attention, resource user groups were able to receive certain political and financial support from foreign as well as central and provincial Vietnam government departments. The regular interaction and negotiations led to improvements in social relations.

In terms of community participation, although there were rules in place on fairness regarding membership and non-membership, these were not monitored nor were violations dealt with. Many cases of rule-breaking were detected but ignored. Authorities could not react effectively enough, and local people did not report the cases to authorities due to their fear of conflict or sympathy with the dependency of outsiders on their natural resources. This inability to deter rule-breakers results in continued unsustainable exploitation of their coastal resources.

Over the longer term, residents reported that their own innovations in forest management were not integrated in a timely fashion into the co-management regulations because the process of adaptive learning was limited. In the end, local resource users perceived co-management as synonymous with their rights to access and utilize aquatic resources. The principle of sharing rights and responsibilities, as part of the co-management ethos, was not fully understood. This is related to the weak legal basis for co-management arrangements in Soc Trang (Nguyen et al., 2016).

Based on the fundamental premises of co-management theory, the three models in Soc Trang are beginning to evolve towards a collaborative process, but to date government retains a leading role in all aspects, especially in the decision-making process. However, when compared with the purely centralized approach, interaction between government and resource users has produced more positive results through engaged communication and understanding of the need for an effective regulatory approach. The Soc Trang co-management model has the characteristics of an "*instruction*" mode because: (1) it does not create sufficient diversity in terms of participants and interests; (2) information exchange and negotiation remain largely one-way in the form of dissemination of forest protection rules; (3) the decision-making process depends on the government, especially at the provincial level, particularly in relation to master and land use plans, licensing, and agro-forestry policy advocacy; (4) feedback during the co-management implementation was not able to innovate and improve in the face of reality; and (5) shared action and commitment in accordance with the agreements could not be organized by local people because they were not aware of the need to form a strong collective position in order to improve the partnership between the state and local people.

In summary, the Soc Trang model depends on the technical and financial support of the GIZ project, and as such its sustainability is not guaranteed. The central role and decision-making authority largely remains with the state, especially the provincial government. Although the aspirational orientation has been to implement a co-management approach based on the sharing of rights and responsibilities between the parties, there are many barriers along the way to achieving that goal. Although the model has clearly legitimized local people's rights to use mangrove resources, the benefits and impacts are not sufficiently strong enough to distinctly change the community's sense of responsibility for coastal resource management. The way in which the use and ownership rights over resources affects the character of the binding relations, and therefore the incentives to protect mangroves, among the parties remains problematic. Monitoring the progress of mangrove co-management in terms of its adherence to rules for implementing the co-management agreements will be crucial for the survival of these pilot models.

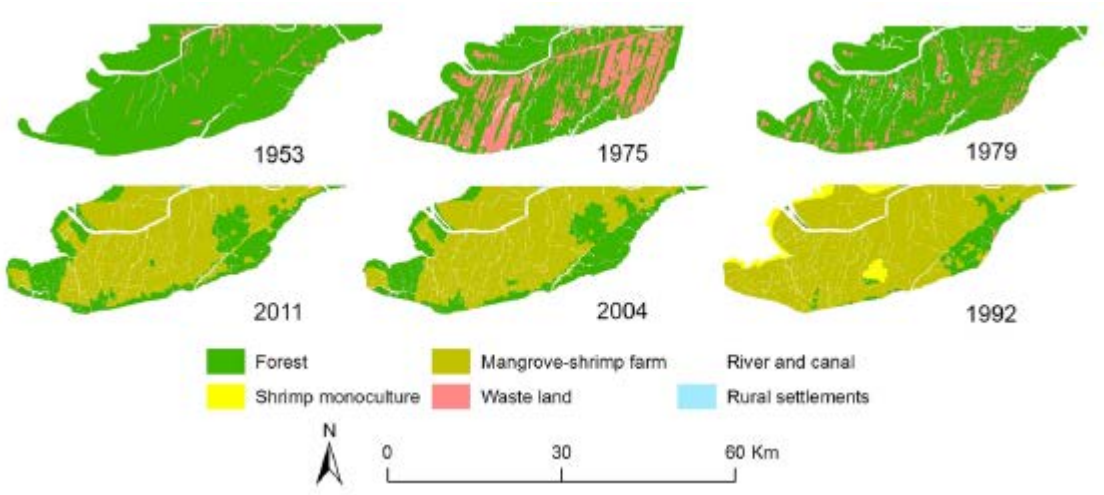
2.4 The Case of Mangrove Co-Management in Mui Ca Mau National Park, Ca Mau Province

The mangroves of Ca Mau, the southernmost coastal province in Vietnam, are considered the largest in the country (Le & Nguyen, 2012). They constitute about 50 percent of the country's mangroves. A large part of these mangroves are now part of Mui Ca Mau National Park (MCMNP), which has an area of 41,862 ha of which 15,262 ha are islands and 26,600 ha is coastal landscape (Figure 2.9). These mangrove forests possess endangered and valuable species even though the mangroves have undergone significant deforestation and degradation. During the Vietnam War (1962-1972), many of these Ca Mau mangroves died due to the heavy use of herbicides and defoliants, and subsequently due to conversion to agriculture and shrimp farming as well as overexploitation. Over time, the mangrove area declined radically from approximately 71,345 ha in 1953 to 33,083 ha in 1992, but then rose again to 46,712 ha by 2011 (Vu et al., 2013). Compared to other mangrove forests in Vietnam, Ca Mau's mangrove forests have a high diversity of mangrove species; some 22 species of mangroves are found, including *Rhizophora apiculata*, *Avicennia alba*, *A. officinalis*, *A. marina,* and *Kandelia candel.* Most forests are either *Rhizophora*, *Avicennia,* or mixed *Rhizophora-Avicennia-Sonneratia* species (BCA, FORET, FORWET, 2013).

FIGURE 2.9. MUI CA MAU NATIONAL PARK LOCATION

Recent analysis of land cover change over the period 1953 to 2011 for five major land cover groups in Ca Mau (forests, mangrove-shrimp farming, shrimp monoculture, wasteland, river and canal, and settlements) provides a clearer geospatial understanding of where the ongoing recovery of mangrove forest areas is taking place (Figure 2.10) (Vu et al., 2013). Early efforts by the government to reforest the area contributed to this transformation.

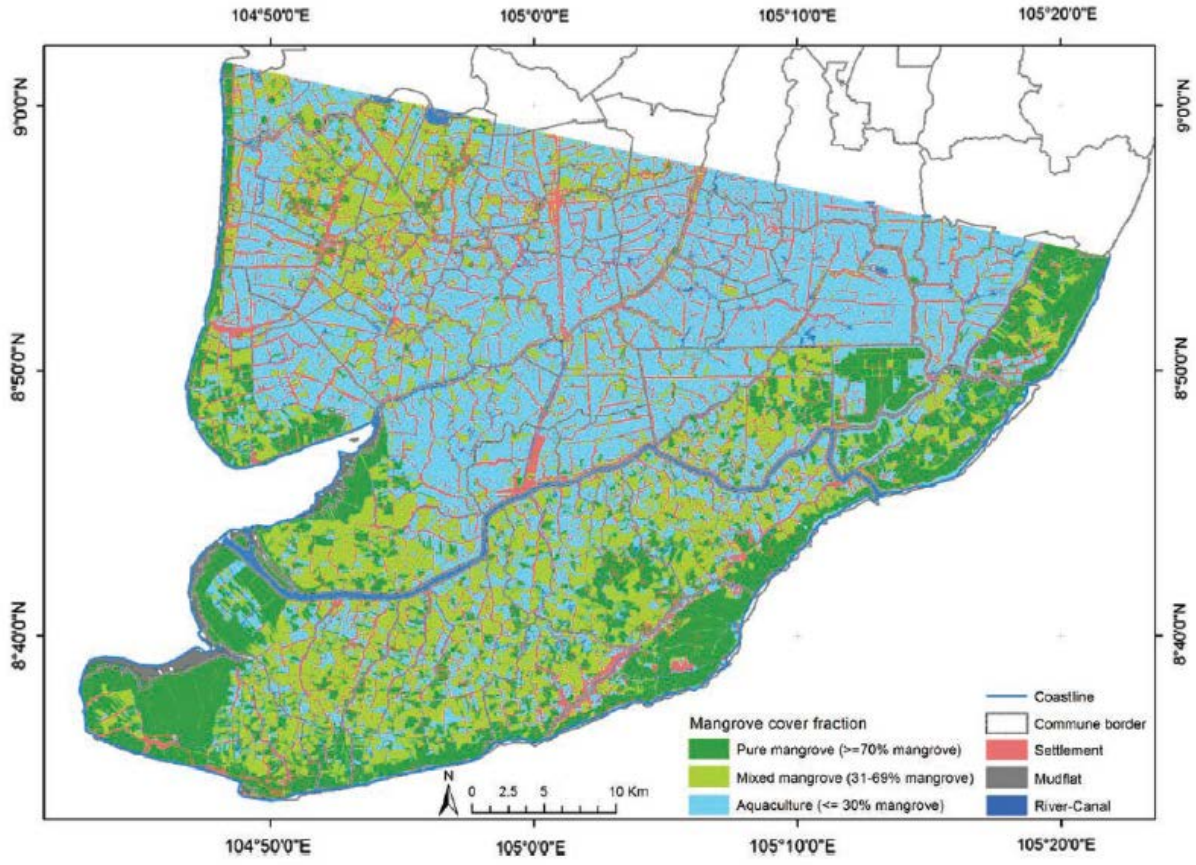
FIGURE 2.10. LAND COVER MAPS FOR THE MUI CA MAU FOR THE YEARS 1953, 1975, 1979, 1992, 2004 AND 2011 SHOWING THE FIVE MAJOR LAND COVER GROUPS



Source: Vu et al., 2013.

However, despite the expansion in mangrove cover, another study concluded that only 22 percent of the land under mangroves has forest cover of more than 70 percent (Figure 2.11) (Vo, Kuenzer, & Oppelt, 2015). As such, mangroves remain significantly affected by extraction of timber for firewood and construction materials, as well as for expansion of combined mangrove-shrimp aquaculture systems. Beyond anthropogenic factors, there is also substantial loss of coastal mangrove forests due to natural processes of coastal erosion.

FIGURE 2.11. MANGROVE DISTRIBUTION ACROSS CA MAU PROVINCE



Source: Vo et al., 2015

Although Ca Mau province has a long coastline of 254 km, much of the mangrove area is unevenly distributed and is mainly concentrated in Ngoc Hien district, the site of MCMNP, at the very tip of Ca Mau province. Because it has numerous valuable and endangered species, MCMNP was recognized as a World Biosphere Reserve in 2009 and subsequently named Vietnam's fifth Ramsar site in 2013 (Department of Remote Sensing Technology, 2015). In addition to its 12,203 ha of strict protection zone, 2,859 ha of ecological restoration zone, and 200 ha of administrative and service zone, it has 8,194 ha under a buffer zone located in Dat Mui, Vien An, and Dat Moi communes of Ngoc Hien district. MCMNP is very rich not only in mangroves, but also in many species such as fish (233 species), birds (93 species), reptiles (43 species), and amphibians (nine species), some of which are listed in the IUCN Red List of Endangered Species (WWF, 2013). It is considered to be an important site for a number of migratory waterbirds that are globally threatened and near-threatened such as the far eastern curlew (*Numenius madagascariensis*), Chinese egret (*Egretta eulophotes*), and painted stork (*Mycteria leucocephala*) (Lam, 2010).

One of the main challenges for the park is that before the park was created in 2003, thousands of poor households were already living in its core protection zone (Mangroves for the Future, 2012). Most of them had no land or only enough for housing, and as such did not have the option to engage in farming or shrimp cultivation. Fishing was only feasible during the June to July period. These households resorted to harvesting mangroves in order to produce charcoal in small kilns, earning them about US$150 a month.

Although prior to 2003 the mangrove areas in the northern part of the park had been designated the Bai Boi Coastal Protection Forest (and therefore managed by the Provincial Department of Forest

Protection), in 2003 this forest was combined with Dat Mui Nature Reserve to form MCMNP based on the Prime Minister's Decision 142/TTg. Following creation of the national park, the forest was classified as SUF within Vietnam's forest classification system. As such, the park was required to protect the mangroves and their natural resources. Although the MCMNP Management Board had established a patrolling and regulatory enforcement unit, the sheer complexity of the landscape with numerous islands and inlets made it hard to achieve the protection goals.

Moreover, under the laws for SUFs, part of the criteria for park operation includes ensuring that local livelihoods are supported. However, the MCMNP Management Board had little experience in addressing such issues. Before park establishment in 2003, many individual households living in what become the ecological restoration and core zone had signed contracts with the Dat Mui Natural Reserve to plant and protect mangroves of the area. The legal basis for these contracts is the Law on Forest Protection and Development 1991 (later updated in 2004), Decree 02/CP dated January 5, 1994, and Decision 202/CP dated May 2, 1994. The households had been issued "green books" for a 15-year duration that required them to protect 70 percent of the allocated land for forest protection and plantation while the rest of the land was available for other production activities. In exchange for forest protection, contract holders could harvest aquatic resources under the forest canopy. On top of this, they received a share worth 70 percent of the value of the thinning forest products based on state forestry investment policies. Since these "green book" contracts were of long duration, the contract holders had the right to transfer their contracts to other persons during the contract period.

However, once the area was converted to SUFs, the MCMNP Management Board suggested signing a new kind of contract involving leasing and protecting mangrove forests for five years. Under the law governing SUFs, community members would not be allowed to exploit or thin the mangrove trees within the ecological restoration and core zone (Article 19, Decree 117/2010/ND-CP on the Organization and Management of Special-Use Forests). This stood in contrast to the terms of their existing "green books." The short-term "lease" offer made households worry that they were about to lose their land and land-related assets.

In reality, although the 2016 Prime Minister's Decree 168/2016/ND-CP permitted forest and water surface lease contracting for a period of 15 years in national parks (under Article 4), MCMNP could not implement the decree because it lacked the required master plan for management and development. Most of the local people along Hai Thien canal of Con Mui commune refused to sign the new contracts. Conflicts between the local people and the management board continued to smolder because no imminent solution to this issue was in sight. Although local people were very aware of the importance of mangrove trees in shrimp production, the changes in the new forest lease contracts left people no longer interested in forest care. Forest quality in Hai Thien canal declined.

In turn, the MCMNP Management Board began working together with GIZ in 2013 to propose a co-management model for Mui Ca Mau that would need to be approved by the Ca Mau PPC. The model for Mui Ca Mau was adjusted based on the Soc Trang experience. Fifty-four households located in Hai Thien canal (in the park's ecological restoration zone) participated in the model.

Currently GIZ works as an intermediary between the government and local people. This work first involved holding focus groups with affected people to collect information and opinions so that the management authorities can more clearly understand the multiple dimensions of the challenge. In exchange, the focus groups disseminated the views of the management authorities to the affected

households. Members of the focus groups included a representative of the Biosphere Reserve Management Board (directly under DARD, in lead role), representatives of the MCMNP Management Board, the Agriculture Division under the Ngoc Hien DPC, the Dat Mui CPC, and the head of Con Mui village.

The 54 participating households in the mangrove co-management pilot were divided into four groups. They were invited to attend workshops to learn more about co-management, aquaculture techniques, and forest and environmental law. As yet, there are no specific regulations for co-management in Hai Thien canal. Households and authorities are still using the terms of the original "green book" forest protection contracts as a basis for their activities on land, forests, and aquaculture water surface.

Based on current forest protection and development legislation, the MCMNP Management Board signs an annual coordination mechanism with the CPCs, border guard, and police for patrolling and monitoring. The CPC engages in administrative management in the area and helps the co-management project mobilize, propagate, and encourage participation, especially among women. Commune authorities also help organize meetings, record comments from local people, selectively solve conflicts within their jurisdiction, and forward issues beyond their authority to higher levels of authorities.

A number of other projects have also been implemented in the park supporting co-management in Hai Thien canal, such as the Swedish International Development Cooperation Agency's project on forming forest protection management teams from 2012 to 2015; the Netherlands Development Organization (SNV) and IUCN with the Mangroves and Markets project promoting ecosystem-based adaptation by providing incentives for mangrove conservation (2013 – present); World Wildlife Fund (WWF) helping restore endangered species and establishing botanic gardens in 2013; and the United Nations Programme on Reducing Emissions from Deforestation and Forest Degradation supporting crab seeds for farming as well as training for capacity enhancement of co-management groups in mangrove protection and management in Hai Thien canal in 2017. In addition, local and international scientists have undertaken collaborative research for restoration fishery resources, forest protection, and mudflat rehabilitation. All these activities focused on supporting a specific aspect such as livelihood development, awareness raising, or forest protection and restoration, while the co-management model, co-organized by GIZ, focused on developing the capacity of local people for negotiation and decision-making in collaboration with the local authorities.

Through the co-management approach, villagers and the MCMNP Management Board have been able to sit together and discuss issues related to forest management and livelihoods. Officials and people participating in the model have had opportunities to visit, learn, and share co-management experiences with other localities. Women's awareness has been enhanced through meetings and discussions, and they have been increasingly willing to share their thoughts and aspirations with other stakeholders. Compared to other households, the ones participating in the co-management model have been prioritized when it comes to receiving state supports such as loans, provision of clean water, and environmental sanitation.

The early stages of this co-management model have resulted in changes in terms of the working approach of national park staff. Previously, their tasks were carried out under the direction of the higher authorities. Now, the approach is perceived as more active in "soliciting opinions," attempting to understand the aspirations of the people, and allowing them to coordinate with the authorities to make relevant decisions. Mangrove co-management requires staff who deeply understand co-

management as well as the legally approved mechanisms that can be followed without fear of breaking any rules.

It is clear that understanding of co-management is somewhat different between the community and the government. After many meetings and discussions and guideline development in the process of creating a co-management institutional structure, a long-term co-management vision is emerging though challenges remain. At present, GIZ pays for all meetings and provides financial resources that help sustain these activities. Once the project is over, the state has no specific funding source for co-management, threatening the sustainability of the model. The effectiveness of the co-management approach not only depends on its ability to engage all levels of government, but also relies on the practical feasibility of implementing the decisions made by the local people. In reality, these are both quite challenging. After two years of project implementation, the co-management groups have been formed, but have not created co-management regulations or started actively managing the resource. Contradictions between the previous and new forest protection contracts have not been resolved. In addition, there are still no solutions to the pressure to exploit and destroy resources by those outside the local community, especially in the season of clam and crab harvesting. These are issues that the model will face in its next steps.

2.5 The Case of Mangrove Co-Management in Nhung Mien forest, Ca Mau Province

Ca Mau province is the only place in Vietnam to produce certified organic shrimp. The problem of mangrove loss to shrimp aquaculture has been the most severe here because Ca Mau province has the largest aquaculture area in the Mekong Delta and Vietnam's largest mangrove area (50 percent). Shrimp farming here accounts for 45 percent of the Mekong Delta's total shrimp farming area and contributes 35 percent of its total shrimp production. In Ca Mau, there are about 17,700 ha of integrated mangrove-shrimp farms (Vu et al., 2013). There was interest among major shrimp producers to address the problem of mangrove forest loss as a result of conversion to shrimp aquaculture ponds. The organic shrimp certification program idea was mobilized by the Vietnam Association of Seafood Exporters and Producers in the early 2000s (Altena, 2014; Vu et al., 2013). The momentum behind organic shrimp began with Ca Mau Frozen Seafood Processing Import-Export Corporation's initiative. Part of the certification requirements includes maintaining 50 percent mangrove cover in shrimp production ponds. Organic shrimp sell for a price that is 25 to 30 percent higher than that of conventional shrimp.

Later, in mid-2008, Nam Can Seaproducts Import Export Joint Stock Company also joined this new direction. While these were important innovations, lessons were learned along the way about the obstacles that can weaken farmer enthusiasm (Ha, van Dijk, & Bush, 2012; Ha, Bush, Mol, & van Dijk, 2012). Most shrimp farmers in Ca Mau still operate in a low investment environment, and pursue conventional extensive, mangrove-shrimp, or rice-shrimp farming (Vu et al., 2013). Since these do not involve much by way of inputs, they were readily able to make the transition to organic shrimp production. In the end, however, many farmers began to withdraw because only a small portion of the 20 percent price premium was directly received by farmers, often after a long time.

A later project, initiated by SNV following discussions with the government, sought to provide additional payments for planting mangroves. This Mangroves to Market project was initiated for mangrove protection and restoration to support climate change adaptation and mitigation, through organic shrimp certification in the coastal areas of Ca Mau, Tra Vinh, and Ben Tre provinces (SNV, 2016). The project engaged in a partnership with Minh Phu, which is the leading seafood company in

Vietnam, and ranks 50th among the top 100 seafood businesses globally. It produces more than 20 percent of the domestic shrimp in Vietnam (Minh Phu Group, 2016). The project is being conducted over a seven-year period from 2013 to 2020. In this project, organic shrimp are farmed in an environmentally friendly manner under the canopy of mangroves and are also certified to Naturland's standards.

In Ca Mau province, this is part of the overall government vision to build an "organic coast." Here, the project was established in the Nhung Mien Protection Forest. In the Mangrove to Markets case, this may not be typically labelled a "mangrove co-management" approach because it does not involve a partnership with all local community members; rather, it is a partnership between small-scale shrimp farmers, a major shrimp company, and the government. This type of mangrove co-management offers insights into how revenue generated through shrimp production can be funneled towards improving mangrove conservation through a PES mechanism.

Prior to 1989, there were not many households in what is today the Nhung Mien Protection Forest area. However, over the period 1993 to 1995, when the price of shrimp began to sharply increase, many people from inside and outside Ca Mau started occupying mangrove forestland and digging shrimp ponds. This led to a decline in mangrove forest cover and disturbed the local ecology. The deforestation level was proportional to the increase in population. After this active period when mangroves were being actively converted to shrimp farms, the population stabilized. Thereafter, over the period 1998 to 2000, the area became the focus of new mangrove plantation projects. Under Decision 661/QD-TTg that was created in July 1998 and ran till 2010, the National Program for Planting 5 Million Hectares of Forest resulted in new mangrove plantings in this area, mainly with *Rhizophora apiculata*. The decision's aim was to increase forest coverage across the country. However, due to the lack of manpower for patrolling these new plantations, many people used to sneak into these areas and destroy planted forests to dig new shrimp ponds.

Over the period 2004 to 2010, the situation of mangrove forest restoration became more positive as people became aware of the role of mangrove forests in disease prevention for shrimp farming. In addition to these afforestation projects, government Decision 178/2001/QD-TTg required shrimp farming in production forests to maintain 70 percent of the aquaculture ponds under mangroves (or 60 percent for smaller ponds). In response, provinces such as Ca Mau introduced their own Decision 24/2002/QĐ-UB in 2002 requiring shrimp aquaculture operations to limit non-timber extraction to 30 percent of farm area for farms over five ha, 40 percent for farms between three and five ha, and 50 percent for those below three ha (Baumgartner, Kell, & Nguyen, 2016). The implementation of this decision has had mixed success both because farmers primarily rely on income from shrimp farming (as well as crab collection) but also because enforcement effort and sanctions are very weak. Farmer income from mangrove timber extraction is limited because they do not have full ownership of the resource. All in all, these regulatory approaches requiring fixed ratios between mangrove and water surface areas have not been able to attend to the economic realities of households (Baumgartner et al., 2016).

In 2013, Ca Mau provincial DARD directed the Nhung Mien Protection Forest Management Board (NMPFMB) to participate in the reforestation of mangroves through sustainable shrimp farming and emission reduction in Ca Mau project funded by SNV. To start project implementation in 2013, local people were invited to attend several meetings with the management board and Minh Phu that eventually led to the formation of a cooperative ecological shrimp farming group. This helped bring the small farms together into a collective and larger commodity production unit. Instead of the farmers growing their own small businesses, each household would become a shrimp pond within

the enterprise. After that, local people were trained by the project on organic shrimp farming techniques, and how to care for and protect mangrove forests. SNV sponsored some visits to similar models in Thailand.

After annual training, implementation, and monitoring and evaluation for three years, the farmers met the standards for organic shrimp farming. By December 2014, 741 households were certified for organic shrimp production with an area of 2,695 ha according to Naturland standards (2014 - 2015). In 2016, Minh Phu provided additional certifications to 553 households with an area of 2,403 ha for matching Naturland standards (2015 - 2016). The requirements to be granted a certificate include: (1) maintaining a planted mangrove forest area at 40 percent or more of the land area; (2) ensuring environmental sanitation of living areas; (3) ensuring seed source and quality; (4) refraining from using chemicals outside the permitted list during shrimp farming; (5) ensuring a good post-harvest reservation; and (6) ensuring records are kept of shrimp farming in accordance with the guidance provided by Minh Phu.

Commune authorities carry out education, monitoring, and inspection of sanitation conditions (such as toilets, cage system, and garbage) and the NMPFMB checks that the standards on mangrove cover and condition meet national regulations for mangrove-shrimp farming. The CPC deals with any disputes that arise, and the border guards maintain their patrolling activity. The remaining standards related to shrimp quality are checked and evaluated by Minh Phu.

Organic shrimp from Nhung Mien protection forest. Credit: Le Tien/IUCN

Minh Phu reimburses 100 percent of farmer cost for achieving international certification of raising organic shrimp on their farms, which can be expensive (~$10,000 per certification for the first year and about half that annually for the next few years). The company also pays forest environmental services (500,000 VND/ha/year) to households that sell more than 40 kg shrimp/ha/year to Minh Phu. In 2015, Minh Phu paid nearly 607 million VND for forest environmental services to 553 households. This money is used for planting further mangroves (NMPFMB had planted 80 ha by 2016). Minh Phu provides financial support equivalent to 1,000 VND/kg of organic shrimp harvested from the area. The board contributes 35 percent of this money to the provincial governmental budget and spends the remaining 65 percent for its own operation and development. Additionally, to encourage households who participate well, 89 households were offered preferential shares in Minh Phu company stock.

The success of the project has been such that in early 2017, Minh Phu announced the establishment of its own social enterprise of mangrove-organic shrimp production based on this modl. This model of social enterprise is spreading across the Mekong Delta as many provinces have started to follow Minh Phu.

There are benefits for all stakeholders involved. Through opportunities for training and interaction, the capacity of the commune and NMPFMB staff has significantly increased, as has sharing of information. Thanks to the model, the pressure on mangrove forests has also been reduced. Regarding payment for forest environmental services, in 2016 the Cau Mau PPC issued Decision No. 111/UBND on the pilot farming of shrimp and forest with international certification in Ca Mau province, including piloting of PES. The model is operating completely within Vietnam's existing legal framework. Although gender mainstreaming has not yet been integrated into the model, local women are increasingly interested in improving their capacity.

Shrimp packaging. Credit: Le Tien/IUCN.

The model demonstrates high compatibility because of the "harmony of interests" among the parties, who are operating in accordance with the national and provincial policy framework on mangrove forest management and protection. The nature of the collaboration among the stakeholders is highly voluntary. Cooperation between the company, the farmers, and authorities at all levels has been much appreciated. Minh Phu is the first company to pay shrimp farmers for environmental services. The central and provincial governments are very interested in further developing this type of organic shrimp production into a national product. Thus, the state has been keen to support the technical, technological, financial, and promotional aspects of the Nhung Mien certified organic shrimp model.

In moving forward, from the company's perspective, it needs support from state policy for its business to be successful. Policies related to the model's operation and organic shrimp production should be clear and stable. Minh Phu highlighted the need for special attention to the stabilization of land use plans for both organic shrimp farming and mechanisms for social enterprises like Minh Phu. Coherence and consistency in policy and direction across the central, provincial, district, and commune levels play an important role in promoting effective models.

One of the weaknesses of the model so far is that many shrimp farming households are aware of the benefits of the model for livelihoods, forest protection, and ecological wellbeing, but do not feel that the model meets their expectations. Compared with other models of shrimp farming in the area, the financial benefits of organic shrimp production are limited. In addition, there is a perception that only big companies with substantial financial resources can operate such a model.

2.6 Lessons from Vietnam Experience with Collaborative Governance of Mangroves

In general, because of the complexity of coastal landscapes involving multiple types of resource users and a wide spectrum of mangrove ecosystem benefits, any individualized or centralized approach to mangrove management faces difficulties. Managing mangroves is a different type of undertaking from terrestrial or upland forests given the unique tidal dynamics, forest architecture, and livelihood needs. A collaborative or partnership approach offers the hope of better management because its inherently participatory orientation and leveraging of local and expert knowledge permit the development of an integrated approach that brings multiple sectors and perspectives into one management frame. Across Vietnam's long coastline, it is clear that in most situations, there are a mix of poor resource users (who rely on gleaning in mangrove areas and mudflats) as well as varied types of shrimp aquaculture producers (using extensive to intensive types of production systems), fishers (typically small-scale fisheries), and clam farmers drawing on the resources in different parts of the landscape.

A range of different case studies across the Red River and Mekong Deltas over the last fifteen years illuminates the driving force behind the commencement of mangrove co-management pilots, as well as their benefits and challenges. Since a co-management approach need to be tailored to the specific context, there can be no general lessons that apply to all contexts. However, these case studies indicate that there are some common findings that can be identified:

1. In comparison with government-managed or individually-managed approaches, the development of a co-management approach permits two-way communication that can help the government better understand community needs related to livelihoods, income generation, tenure duration, and technical support to achieve improvements in mangrove planting and conservation. At the same time, communities can learn about the government's goals, approach, and methods. This has been shown to play an important role in changing what are often distrustful dynamics between the government and local communities. In the process of building two-way communication, both sides begin to learn what co-management is. Co-management as an idea is relatively new in Vietnam. It is not readily understood by government staff, commune leaders, mass organizations, or community members. Sustained support for capacity-building, both among government agencies as well as among mass organizations and local community members, is necessary to build up the skills and technical knowledge for productively engaging in collaborative mangrove governance.

2. Broadly speaking, most community members support mangrove conservation having seen firsthand the benefits to the coastal landscape in terms of protecting infrastructure and farms, supporting rich aquatic productivity, enabling food security, providing income-generation opportunities, and addressing climate change adaptation and mitigation needs.

3. Communities are not in strong favor of individualized mangrove forest protection agreements to households because this results in exclusion of those (often poor) community members who rely on gleaning within the mangroves and mudflats. The content of these agreements is often not detailed enough to specify which resources within mangroves are to be broadly shared, and which are to be strictly regulated. Mangroves and mudflats are common property resources that are utilized by many members of the community to meet household food needs.

4. Where forest protection agreements are developed, communities prefer contracts of longer duration such as the 15 years under "green books." The five-year or one-year forest protection agreements do not create sufficient incentive to invest the time, labor, or resources into protecting mangroves or mangroves-shrimp pond systems in a sustainable way. Clear tenure rights of a long duration are preferred by communities. In addition, many contracts are not awarded in an open, transparent fashion. As such, community members lose interest in supporting the overall goals of such agreements.

5. Confusing and overlapping authority among different government agencies for managing mangrove areas results in open access situations. No single authority is responsible for ensuring that rules are established and implemented in a fair and transparent way. CPCs are often responsible for managing the mangroves in their jurisdiction even though they lack the capacity to do so. Moreover, they are not presented with sufficient incentives to manage the mangroves in a sustainable fashion.

6. Pilots to carry out mangrove co-management have been positively received, particularly where communities hold considerable authority to govern their coastal mangroves, develop and implement rules, and carry out their own coastal planning and zonation. Where authority for rule development and implementation largely lies in the government's hands, villagers lack the enthusiasm and interest to support mangrove conservation. All too often, contracts issued by the government are not clear on benefit-sharing details, nor on dispute resolution systems.

7. Even where successful co-management pilots have been developed over the course of a few years through a community-oriented approach, the fact that the resource tenure rules have not been formally or legally recognized, by incorporation for example in the form of a village convention (as was done in Dong Rui commune of Quang Ninh province) has meant that the co-management system was easily set aside in favor of more formally sanctioned approaches (with established budget lines) such as working with border guards and forest rangers. In a similar vein, identifying the appropriate enabling legal frameworks to create a community association or cooperative that becomes the institutional vehicle for engaging in collaborative mangrove governance is important so that members can leverage its assets to build incentives for community engagement.

8. The funds supporting mangrove co-management have primarily come from donor agencies or from national park management boards. Once project funding ends, the co-management arrangements also end, or only continues in a voluntary and low-level way. There is no established source of funding available from the government for communities to engage in mangrove co-management. Moreover, co-management pilots have not been sufficiently successful at developing alternative sources of income, through cooperatives or community-based enterprises that can support the limited costs of co-management. Appropriate mechanisms for establishing PES in coastal landscapes that can support co-management do not exist.

9. Mangrove co-management institutional structure and rules need to be designed to suit the local context. When designing governance approaches, the multi-functionality of mangrove forests needs to be carefully understood, in particular the diverse ways in which the landscape supports food security and income generation of different types of households and companies (see also van Oudenhoven et al., 2015 for Indonesia). All too often, the focus has been on mangrove planting and protection: a tree-oriented perspective. Instead, a mangrove ecosystem perspective

should be used so that the linkages between various types of livelihood systems and the health of the ecosystem become more prominent. The assessment of community needs to include consideration of natural resource issues, tenure rights to varied aquatic resources, and community and institutional capacities, as well as a map of conflicts. Designing strategies for mangrove management and protection is best addressed through a participatory coastal spatial planning approach that takes up an integrated coastal resource management perspective relying on multi-sectoral thinking. Once the broader vision and spatial scenarios together with implementation plans are developed in the context of future economic development and climate change forecasts, the specific needs of mangroves come into clearer view. Then, the development of zonation systems, sequential plans for mangrove planting and rehabilitation, and graduated levels of resource use over an annual cycle can form the basis for rule and responsibility systems.

10. Multi-sectoral coordination also indicates the importance of taking proactive action in ensuring new legislation such as the Planning Law of 2017 or the new Forestry Law being finalized provide enabling frameworks specific to collaborative mangrove governance. Similarly, the implementation of Decree 119 on coastal forest management can consider some further pilots on mangrove co-management which can, together with earlier pilots, be rigorously evaluated to derive lessons for designing longer-term mangrove management legislation and regulations.

11. Gender and social inclusion concerns are addressed in some pilots, and have produced positive rules. Developing guidelines that support significant engagement of women and poorer or marginalized members of local communities can increase inclusive and equitable results.

12. Adaptive co-management is necessary to adjust the rules and responsibilities in accordance with changing economic, social, and environmental circumstances. A system of monitoring and learning can support learning so that adaptive co-management can be facilitated.

The various mangrove co-management pilots in Vietnam have demonstrated that there is tremendous innovation at work in various parts of its long coastline. By creating further opportunities to discuss the merits and challenges of these various pilots, it will be possible to delve deeper into the most appropriate approaches for implementing Decree 119. Since Vietnam's commitment to protecting and sustainably managing its coastal forests is clearly high on the national agenda, such an adaptive approach will facilitate both climate change adaptation and mitigation capacities.

Chapter Three: Asia: Mangrove Collaborative Governance in Five Countries

3.1 Moving Towards Mangrove Collaborative Governance in Asia

After long histories of state-led protectionist approaches to mangrove conservation in many Asian countries, there is a change afoot as these countries explore the potential benefits of a collaborative approach to mangrove governance. As the economic, social, and ecological benefits of mangrove forests for climate change adaptation and mitigation are becoming clear, both in social and economic terms, there is growing interest in developing more effective ways of protecting and managing coastal forests. By developing new institutional and policy structures that support collaborative mangrove management by the government together with local communities, the opportunities to leverage the strengths of both partners to achieve practical gains in mangrove cover and condition are increased.

Some countries in Asia, such as the Philippines and Thailand, have been at the forefront of co-management approaches that provide greater authority to communities in mangrove management. In other countries, such as India, joint mangrove management (JMM) is more of a partnership between the government and local communities, albeit with the government having the stronger hand. In Bangladesh, multi-tiered co-management approaches are being piloted at present to identify the best design strategy. In Indonesia, even as the national government is focused on establishing inter-sectoral management bodies for building a strategy on mangrove management, local communities have decided to pioneer their own local institutions for mangrove protection and conservation, cobbling together a regulatory framework under existing laws to achieve their goals by networking with government officials.

While it is clear that the collaborative governance of mangroves will continue to bring needed positive energy to sustainably managing mangroves, the question of how incentives are embedded within the governance and rule structures for mangrove co-management needs careful attention in order to achieve tangible goals. All too often, local community members are invited to participate in co-management committees and councils without clarity on benefit-sharing mechanisms, how alternative livelihoods can be developed, or who will pay for the costs of monitoring and patrolling. Given the long histories of mistrust between forest departments and local communities in most countries, and the uneven distribution of power between the stakeholders involved in mangrove co-management, improving the chances for mangrove co-management requires attention to the details of regulatory design. In many countries, those living in these coastal landscapes are in a condition of extreme poverty, are landless, or are socially marginalized. Levelling the playing field in these contexts will require a slow, careful process of building capacity, support, and trust. Identifying opportunities for learning into the process of implementing mangrove co-management will be essential for ensuring that these innovative institutions continue to survive into the future as economic and environmental conditions change.

3.2 Bangladesh

Bangladesh has the world's largest contiguous mangrove forests called the Sundarbans covering about 6,000 km^2, with up to 13 mangrove species making up its ecosystem. It forms part of the world's largest river delta in the Ganges-Brahmaputra-Meghna estuary with UNESCO declaring it a

World Heritage Site in 1997. The Sundarbans forest spans the coastline across Bangladesh and India with about 60 percent in Bangladesh (Giri et al, 2014). This mangrove ecosystem provides the breeding and nursing habitats for a wide range of aquatic and terrestrial species such as the royal Bengal tiger (*Panthera tigris*) and Ganges river dolphin (*Plantanista gangetica*). Although there are no permanent settlements in the Sundarbans, some 3.5 million people, many of whom are landless and in a condition of extreme poverty, are dependent on these mangroves (Zohora, 2011). There is significant collection of timber and NTFPs such as honey and wax in the Sundarbans. In addition, since the mid-1980s, the growth of shrimp farming has also led to substantial mangrove loss (Ahmed, Cheung, Thompson, & Glaser, 2017).

The precise details of the current status and dynamics of mangroves are not well understood as yet, partly because of the very complex processes of flooding, erosion, and land creation in this delta (Giri et al., 2014). About seven percent of the 1970s mangrove forests had been converted to non-mangrove, flooded areas, water bodies, or barren lands by the early 2000s. However, over the same period, 37 percent of flooded land, 21 percent of barren land, 8.3 percent of non-mangrove, and 2.2 percent of water bodies were converted to mangroves. Most of all, newly created land in a dynamic delta context regularly becomes vegetated by mangroves. Fleshing out these findings, another study indicated that from the late 1980s to late 2000s, there had been a 50 percent reduction in tree density (Kabir & Hossain, 2008). In addition, even though mangroves provide significant protection to coastlines during cyclones such as Cyclone Sidr in 2007, Aila in 2009, and Mora in 2017, such storms can also result in mangrove disturbance and loss. Sidr damaged 30 percent of the mangrove in the area.

In terms of the future, analysis of the effects of global sea level rise on the Bangladesh Sundarbans indicates that the loss of mangroves will be relatively small (less than 10 percent of current area). It is erosion rather than inundation that will likely be the dominant driver of mangrove loss (Payo et al., 2016). Studies have also examined the biophysical and economic impacts of climate change on mangrove species and the overall ecosystem, particularly as it relates to the wellbeing of forest-dependent communities (Uddin, Shah, Khanom, & Nesha, 2013; Uddin, de Ruyter van Steveninck, Stuip, & Shah, 2013). Although there has been little understanding of the contribution of the Sundarbans to the national economy to date, the situation is slowly changing (Uddin, de Ruyter van Steveninck, Stuip, & Shah, 2013). A study led by the United States Agency for International Development-funded Climate Resilient Ecosystems and Landscapes project in Bangladesh estimated the diverse value of the Sundarbans mangroves through local research and found that the value of the mangroves for livelihoods for two million residents was $296 million per year, the value of avoided storm damages between $98 and $132 million per year, and the value of tourism and cultural services $53 million per year (Winrock, 2014).

Since 1927, when the Sundarbans was declared a reserve forest under the Forest Act, access has been restricted by the Forest Department. A state-led protectionist approach was adopted in which the Forest Department engaged in selective timber felling, although this has been halted since 1989 due to the existence of diseased trees. The value of a restrictive approach to mangrove management in a context where there is significant reliance of forest-dependent communities on the mangrove ecosystem has been increasingly called into question (Roy, Alam, & Gow, 2013). Over the last ten years, there has been a change afoot in terms of the approach to mangrove management: not only has the top-down approach led to substantial conflict and overuse of the resources, but the government's recognition of the importance of mangroves in the context of climate change has enabled it to begin considering other management options.

As a result, the government decided to move towards a mangrove co-management approach in 2006. The co-management approach would be institutionalized through the creation of co-management councils and committees. With the support of GIZ, the Bangladesh Ministry of Environment and Forests began a pilot project to strengthen the institutional and organizational framework conditions for collaborative management of the Sundarbans, including the creation of a knowledge platform (GIZ, 2017). Drawing on the Wildlife Conservation and Security Act of 2012 that provides for the establishment of co-management organizations, a multi-tiered structure was created. At the lowest level is the village conservation fora in which resource users, including the poorest, can participate in order to decide on access, use, and management rules for the mangrove areas. These for a have 30 to 100 members with one-third being women. Community patrol groups have also been formed at the local level to support implementation of the rules formed by the village conservation fora.

The people's forum is the next level up in which two members (one man and one woman) from each village conservation fora participate. At the next and final level are the co-management councils with executive bodies called co-management committees. At present, a set of co-management rules are being prepared under the Wildlife Preservation and Security Act of 2012 (Islam, 2014). About 50 percent of the members of the co-management councils and committees are local users. In addition to this structure, additional attention is being given to supporting women's engagement in co-management. Although women do not typically enter the forest to extract resources, they are involved in processing the products and meeting household food needs. As such, special women's groups were formed within the existing co-management umbrella, and a guideline was developed to promote gender equity within the co-management committee (GIZ, 2017).

While the process of institutional formation is ongoing, a number of challenges exist. Resource users are not adequately represented at the village conservation fora level, nor are they able to voice their concerns actively through this structure. There is weak understanding of what co-management is and what it can deliver. The pilot will continue to address these concerns in order to build a robust system across the large wetlands landscape.

3.3 India

In India, mangroves are found in both the eastern coastal areas such as the Sundarbans delta (60 percent), western estuarine and backwater areas (27 percent) as well as insular island contexts (13 percent) (Kandasamy, 2017). Over the last century, India lost 40 percent of its mangroves. Today, there are about 4,628 km^2 of mangrove forests that have stabilized since 1995 (Sahu, Suresh, Murthy, & Ravindranath, 2015). Based on an assessment of mangrove cover from 1987 to 2013, India gained mangrove forests in most areas except in Andhra Pradesh and the Andaman and Nicobar Islands (Sahu et al., 2015).

India was one of the first countries to set up a National Mangrove Committee in 1976 to advise the government on mangrove conservation and management (Kumar, 2000). Its recommendations included targeting 15 areas for mangrove conservation. Since 1987, the Forest Survey of India has assessed the mangrove area every two years (DasGupta & Shah, 2017). More recently, more ambitious plans are afoot as India has set up a goal to increase its mangrove area by 1000 km^2 under the 2008 National Action Plan on Climate Change.

After many decades drawing on a state protectionist approach to mangrove conservation, the government moved towards a mangrove co-management approach after the establishment of its

1990 Joint Forest Management policy (DasGupta & Shaw, 2014). Thereafter, a JMM approach was put into motion that relied on the involvement of NGOs and community-based organizations. This approach was initially piloted in Tamil Nadu's Pichavaram mangrove forests with the formation of four village mangrove committees. The M. S. Swaminathan Research Foundation, in its role of providing technical guidance, worked with the Tamil Nadu Forest Department to successfully restore Pichavaram's mangrove forests through the JMM approach (Thamizoli, 2017). Following that, the Foundation initiated similar projects in Orissa, West Bengal, and Andhra Pradesh and set up 28 village mangrove councils.

In the Indian Sundarbans, where 4.37 million people live, communities are significantly exposed to the effects of seaward hazards. As DasGupta and Shaw (2017) put it, the process of retrofitting JMM into a strict state-led protected area system is a complicated one for mangroves because of the existence of diverse forest products and a wide range of stakeholders. Although the 1927 Forest Act managed to slow down the significant deforestation that took place from creating permanent settlements during the earlier British colonial period, more serious efforts at conservation only began after Indian independence when the Sundarbans Tiger Reserve was established in 1973. After the Joint Forest Management Policy was created in 1990, a series of 14 eco-development committees (focused on preventing biodiversity loss) and 51 JMM forest protection committees (focused on mangrove conservation) were established in the buffer zone over the period from 1993 to 2004. Members can collect NTFPs freely, and also receive 25 percent of ecotourism revenues. Local forest offices work with these village-level committees to determine how protection and resource use will take place, including the extraction of NTFPs such as tannin, honey, wax, and a range of aquatic species.

One study of the eco-development committees indicated that the condition of the mangroves correlated with the effective functioning of the committees. However, nearly half of these committees remain dormant or inactive. Another study indicates that where the dependency of communities on the mangrove ecosystem is high, their perception of JMM effectiveness tends to be negative (DasGupta & Shaw, 2017). This is mainly related to the lack of appropriate incentives in the existing rule system stemming from the continuing suspicion among forestry officers that communities cannot be relied on to sustainably manage the natural resources (see also Datta, Chattopadhyay, & Guha, 2012). These include strict control over felling timber, inability to access specific species such as nipa palm leaves, restricted marketing rights, and low prices on NTFPs. In general, it is the local forest administration that determines the management system, not the local community members. In the absence of a comprehensive community needs assessment, there is no clear picture of how resources in mangrove forests are being used.

Longstanding distrust between the Forest Department officials and villagers has led to NGOs playing a critical role in facilitating negotiations and building the institutional and rule structure for co-management. They can also leverage additional financial resources to support mangrove management for communities by obtaining grants from donor agencies. Despite the gains that JMM provides in terms of a new institutional structure through which collaborative mangrove governance can be facilitated, the Forest Department retains the stronger hand in terms of legal knowledge, technical capabilities, and ability to influence decision-making. Since Forest Department staff remain wedded to a conservation ethic, it remains to be seen to what extent the balancing of objectives of mangrove conservation with other goals such as livelihood support can be achieved in a context where communities have no legally sanctioned tenurial rights to the mangrove areas and where there are no clear guidelines on benefit-sharing arrangements.

In particular, after recent cyclones, there is considerable awareness about the protective function of mangroves among the communities. Given that the commitment among villagers for protecting mangroves is strong, it remains possible to move towards a stronger partnership between the forest staff and local communities to build a collaborative system of mangrove management. Moreover, in light of the fact that the Forest Rights Act of 2006 provides greater tenure rights to local forest-dependent users, the incentives to recognize the decision-making authority of local communities are now in place for strengthening mangrove co-management.

3.4 Indonesia

Indonesia holds some 20 to 22 percent of the world's mangrove areas across its vast archipelago, covering between 2.8 and 3.2 million ha of which only 30 percent are in good condition (Banjade, Liswanti, Herawati, & Mwangi, 2017; FAO, 2007; Giri et al, 2011; Kusmana, 2014). Historically, from the 1800s onwards, mangroves have been lost to brackish water shrimp aquaculture and timber harvesting, resulting in the loss of nearly 200,000 ha by 1960, mostly in Java and Sumatra (Ilman, Dargusch, Dart, & Onrizal, 2016). Since the 1970s, mangrove deforestation has accelerated as conversion of forests started taking place in Kalimantan and Sulawesi as a result of government policies to both increase timber production and expand shrimp aquaculture operations. Nearly 800,000 ha of mangroves were further lost over this 30-year period, even as many aquaculture operations were abandoned or are in weak output mode due to disease and decline in productivity.

In conjunction with the conversion to palm oil production, mangroves remain under significant threat to aquaculture conversion in Indonesia. One study of drivers of anthropogenic mangrove forest loss over the period 1996 to 2010 indicates that conversion to aquaculture and agriculture played a major role in Southeast Asia, including in Indonesia (Thomas et al., 2017). Another study examining drivers over the period 2000 to 2012 indicated the importance of conversion of mangroves to palm oil plantations in Indonesia (Richards & Friess, 2016).

After various decrees by Fisheries and Forestry Director-Generals from the 1970s to 1990s concerning the creation of coastal greenbelts, Presidential Decree 32/1990 on Management of Conservation Areas was issued to protect coastal areas from any destructive activity that would negatively affect the protective functions of the coast. This put into place a state-led protectionist approach to coastal mangrove conservation (Banjade et al., 2017). Following the 2004 tsunami in the Indian Ocean, there was greater momentum behind not only examining the lessons from mangrove rehabilitation in Aceh, but also taking a national look at mangrove ecosystems and their needs. An assessment of effective mangrove rehabilitation and restoration in Aceh province pointed to the importance of NGO-led mangrove conservation projects working with traditional mangrove management institutions (*Panglima Laots*) in order to obtain productive results (Iwasaki & Rahman, 2017; see also Wibisono & Suryadiputra, 2006 for a detailed assessment of mangrove restoration efforts in Aceh). One effect of the stock-taking was increased engagement with local communities in mangrove rehabilitation projects (Brown, Fadilah, Nurdin, Soulsby, & Ahmad, 2014).

At the same time, the Indonesian government moved forward with developing an effective strategy for mangrove management that culminated in the 2012 National Strategy on Mangrove Ecosystem Management (Presidential Regulation 73/2012 led by Ministry of Environment and Forests) (Banjade et al., 2017). In addition, a National Mangrove Working Group was formed in 2014 to build an inter-ministerial coordination mechanism. In parallel, the government planted 4.9 million trees in 2014 to generate momentum for protecting mangroves.

To date, as in many countries, the Indonesian government has focused on mangrove planting and rehabilitation, rather than on mangrove governance issues (Banjade et al., 2017). As such, there are no formal moves to re-think the government-led protectionist approach to mangroves. That said, local communities are taking their own initiatives together with the local government to manage their mangroves. A 2017 study on mangrove governance and tenure in Indonesia examined such initiatives in Lampung Province. With the goal of increasing mangroves for coastal protection (rather than primarily for livelihood support), communities negotiated with local authorities a set of access, use, management and exclusion rights to their local coastal mangroves. They established their own monitoring towers and patrolling groups and created a set of graduated sanctions. These rights have been included within the village and district-level rules on resource use that are formally endorsed by the government (Banjade et al., 2017).

In developing this set of rights, the local leadership was innovative and forward-thinking in finding ways of co-managing their mangroves by building on their networks and linkages with government staff, donors, and other organizations. This was carried out in the absence of any formal legal or policy framework on mangrove management. As a result of this initiative, communities perceive they have more secure tenure rights to their mangroves and related aquatic resources. As such, their mangrove rehabilitation efforts achieved a good level of success. One of the weaknesses of this creative, yet ad hoc, method is its lack of institutionalization: once a leader steps away, a vacuum is created that is then difficult to fill. In addition, there are no funds provided by the government to support this co-management approach, and it will be difficult to sustain over the longer term. Lastly, such concerns as gender and social inclusion still require substantial attention to build a stronger platform for women's engagement and decision-making role in mangrove management.

3.5 Philippines

The Philippines was one of the earliest initiators of a collaborative mangrove approach in Asia. Starting in the 1980s, the Philippines transferred considerable authority to communities for planting and protecting mangroves. From 500,000 ha in the 1920s, nearly half of the Philippines' mangroves have been lost, with only 247,600 ha left today due to overharvesting and conversion to shrimp aquaculture (Primavera & Esteban, 2008). Slowly, over the last two decades, deforestation rates have eased.

As the ecological and economic values of mangroves come into clearer focus, the government devoted more resources to sustaining coastal mangrove forest cover. In the 1990s, a series of laws were passed curtailing conversion of mangroves for other uses. In light of this, the Department of Environment and Natural Resources (DENR) developed a range of supportive rules and regulations (Pulhin, Gevaña, & Pulhin, 2017). Among these were the Department Administrative Order (DAO) 123 of 1989 that allowed for 25-year tenure through community forestry management agreements for mangrove planting, and DAO 15 of 1990 that permitted the awarding of mangrove stewardship contracts to local communities and fishpond leasers that serve to protect mangrove resources and permit the conversion of fish ponds back to mangrove areas. In addition, Executive Order 263 on Community-Based Forest Management and DAO 10 of 1998 on Guidelines for the Establishment and Management of Community-Based Forest Management in Mangrove Areas provided stronger tenure security for legally accessing and managing mangrove forest areas. All in all, this has successfully extended the community forestry paradigm to mangrove management. About 15 percent of community-based forestry management institutions are located in mangrove areas (Pulhin et al., 2017).

A community-based mangrove management program in Bohol Province's Banacon Island has been considered a successful model. After a period of unfruitful attempts to grow mangroves for timber and fuelwood, DENR awarded the community with a community-based forest management agreement. Under this agreement, thinning of trees was allowed for domestic but not commercial purposes. In turn, the local community formed the Banacon Fisherfolks and Mangrove Planters Association. One-third of households became members. In 1981, the Association won the Natural Resources Award of DENR for its mangrove planting efforts. Other examples of this kind exist across the country.

Despite the success in promoting mangrove conservation through these community-based forest management agreements, there are still some challenges that need to be addressed (Pulhin et al., 2017). These include the lack of clear tenure rights over the planted trees (no commercial cutting of mangroves is allowed), lack of alternative livelihood options, weak motivation for participating in mangrove planting, poor species-site match during reforestation, and poor coastal land use zoning (Primavera & Esteban, 2008). The incentives for planting in abandoned fish ponds are not strong enough to promote planting in sites that badly need attention. Increasingly, it is recognized that an integrated coastal zone management approach is needed to identify the best sites for rehabilitating and restoring mangroves.

The pace of work on mangrove expansion and management is increasing. Organizations such as the Zoological Society of London have produced manuals to support community-based mangrove rehabilitation (Primavera et al., 2012) and mangrove reversion of abandoned and illegal brackishwater fishponds (which includes a section on tenure mapping of fish ponds) (Primavera et al., 2013). There is greater interest in moving away from monoculture mangrove plantations towards creating a species mix of mangroves that was originally in place. In 2014, the government allocated $22.7 million for a large-scale afforestation program in coastal areas in the aftermath of Typhoon Haiyan (Pulhin et al., 2017). Fine-tuning the collaborative governance of expanding mangrove areas will require moving away from a planting mentality to a long-term sustainable mangrove governance vision.

3.6 Thailand

In 1975, mangroves covered about 320,000 ha of Thailand's entire coastline of about 2,880 km, but by 1996 this had declined to 160,000 ha, only to recover to 240,000 ha by 2004 (Pumijumnong, 2014). Presently, well-developed mangroves can be found along the coastline of the Andaman Sea, whereas largely only young forests exist along the Gulf of Thailand (Iwasaki & Teerakul, 2017). Although rapid economic expansion explains most of the mangrove loss up to the 1990s, initially for charcoal production and later for shrimp farming under a system of major concessions, in recent years, mangroves have started to be reestablished to create better conditions for shrimp aquaculture.

Starting from the mid-1990s, the government began to recognize the importance of mangrove forests after witnessing the damage from large-scale aquaculture production, and moved away from a reactive approach to a proactive approach emphasizing protection and rehabilitation (Iwasaki & Teerakul, 2017). As a result, in 1996, the government began the process of cancelling shrimp farming concessions. This led to many local initiatives for mangrove planting and conservation developed under the "community forestry" umbrella that is facilitated by stipulations of the Thai Constitution (Article 46 and 56) as well as the Decentralization Act of 1988. This remains the case despite numerous unsuccessful attempts to pass a Community Forestry Bill to date.

These initiatives are typically self-initiated and involve communities with longstanding, self-proclaimed rights over specific forest resources (Iwasaki & Terrakul, 2017; On-prom, 2014; Sudtongkong & Webb, 2008; Tanawat & Boonplod, 2012). This is a form of co-management where local communities hold considerable authority in managing their local mangroves, relying on the support of other stakeholders such as the government to achieve their objectives. Though forestry staff continue to be skeptical about the benefits of mangrove co-management, many communities are moving ahead with taking control over their local mangrove forests. In response, the Royal Forest Department provides some technical and financial support. Based on studies in southern Thailand, one of the features that stands out as important for successful mangrove co-management is high quality leadership (Sudkongtong & Webb, 2008). This is important for both good internal institutional organization, as well as for establishing linkages with external entities such as the government, political leaders, and NGOs. Successful initiatives of this kind are related to better quality mangroves than in areas with open-access conditions.

In mangrove-rich areas that were badly affected by the December 2004 tsunami, such as in the Kuraburi estuary, communities started to mobilize co-management institutions, eventually building the Kuraburi Environmental Network (Iwasaki & Teerakul, 2017). These areas had already experienced the negative impacts of charcoal production and shrimp farming on their mangrove forests that then became starkly clear after the tsunami. At the forefront of the local communities' concern was the declining fish stock in the estuary. In one community conservation group, four conservation zones were established over 960 ha of mangroves for plantation, restoration, non-commercial forest, and research areas, with plantation being the largest. After the tsunami, among the numerous donors involved in relief and rehabilitation, some such as the Rak Thai Foundation supported the building of the Kuraburi Environmental Network to create linkages and cooperation between villages in mangrove conservation. The organization has its own board which decides on annual planning, activities, and collaborative rules. Relevant government staff, NGOs, and experts also attend meetings as needed.

Pred Nai village in Trat province provides another example of an effective mangrove co-management approach; it resulted in the reforestation of 1,920 ha that had previously been converted to shrimp farms (On-prom, 2014). This was another self-initiated development whereby villagers, all with small or marginal land holdings, mobilized to protect and expand their mangroves. In 1941, the government had placed the Pred Nai mangroves under a logging concession. As a result, the 48,000 ha of mangroves were reduced to about 1,920 ha by the early 1980s. A small group of villagers protested this activity which then snowballed into a larger movement resulting in a ban on logging in 1987. The same year, the Pred Nai Community Forestry Group was established. The group not only plants and protects mangroves, but also establishes rules on aquatic resource use and has created a village community fund to support these activities. From this beginning, the group has supported the development of a network of 20 village-level community forestry groups across four provinces. Over time, relationships with the government and capacity to regulate mangrove conservation both increased in positive ways. Attention was given to ensuring the participation of the poor and marginalized. Through these sustained efforts, stocks of key aquatic resources as well as mangrove health has grown.

The picture across Thailand is heterogeneous but in all cases, these co-management approaches have been initiated by villagers. In some cases, networks have been developed, such as in Kuraburi or Pred Nai, but in other areas such as in Songkhla province, where there are more degraded and patchy mangroves, co-management groups did not grow to become a network (Iwasaki & Teerakul, 2017). Nevertheless, there is considerable sharing of good practices and experiences within and

between these networks. The Thailand networking experience among mangrove management groups demands further research and analysis, as it offers insights into new dimensions of mangrove co-management approaches.

3.7 Lessons from Collaborative Governance of Mangroves in Asia

The dynamics of mangrove decline across Asia due to expansion of aquaculture and the subsequent gradual realization of the important role of mangroves in healthy and resilient coastal ecosystems in recent decades is largely consistent across countries. While government and in some cases communities are willing to invest effort into mangrove establishment, the long-term incentives regarding the maintenance and management of mangrove systems remain precarious. Each country has examples of mangrove co-management modalities that function at a local/pilot scale, but each is also limited by a lack of long-term funding options. Due to the high value of alternative coastal uses, incentives from mangrove management must be substantial, and for the most part neither government programs nor alternative livelihoods can easily compete with mangrove conversion. At the same time, enforcement of management rules both by government and by local community members appears to be weak in mangrove areas. From the side of government, the lack of historical prioritization of these ecosystems from a forestry perspective likely explains this, while for communities, the open access tenure regime of mangrove forests is likely partially responsible. These two factors are likely to continue to undermine opportunities for sustainable co-management arrangements to emerge in mangrove areas.

There is a broad range of government involvement in mangrove co-management ranging from bureaucratic processes associated with the Indian forest service, to more of a hands-off approach to co-management in Thailand, allowing communities to take the lead. In all cases, local leadership and the development of collaborative relationships between coastal interests are crucial to successful pilots. This underscores the importance of developing participatory processes that help stakeholders represent and negotiate their interests and form common visions for the coastal landscape.

The experiences from the region demonstrate the value of having guidance that links individual co-management agreements to a government framework, but in a way that allows communities to fully participate in the process. In Vietnam, this would represent a change from the Forest Department (and other relevant departments and ministries) making decisions on behalf of the people to facilitating agreement among multiple stakeholders. The overlapping jurisdictions posed by coastal zones presents opportunities for negotiation and creativity to address each system's unique social and ecological challenges. The more that government can permit and encourage communities to engage in co-management where the demand and value is present, the better social and ecological results are likely to emerge.

References

Ahmed, N., Cheung, W. W. L., Thompson, S., & Glaser, M. (2017). Solutions to blue carbon emissions. Shrimp cultivation, mangrove deforestation, and climate change in coastal Bangladesh. *Marine Policy*, *82*, 68-75.

Altena, A. 2014. *Identification of market potentials of certified organic shrimp from Ca Mau Province, Vietnam*. Ho Chi Minh City: GIZ.

Banjade, M. R., Liswanti, N., Herawati, T., & Mwangi, E. (2017). *Governing mangroves. Unique challenges for managing Indonesia's coastal forests*. Bogor, Indonesia: CIFOR; Washington, DC: Tenure and Global Climate Change (TGCC) Program.

Baumgartner, U., Kell, S., & Nguyen, T. H. (2016). Arbitrary mangrove-to-water ratios imposed on shrimp farmers in Vietnam contradict with the aims of sustainable forest management. *SpringerPlus*, *5*, 438. doi:10.1186/s40064-016-2070-3

BCA, FORES, FORWET. (2013). *Ecosystem services assessment in Mui Ca Mau National Park*. Stockholm: FORES.

Borrini-Feyerabend, G. (2011). Co-management and shared governance – the "effective and Equitable Option" for natural resources and protected areas? In D. G. Spelchan, I. A. Nicoll, & T. P. H. Nguyen (Eds.), *Co-management/shared governance of natural resources and protected areas in VN (Proceedings of the National Workshop on Co-management Concept and Practice in Viet Nam-Soc Trang, 17–19 March 2010)* (pp. 165). Hanoi: GIZ.

Brown, B., Fadillah, R., Nurdin, Y., Soulsby, I., & Ahmad, R. (2014). Case study: Community based ecological mangrove rehabilitation (CBEMR) in Indonesia. *Surveys and Perspectives Integrating Environment and Society (SAPIENS), 7*(2).

Buffle, P., Nguyen, T. Y., & Thomsen, M. F. (2010). *Community-based mangrove reforestation and management in Da Loc, Vietnam*. Ecosystems Livelihood and Adaptation Network.

CARE International. (2014). *Building coastal resilience in Vietnam - An integrated, community-based approach to mangrove management, disaster risk reduction, and climate change adaptation.* Hanoi: CARE International.

DasGupta, R., & Shaw, R. (2014). Role of NGOs and CBOs in a decentralized mangrove management regime and its implications in building coastal resilience in India. In R. Shaw & T. Izumi (Eds.), *Civil society organization and disaster risk reduction: Methods, approaches, and practices* (pp. 203-217). Tokyo: Springer.

DasGupta, R., & Shaw, R. (2017a). Perceptive insight into incentive design and sustainability of participatory mangrove management: a case study from the Indian Sundarbans. *Journal of Forest Research*, *28*(4), 815-829.

DasGupta, R., & Shaw, R. (2017b). Retrofitting joint forest management (JFM) in protected areas of Indian Sundarbans: How sustainable it is? In R. DasGupta & R. Shaw (Eds.), *Participatory mangrove management in a changing climate. Perspectives from the Asia-Pacific* (pp. 59-71) Tokyo: Springer Japan.

Datta, D., Chattopadhyay, R. N., & Guha, P. (2012). Community based mangrove management: A review on status and sustainability. *Journal of Environmental Management, 107*, 84-95. https://doi.org/10.1016/j.jenvman.2012.04.013

Department of Remote Sensing Technology. (2015). *Land cover classification and change detection in Ngoc Hien, Ca Mau using multi-temporal satellite images.* Hanoi: Space Technology Institute.

Eucker, D. (2009). *Project analysis and impact monitoring.* GTZ project management of natural resources in the coastal zone of Soc Trang Province. Soc Trang, Vietnam: GIZ.

Food and Agriculture Organization [FAO]. 2007. *The world's mangroves, 1980-2005*. Rome; FAO.

Giri, C., Long, J., Abbas, S., Murali, R. M., Qamer, F. M., Pengra, B., & Thau, D. (2014). Distribution and dynamics of mangrove forests in of South Asia. *Journal of Environmental Management*, 1-11. http://dx.doi.org/10.1016/j.jenvman.2014.01.020

Giri, C., Ochieng, E., Tieszen, L. L., Zhu, Z., Singh, A., Loveland, T. …. Duke, N. (2011). Status and distribution of mangrove forests of the world using earth observation satellite data. *Global Ecology and Biogeography, 20*, 154-159.

GIZ. (2017). *Support to co-management in the Sundarbans Mangrove Forest.* Dhaka: GIZ.

Ha, T. T. T, Bush S. R, Mol, A. P. J., & van Dijk, H. (2012). Organic coasts? Regulatory challenges of certifying integrated shrimp–mangrove production systems in Vietnam. *Journal of Rural Studies*, *28*.

Ha, T. T. T., van Dijk, H., & Bush, S. R. (2012). Mangrove conservation or shrimp farmer's livelihood? The devolution of forest management and benefit sharing in the Mekong delta, Vietnam. *Ocean and Coastal Management*, *69*, 185-193.

Ilman, M., Dargusch, P., Dart, P., & Onrizal. (2016). A historical analysis of the drivers of loss and degradation of Indonesia's mangroves. *Land Use Policy, 54*, 228-459.

Islam, M. D. (2014). Sundarbans restoration: Bangladesh perspective, presented at the Capacity Building Workshop for Central, South, and East Asia on Ecosystem Conservation and Restoration to Support Achievement of the Aichi Biodiversity Targets, Korea.

Iwasaki, S., & Rahman, A. (2017). Roles of traditional coastal management institution for mangrove rehabilitation and restoration in Aceh province, Indonesia. In R. D. Gupta & R. Shaw (Eds.), *Participatory mangrove management in a changing climate: Perspectives from the Asia-Pacific* (pp. 217-227). Tokyo: Springer Japan.

Iwasaki, S., & Teerakul, B. (2017). Process and interaction of mangrove co-management in Thailand. In R. DasGupta and R. Shaw (Eds.), *Participatory mangrove management in a changing climate: Perspectives from the Asia-Pacific* (pp. 203-215). Tokyo: Springer Japan.

Joffre, O., & Luu, H. T. (2007). *A baseline survey in the coastal zone of Soc Trang Province livelihood assessment and stakeholders analysis.* Soc Trang Province, Vietnam: GIZ.

Kabir, D. M. H., & Hossain, J. (2008). *Resuscitating the Sundarbans: Customary use of biodiversity and traditional cultural practices in Bangladesh*. Dhaka, Bangladesh: Unnayan Onneshan, The Innovators.

Kandasamy, K. (2017). Mangroves in India and climate change: An overview. In R. D. Gupta & R. Shaw (Eds.), *Participatory mangrove management in a changing climate: Perspectives from the Asia-Pacific* (pp. 59-71). Tokyo: Springer Japan.

Kumar, R. (200). Conservation and management of mangroves in India, with special reference to the State of Goa and the Middle Andaman Islands. *Unasylva*, *51*.

Kusmana, C. (2014) Distribution and current status of mangrove forests in Indonesia. In: I. Faridah-Hanum, A. Latiff, K. R. Hakeem, & M. Ozturk (Eds.), *Mangrove ecosystems of Asia: status, challenges and management strategies* (pp. 37-60). New York: Springer.

Lam, N. K. (2010). Mui Ca Mau National Park: the Eighth World Biosphere Reserve of Vietnam. Retrieved 18 November 2017 from http://www.kiemlam.org.vn/Desktop.aspx/List/So4/Vuon_quoc_gia_Mui_Ca_Mau_Khu_du_tru_sinh_quyen_the_gioi_thu_tam_cua_Viet_Nam/

Le, A. T., & Nguyen, N. H. (2012). *Project: Community-based adaptation to climate change in Ca Mau Province (CBAC).* Ca Mau, Vietnam: World Vision Vietnam.

Lloyd, R. (2010). *Co-management in Au Tho B Village - A pilot test for the coastal zone of Soc Trang Province.* Soc Trang Province, Vietnam: GIZ.

Mangroves for the Future. (2012). *Capacity building in management and conservation of mangrove ecosystem in a community participatory approach in Mui Ca Mau National Park*. Hanoi: Mangroves for the Future Vietnam. Retrieved from: https://www.mangrovesforthefuture.org/grants/small-grant-facilities/viet-nam/cycle-2-sgf-projects-vn/capacity-building-in-management-and-conservation-of-mangroves-ecosystem-in-a-community-participatory-approach-in-mui-ca-mau-national-parks

Mangroves for the Future-Vietnam. (2011). *Sustainable use of mangrove resources to benefit poor women through a co-management pilot in the core zone of Xuan Thuy National Park.* Retrieved from: https://www.mangrovesforthefuture.org/grants/small-grant-facilities/viet-nam/cycle-1-sgf-projects-vn/sgf-project-in-xuan-thuy-national-park

MARD. (2014). *Program for coastal forest protection and development to response to climate change over 2015-2020.*

MCD. (2015). *The stakeholder engagement in mangrove forest governance for climate change adaptation and disaster risk reduction in North and North Central Coast of Vietnam*. Hanoi: Vietnam Forests and Deltas Program.

Minh Phu Group. (2016). *Tập đoàn Minh Phú: Thương hiệu đẳng cấp*. Retrieved from http://minhphu.com/vi/tap-doan-minh-phu-thuong-hie%CC%A3u-dang-cap/.

Nguyen, K. D, Le, T. L., & Tran, A. N. D. (2016). *An analysis and assessment of mangrove co-management models in Soc Trang Province.* Ho Chi Minh City: GIZ.

Nguyen, T. Y. (2013). Mangrove and coastal community resilience, presented at the 1st Asia Parks Congress in Sendai.

Nguyen, V. C. (2012). Benefit sharing and clam seed production in Xuan Thuy National Park, Viet Nam. In D. J. Macintosh, R. Mahindapala, & M. Markopoulos (Eds.), *Sharing lessons on mangrove restoration, Proceedings and a call for action from an MFF Regional Colloquium, 30-31 August, 2012, Mamallapuram, India* (pp. 199-203). Bangkok, Thailand: Mangroves for the Future, and Gland, Switzerland: IUCN.

Nguyen, V. C. (2016a). *Report on the implementation of pilot on co-management and benefits sharing models and development of sustainable financial mechanisms in Xuan Thuy National Park*. Nam Dinh: Xuan Thuy National Park.

Nguyen, V. C. (2016b). *Report on the development of co-management of mangroves in Xuan Thuy National Park.* Nam Dinh: Xuan Thuy National Park.

On-prom, S. 2014. Community-based mangrove forest management in Thailand. Key lesson learned for environmental risk management. In N. Kaneko, S. Yoshiura, & M. Kobayashi (Eds.), *Sustainable living with environmental risks* (pp. 87-96). Tokyo: Springer Japan.

van Oudenhoven, A. P. E., Siahainenia, A. J., Sualia, I., Tonneijck, F. H., van der Ploeg, S., de Groot, R. S., … Leemans, R. (2015). Effects of different management regimes on mangrove ecosystem services in Java, Indonesia. *Ocean and Coastal Management, 116*, 353-367.

Payo, A., Mudhopadhyay, A., Hazra, S., Ghosh, T., Ghosh, S., Brown, S., … Haque, A. (2016). Projected change in area of the Sunderban mangrove forest in Bangladesh due to SLR by 2100. *Climatic Change, 139*(2), 279-291.

Pham, T. T. (2011). *Mangroves of Soc Trang 1965–2007*. Soc Trang, Vietnam: GIZ

Pomeroy, R. & Berkes, F. (1997). Two to tango: the role of government in fisheries co-management. *Marine Policy, 21*(5), 465-480.

Primavera, J., & Esteban, J. (2008) A review of mangrove rehabilitation in the Philippines: successes,

failures and future prospects. *Wetlands Ecological Management, 16*(3), 173–253.

Primavera, J., Savaris, J. P., Bajoyo, B. E., Coching, J. D., Curnick, D. J., Golbeque, R. L., …. Koldewey, H. J. (2012). *Community-based rehabilitation of mangroves*. Mangrove Manual Series No. 1. London: Zoological Society of London.

Primavera, J., Yap, W. G., Savaris, J. P., Loma, R. J. A., Moscoso, A. D. E., Coching, J. D., ….Tayo, I. D. (2013). *Manual on mangrove reversion of abandoned and illegal brackishwater fishponds*. Mangrove Manual Series No. 2. London: Zoological Society of London.

Pumijumnong, N. (2014). Mangrove forests in Thailand. In I. Faridah-Hanum, A. Latiff, K. R. Hakeem, & M. Ozturk (Eds.), *Mangrove ecosystems of Asia: status, challenges and management strategies* (pp. 61-78). New York: Springer.

Pulhin, J., Gevaña, D. T., & Pulhin, F.B. (2017). Community-based mangrove management in the Philippines: Experience and challenges in the context of changing climate. In R. DasGupta and R. Shaw (Eds.), *Participatory mangrove management in a changing climate: Perspectives from the Asia-Pacific* (pp. 247-261). Tokyo: Springer Japan.

Richards, D. R., & Friess, D. A. (2016). Rates and drivers of mangrove deforestation in Southeast Asia, 2000–2012. *Proceedings of the National Academy of Sciences of the United States of America (PNAS), 113,* 344-349.

Roy, A. K. D., Alam, K., & Gow, J. (2013). Sustainability through an alternative property rights regime for Bangladesh's mangrove forest. *The Geographical Review, 103*, 372-389.

Sahu, S. C., Suresh, H. S., Murthy, I. K., & Ravindranath, N. H. (2015). Mangrove area assessment in India: Implications of loss of mangroves. *Journal of Earth Science and Climate Change*, *6*, 5.

Schmitt, K. (2009). *Protection and sustainable use of coastal wetlands through co-management and mangrove rehabilitation with emphasis on resilience to climate change*. Ho Chi Minh City: GIZ.

Schmitt, K. (2012). Mangrove planting, community participation and integrated management in Soc Trang Province, Vietnam. In D. J. Macintosh, R. Mahindapala, & M. Markopoulos (Eds.), *Sharing lessons on mangrove restoration, Proceedings and a call for action from an MFF Regional Colloquium, 30-31 August, 2012, Mamallapuram, India* (pp. 205-226). Bangkok, Thailand: Mangroves for the Future, and Gland, Switzerland: IUCN.

Schmitt, K., Albers, T., Pham, T. T., & Dinh, S.C. (2013). Site-specific and integrated adaptation to climate change in the coastal mangrove zone of Soc Trang province, Viet Nam. *Journal of Coastal Conservation*, *17*, 545-558.

SNV. (2016). *Mangroves and Markets. Sustainable Mangrove-Shrimp Production in Coastal Mekong Delta, Vietnam*. Ho Chi Minh City: SNV, Netherlands Development Organization.

Sudtongkong, C., & Webb, E. L. (2008). Outcome of state vs. community-based mangrove management in southern Thailand. *Ecology and Society, 13*(2), 27.

Swan, S. (2011). Co-management: Concepts and Practices in Viet Nam. In D. G. Spelchan, I. A. Nicoll, & T. P. H. Nguyen (Eds.), *Co-management/shared governance of natural resources and protected areas in VN (Proceedings of the National Workshop on Co-management Concept and Practice in Viet Nam-Soc Trang, 17–19 March 2010)* (p. 165). Hanoi: GIZ.

Tanawat, T., & Boonplod, P. (2012). Local knowledge management for mangrove management. In D. J. Macintosh, R. Mahindapala, & M. Markopoulos (Eds.), *Sharing lessons on mangrove restoration, Proceedings and a call for action from an MFF Regional Colloquium, 30-31 August, 2012, Mamallapuram, India* (pp. 169-177). Bangkok, Thailand: Mangroves for the Future, and Gland, Switzerland: IUCN.

Tao, V. D., & Nguyen, M. T. (2017). *Report on mangrove co-management study tour for Tien Lang District pilot*. Washington, DC: USAID Tenure and Global Climate Change Program.

Thamizoli, P. (2017). Chronicling development in a mangrove conservation project. Education, a pathway for the Irula Tribe to integrate in mainstream society. In R. DasGupta & R. Shaw (Eds.), *Participatory mangrove management in a changing climate. Perspectives from the Asia-Pacific* (pp. 72-83). Tokyo: Springer Japan.

Thinh, N. A., & Hens, L. (2017). A digital shoreline analysis system (DSAS) applied on mangrove shoreline changes along the Giao Thuy Coastal area (Nam Dinh, Vietnam) during 2005-2014. *Vietnam Journal of Earth Sciences*, *39*(1), 87-96.

Thomas N., Lucas, R., Bunting, P., Hardy, A., Rosenqvist, A., & Simard, M. (2017). Distribution and drivers of global mangrove forest change, 1996–2010. *PLoS ONE,12*(6). https://doi.org/10.1371/journal.pone.0179302

Tran, A. T.., Le, X. C., Le, M. H., Le, Q. T., & Chu, T. H. (1996). Supervision of mangrove ecological systems in Xuan Thuy National Park, Nam Dinh Province using distant surveillance and GIS techniques. In *Proceedings of the Sixth National Scientific Conference on Biological Ecology and Resources* (pp. 1802–1806). Hanoi: Vietnam Natural Science Academy.

Uddin, M. S., Shah, M. A. R., Khanom, S., & Nesha, M. K. (2013). Climate change impacts on the Sundarbans mangrove ecosystem services and dependent livelihoods in Bangladesh. *Asian Journal of Conservation Biology*, *2*(2), 152-156.

Uddin, M. S., de Ruyter van Steveninck, E., Stuip, M., & Shah, M. A. R. (2013). Economic valuation of provisioning and cultural services of a protected mangrove ecosystem: A case study on Sundarbans Reserve Forest, Bangladesh. *Ecosystem Services*, *5*, 88-93.

UNEP. (2009). *Status and management of mangroves in Vietnam - Presentation at the Regional Training Workshop on Economic Valuation of the Goods and Services of Coastal Habitats,* Thailand, March 24 – 28, 2008. Retrieved August 28, 2017, from http://www.unepscs.org/Economic_Valuation_Training_Materials/02%20Valuing%20Coastal%20Habitat%20Goods%20and%20Services/16-Status-Management-Mangrove-Vietnam.pdf

Vietnam Forests and Deltas Program. (2017). *Mangrove management in Da Loc commune, Thanh Hoa province*. Presentation by SNV team.

Vo, T. Q., Kuenzer, C., & Oppelt, N. (2015). How remote sensing reports mangrove ecosystem service valuation: A case study in Ca Mau Province, Vietnam. *Ecosystem Services*, *14*, 67-75.

Vu, A. T, Phan, T. L., Do, V. H., Ngo, T. N. T, Nguyen, D. K., Phan, Q. V., & Ha, N. T. (2013). *Status of small-scale environmentally friendly shrimp production in Ca Mau Province, Vietnam*. Ho Chi Minh City: GIZ.

Vu, H. P. (2009). Report on the survey to assess the status of households' livelihood in five communes in the buffer zone of Xuan Thuy National Park.

Wibisono, I. T. C., & Suryadiputra, I. N. (2006) *Study of lessons learned from mangrove/coastal ecosystem restoration efforts in Aceh since the Tsunami.* Bogor, Indonesia: Wetlands International.

Winrock. (2014). *Valuing the ecosystem services provided by mangroves in Bangladesh*. Dhaka: Climate Resilient Ecosystems and Livelihoods Project.

WWF. (2013). *Mui Ca Mau awarded the 5th RAMSAR site in Vietnam*. Retrieved from http://wwf.panda.org/wwf_news/?209000/Mui-Ca-Mau-awarded-the-5th-RAMSAR-site-in-Vietnam.

Xuan Thuy National Park, & VCF. (2013). *Benefits sharing options in sustainable management, protection and development of natural resources in Xuan Thuy National Park*.

Zohora, F. T. (2011). Non-timber forest products and livelihoods in the Sundarbans. In J. Fox, M. G. Mustafa, S. A. Quazi, W. B. Miles, E. J. Cunningha, & M. Chasells (Eds.), *Rural livelihoods and protected landscapes: Co-management in the wetlands and forests of Bangladesh* (pp. 99-117). Dhaka: Nishorgo Network.

Annex 1: Rules on Management, Protection and Development of Community Forest in Dong Tan Village

I. Geographic Location and Meaningful Purpose of Community Forest Management

The community forest in Dong Tan village which is planted, nurtured, and protected by its people with financial support by Care International is a coastal protection forest with a total area of 51 ha. It borders the sea to the east, the sea dike section belonging to Dong Tan village in the west, the former forest area which is under the management of Da Loc Border Guard Post in the north and Dong Hai village to the south. The mangrove forest plays an important role in defending the living environment of not only the people in Dong Tan village but also the surrounding communities, preserving ecological conditions, protecting sea dikes, preventing coastal land from erosion and salinity. It also creates a favorable environment for many species and coastal organisms. The management and protection of community forests in the village is the responsibility of all the people in order to protect their environment, natural resources and effectively and sustainably use the resources.

II. Specific Regulations

Article I: Rights and obligations of the people

1. Rights of the people:

a. Develop forest management plan, rules for forest protection and development, and organize their implementation;

b. Develop and implement plans for management, utilization and distribution of resources within the community;

c. Elect the Community Forest Management (CFM) Board and Community Forest Protection (CFP) team;

d. Use forest resources such as seedlings and honey;

e. Use aquaculture and fisheries products such as clams, crabs, shrimps and fish;

f. Exploit tourism resources such as putting up and operating sale huts or providing tourists homestay services; and

g. Be eligible for compensation for results of their labor in or investment into community forests in accordance with legal provisions in case of forest acquisition by the State.

2. Obligations of the community in forest protection and development:

a. To use forests and their resources for assigned purpose effectively in accordance with guidance by competent authorities;

b. Be responsible for monitoring and managing the development of forest resources allocated and undertaking measures to prevent diseases and pests, as well as barnacles harming young mangroves;

c. Work together to take care of mangroves such as hatching barnacles, collecting garbage on young trees, and cleaning the coast line;

d. Undertake joint action to protect forests and detect in a timely way and prevent acts of forest infringement, report rule or regulation violations to the CFP Team, Border Guards post, or the commune Police for their action in accordance with the law;

e. Contribute to the establishment of the Community Forest Protection and Development Fund;

f. Hand over the forest in case of the State's decision to acquire it; and

g. Provide other members of the community with mutual assistance and support in the field of protection and sustainable use of aquatic resources, provision of production services and seeking markets for their products.

Article 2: Functions, tasks and authority of the Community Forest Management Board

The CFM Board is elected by the people of Dong Tan village, has the function and task to directly manage, protect and develop its forests on behalf of the villagers.

a. To develop plans and bring into full play the community's internal resources to take care of, nurture and develop the forests;

b. To set up and manage the Forest Protection and Development Fund, organize the exploitation of forest resources in a rational and effective manner, and obtain remuneration from the villagers' contribution according to regulations;

c. To hold village meetings to develop a plan for forest planting, care, management and protection;

d. To organize forest planting, care, management and protection activities in line with the plan approved by the community of Dong Tan village;

e. To make a plan for the distribution of benefits related to the exploitation of resources from the community forests;

f. To be a bridge for communications concerning forest management and protection between the Village Steering Committee and the Commune Project Management Board, CPC, and Da Loc Border Guard Post;

g. To undertake the reconciliation and settlement of conflicts arising among people in the course of their protection or use of forest resources; and

h. To coordinate with neighboring coastal villages of Ninh Phu and Dong Hai as well as adjacent communes for an effective planting, caring, protection and use of mangrove forest resources.

Article 3: Tasks and powers of the Community Forest Protection Group

The CFP Group is elected by the people in the village and is directly responsible for protecting the forest, promptly detecting, preventing and treating any acts of infringement and receive remuneration paid from the villagers' contribution.

a. To organize patrols to guard the forest;

b. The CFP group shall have the responsibility to monitor and guide aquatic resource users, particularly those using fish traps;

c. To distribute forest areas among resource user groups, stipulating the number of persons to exploit resources in each area with forest and resource protection responsibilities at the same time;

d. The time and duration of resources harvesting shall be determined by the commune and village mangrove forest management boards; and

e. The commune CFM Board and the CFP group shall prescribe aquatic resource exploitation cycles.

Article 4: Regulations on exploitation of products and use of mangrove forest land

a. Every year, the villagers can enter the forest for collecting dry firewood under the supervision of the CFP group 3- 5 times / month in planted forests seven-years old or above;

b. Should carry out trimming branches and forest trees in a rational manner, in accordance with silvicultural techniques;

c. Grazing ducks is allowed in planted mangrove two-months old and above;

d. Harvesting products such as don, pearl, fish shall not be for more than 5 days each tidal period and in. planted forest two-months old and above only. The use of wide rakes and digging don between two rows of trees of 30-35 cm wide or less are forbidden to avoid damaging mangrove roots;

e. Harvesting period for small mussels (don) is from April to August, for meaty Kheu crab is from April to October, and for soft-shelled Kheu crab is from May to August each year;

f. The harvesting shall be by plot. Plots are allocated to groups of harvesters based on the number of their members on a random basis; and

g. All harvesting activities and harvesting time are supervised and guided by the CFM Board and the CFP Team.

Article 5: Prohibited activities

a. Catching birds in mangrove forest is prohibited;

b. Grazing ducks in planted mangroves less than two-months old is prohibited;

c. It is forbidden to dig small mussels (don), catch egrets and kheu crabs or harvest, transport and sale/purchase other fisheries resources without prior agreement of the CFM board or CFP group;

d. Do not use wide rakes for digging small mussels (don) to avoid damaging mangrove roots;

e. It is banned to walk or anchoring boats illegally to avoid damaging planted mangrove;

f. It is prohibited to use explosives, electric shocks, electric three-phase currents to harvest mangrove resources in an exterminating manner;

g. It is forbidden to cut down forests or harvest firewood illegally;

h. It is forbidden to damage forest protection infrastructure such as signboards, guard towers, and protection landmarks;

i. Leaving rubbish in the embankment, coastline, planted forests is prohibited; and

j. It is forbidden to commit other acts that harm the forest and forest resources.

Article 6: Provisions on the handling of forest protection and development offenses

The protection team shall make a written record of acts of violation, seize material evidence and/or means of violation and transfer them to the police office, People's Committees of the commune or Da Loc Border Guard Post, depending on the scope and consequence of the violation so that they can handle administrative violations or transfer the case to competent bodies to be prosecuted for criminal liability.

a. The persons who committed violations and were announced in the commune radio;

b. Fine and forced remedy of consequences such as replanting damaged forest area, according to Decision No.139/2004 of the Government; and

c. If the offender causing damage to the forest are children, his/her parents shall have to compensate the damage and/or remedy the consequences strictly according to the provisions of law. His/her school will also be informed to undertake appropriate measures.

Article 7: Regulations on mobilization of community's internal resources for the care, nurturing and development of forests

a. Contribute work-days for re-planting the mangroves which were destroyed or damaged by waves and barnacles;

b. Contribute work-days for forest care and removing barnacles and rubbish; and

c. Contribute money to the Forest Protection and Development Fund.

Article 8: Provisions on the purpose and form of mobilization funds for the Community Forest Protection and Development Fund

a. The purpose of the Fund is to protect and develop village community forest resources, fisher resources and other resources and ensure continuing development of the Fund in support of mangrove protection; and

b. Sources of funds include villagers' contributions during their use of mangrove resources, donors, support from the State budget, Project 661 and other sources.

- Villagers' contribution is *VND 20,000 / household-year.*

Article 9: Fund's management and use mechanism

a. The CGM Board sets a levy of 5 to 10% of the revenue from the fishery resources harvested to set up the Fund;

b. Prepare the revenue plan and set the level of spending for each activity, ensuring the principle of balancing the revenue and expenditure, and present the financial plan at the village meeting; and

c. Ensure that spending for forest protection and development activities must be accurate (in accordance with spending priorities), timely and in accordance with legal regulations. Make clear records. The fund is subject to the supervision of the Inspection Team elected by villagers, the village head and the Da Loc Commune People's Committee.

d. Report revenue collection and spending to the village meeting every 6 months.

Eligible expenditures include:

- Support to the protection and development of forests;
- Allowance for forestry extension and fishery extension workers;
- Allowance for management and forest protection staff; and
- Spending on forest planting.

Annex 2: 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.

Pursuant to the Law on Forest Protection and Development 2004. Within the framework of the project "Management of Natural Resources in the Coastal Zone of Soc Trang Province". Based on the Co-operation Contract signed by the Co-management Group of Natural Resource Users in Au Tho B Village and the Vinh Hai Commune People's Committee on 1 January 2009, and following a negotiation process with approval from local authorities and other relevant agencies, the Co-management Group of Natural Resources Users in Au Tho B Village (hereinafter referred to as the Co-Management group) has established and promulgated the following co-management regulations on forest protection and natural resource management in the coastal area of Au Tho B Village, Vinh Hai Commune:

CHAPTER 1 Objectives

Article 1. To enable co-management practice to protect the forest and rationally and sustainably use natural resources within the Au Tho B coastal area to achieve the vision contained in the Co-operation Contract dated 1 January 2009: "*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*".

Article 2. To strengthen co-operation between the Au Tho B resource users, local authorities and other related organisations to improve the standard of living for resource users in the Au Tho B Village coastal area.

CHAPTER 2 Where and to Whom this Regulation Applies

Article 3. These regulations apply to the existing and proposed mangrove forest areas (500 m into the mudflat area) which are contiguous to the area of Au Tho B Village, Vinh Hai Commune. The area is bounded to the west by Lac Hoa Commune and to the east by Au Tho A Village, Vinh Hai Commune.

Article 4. Natural resources mentioned in this regulation include fuelwood and aquatic products such as shrimps, crabs, fish, clams, cockles and others which are extracted from the mangrove forest and mudflats, and from the sea in the area of Au Tho B Village.

Article 5. Members of the Co-management Group, visitors from outside and Au Tho B Village community shall comply with this regulation.

CHAPTER 3 General Provisions

Article 6. The boundary for the area to which this regulation applies is clearly shown on the attached map and marked on the ground by people in Au Tho B Village under instructions from local

authorities. Members and non-members of the Au Tho B Co-management Group shall only access the mudflats and sandbanks using the four existing access pathways marked on the map.

Article 7. Members of the Au Tho B Co-management Group shall be identified using membership cards. For members who are above or equal to 16 years old will be eligible to obtain blue cards. For children whose ages are from 7 to under 16 years old will be issued with green cards which their parents will be responsible for safe keeping. Only when parents allow their children to go to the forest should they give these green cards to their children. The household head will take the responsibility to manage his/her family's membership cards. The cards cannot be given to another person to use. In case a person loses his/her card, the household head shall inform any person in charge and apply for a new one. Only members of the Co-management Group with their membership cards on them can enter the forest to collect dry wood and aquatic resources using the four existing access pathways, following the regulations in this document.

Article 8. All members of the Co-management Group shall have the duty to be involved in managing the natural resources of the Au Tho B coastal zone and monitoring and reporting all illegal activities inside the map area to local authorities.

CHAPTER 4 Natural Resource Management

Article 9. The area to which this regulation applies (refer the attached map) comprises 4 functional zones:

1. **Protection Zone**: is part of the mangrove forest which is setup for good protection of aquatic animals, providing them undisturbed habitats for natural breeding, ensuring biodiversity of the mangrove forest. This 12-ha area lies next to Sub-groups 3 and 4.
2. **Rehabilitation Zone** (inside the forest): is part of the inner mangrove forest belt where the forest has lower density and has been replanted for the purpose of protection from breaking waves and habitat provision for aquatic animals. This 22-ha area lies next to Sub-group 4.
3. **Rehabilitation Zone** (outside the forest): is newly-planted forest lying 90 m from the border of the inner mangrove forest towards the mudflats. This zone is set up to increase the forest width for the purpose of protection from breaking waves and habitat provision for aquatic animals. This 26.5-ha area runs parallel to Sub-groups 1, 2, 3 and 4.
4. **Sustainable Use Zone**: is part of the inner mangrove forest belt where trees are wellgrown and the density is high. This 34-ha forest lies next to Sub-groups 1 and 2 and can continuously provide natural resources for people if used sustainably.

Article 10. Regulations on what can and cannot be done in each zone

Protection Zone	*Prohibited*:
	➢ Entry of people without permission ➢ Any other activity not explicitly permitted
	Permitted:
	➢ Patrolling (with permission) from time to time, ensuring no illegal activities are occurring
Rules for all zones (except the Protection Zone)	*Prohibited:*
	➢ Entry of non-members of co-management group ➢ Carrying and use of axes, knives, saws, spades, hoes in the forest

		➢ Activities which damage or destroy trees (including small trees) such as cutting or digging ➢ The use of chemicals and electric fishing devices ➢ Use of long nets ➢ Any other activity not explicitly permitted
		Permitted:
		➢ Only members of co-management group can enter to collect resources ➢ Catching of sesarmid crabs, juvenile crabs, elongated gobies, mudskipper, snake, rat and cockles when the tide is low and mud is visible ➢ Using long hooks to catch crabs ➢ Using bamboo trapping basket (chum) for collecting mudskipper *Periophthalmus schlosseri* (*ca thoi loi*)
Rules for Specific Zones	**Rehabilitation Zone (inside the forest)**	*Permitted*:
		➢ Catching sesarmid crabs, small crabs, sea snakes and snails when the tide is high or low ➢ Catching by hand or with round nets (diameter less than 50 cm) ➢ Collecting dry wood by hand in months 1, 3, 5, 7, 9, 11
	Rehabilitation Zone (outside the forest)	*Permitted*:
		➢ Entering the forest when mud is clearly visible ➢ Catching by hand or with round nets (diameter less than 50 cm)
	Sustainable Use Zone	*Permitted*:
		➢ Catching sesarmid crabs, small crabs, sea snakes, snails, juvenile elongated gobies when the tide is high or low ➢ Catching by hand or using round nets (diameter less than 80 cm) ➢ Collecting dry wood by hand in months 2, 3, 5, 6, 8, 9, 11, 12

Article 11. Monitoring of both natural resource use and activities occurring within the various zones must be continuously undertaken as follows:

a) When requested, each household member of the Co-management Group shall detail the time taken to collect resources and the amount of resources collected for a given time he/she enters the forest.

b) These records will be compiled and summarised by selected monitoring recorders and then given to the Group Head monthly for analysis.

c) Monitoring of activities occurring within the Au Tho B coastal area through observation shall be undertaken by Group members at all times when they are in the area.

d) The Protection Zone shall be monitored only by authorised members who are determined to patrol the zone by the instruction from local authorities.

e) In case of detecting illegal activities Group members shall follow the procedure outlined in Chapter 5 below.

f) Each Sub-group Leader shall have a book for recording detected illegal activities and suggested methods for prevention and shall inform the Group Head monthly.

g) In case of emergency, members should directly call the Village Head or Chairman of the Commune PC. After receiving such notice, the Commune PC will assign one staff to arrive on the scene as soon as possible (not later than 1 hour).

Article 12. Relevant agencies including the Village's People's Board, Civil Defence, Police, Communal Detachment, Vinh Hai Commune's People Committee, Forest Protection Office (District-level), Sub-Department of Fisheries and Border Military Station shall provide favourable conditions for the Group's activities and closely collaborate with the Co-management Group to achieve the objective stated in Article 2.

CHAPTER 5 Enforcement

Article 13. In case of detecting illegal activities which damage the forest (such as cutting of forest and digging for worms) Group members shall immediately inform a Sub-group Leader or the Group Head. The Group Head or Sub-group Leader shall immediately inform local authorities of the illegal activities. The Group Head, Sub-group Leaders and members are allowed to make a record of illegal activities.

Article 14. In case of detecting illegal activities which do not damage the forest, though are contrary to these regulations, Group members shall:

a) For the first offence: inform and educate the violator of their offence.

b) For the second offence: immediately inform a Sub-group Leader or the Group Head.

c) For the third offence: immediately inform a Sub-group Leader or Group head who will report it to the local authorities.

CHAPTER 6 Rewards and Penalties

Article 15. Any member or non-member who detects violation of these regulations and timely reports the matter will be rewarded accordingly. Any serious violation of Law on Forest Protection and Development or Law on Fisheries shall be directly dealt with by local authorities regardless of the number of repetition.

Article 16. For illegal activities which do not damage the forest, though are contrary to these regulations, if the offender is a member of the Au Tho B Co-management Group:

a) For the first offence: the exhibit(s) will be confiscated and his/her membership card will be confiscated for 3 months and he/she will be subject to an educational lesson by the Group Head. For the second offence: the exhibit(s) will be confiscated as well as all membership cards of the offender's family for 3 months. For the third offence: the exhibit(s) will be confiscated and a meeting held to vote for terminating the offender's membership. For subsequent offences (purposely), the exhibit(s) will be confiscated and the offender shall be dealt with by the local authorities.

b) If children under 16 years old repeat offences more than 4 times they will be dealt as if he/she was an adult.

c) Households who skip 3 consecutive group/sub-group meetings will be dismissed from the group.

Article 17. For illegal activities which do not damage the forest, though are contrary to these regulations, in case the offender is not a member of the Au Tho B Co-management Group:

a) For the first offence: the exhibit(s) may be confiscated and the offender will be subject to an educational lesson by the co-management member, Sub-group Leader, Group Head or Village Head.

b) For the second offence: Sub-group Leader or the Group Head who will provide a further educational lesson and may confiscate exhibit(s).

c) For the third offence: exhibits will be confiscated and the offender will be reported to the local authorities.

CHAPTER 7 Report Schedule

Article 18. Sub-group Leaders shall report all the Sub-group's activities as well as monitoring results to the Group Head monthly.

Article 19. The Group Head and the Village Head shall report to Vinh Hai Commune PC by documents every 2 months.

CHAPTER 8 Implementing Provisions

Article 20. The Co-management group and local authorities shall inform and propagate to members about these regulations. Members shall comply with and effectively implement these regulations.

Article 21. These regulations may be modified at any time during their implementation but only as agreed by the majority of the Co-management Group and shall only become effective when certified by the Vinh Hai Commune PC.

Article 22. These regulations were certified by the Vinh Hai Commune PC and took effect in May 2011.