

CASE STUDY ON MANGROVE FOREST MANAGEMENT

POLICY 7:3 ON PROTECTION AND DEVELOPMENT OF COASTAL PROTECTION FOREST IN KIEN GIANG

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The GTZ Conservation and Development of the Kien Giang Biosphere Reserve Project
For Katoomba meeting on mangrove study and carbon



Threatened mangrove species *Limnuzera lotterea* – Cóc Đỏ in Ha Tien District

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1. Background

1.1. GTZ Kien Giang project

GTZ together with Kien Giang Provincial People Committee (PPC) began to implement the project “**Conservation and Development of the Kien Giang Biosphere Reserve**” (Phase I) funded by AusAID in August 2008. The overall objective of the project is to utilize the natural resources of Kien Giang province in a sustainable way with effective management of the project areas.

The Kien Giang Man and the Biosphere (MAB) Reserve was recognized by UNESCO in 2006. It includes Hon Dat district, Kien Luong District, An Minh District, An Bien District, U Minh Thuong National Park and Phu Quoc National Park and is the largest MAB Reserve in South East Asia with the total area of over 1.1 million ha (Kien Giang PPC & National Committee of Man and the Biosphere program, 2005)

The last official measure of mangrove forest area in Kien Giang is 7,103 ha, mainly distributed along the coast (Table 1). Measures by the Project in 2009 indicate the area with mangrove trees has been reduced to less than 3,000ha and cover 42% of the coast line not including Phu Quoc. Only 22% of the coast has relatively intact mangrove forest left. More than half the coast has no mangroves left (Mackenzie, 2009). Mangrove forests are classified nationally as protection forests. Notably, there are some small fragments of 83 ha of natural mangrove forest with high diversity (including the largest rare population of *Limnuzera littorea*) in river estuaries on Phu Quoc island and on the mainland in Ha Tien District. These have not yet been entered into the provincial protection program (Le Phat Quoi, 2010). Some mangrove forests were destroyed during the second Indochina war and the large area of replanted mangroves reflects the Provinces attempt to rehabilitate the coastal mangrove area. However, most of these plantings did not survive to develop mature mangrove forests.

Table 1. Coastal protection mangrove forests in Kien Giang (Kien Giang PPC, 2006)

No	Administrative locations	Total (ha)	Forest area (ha)		Bare land (ha)
			Natural forest	plantation	
1	An Minh district	1,064.1	138.7	682.0	243.4
2	An Bien district	3,027.7	130.7	2,423.9	473.1
3	Hon Dat district	1,004.4	242.0	266.4	496.0
4	Ha Tien town	998.6	460.2	538.4	00
5	Kien Luong district	937.1	118.3	409.0	409.8
6	Rach Gia city	71.7	3.4	17.7	50.6
Total of the province¹		7,103.6	1,093.3	4,337.4	1,672.9

¹Total land and forest reduced to 6,544.4 ha after revising following the instruction No 38/2005/QĐ-TTg in 2005. This figure does not include mangrove forest in Phu Quoc island.

Mangrove forests in Kien Giang play a vital role in the livelihoods of the local people and also in the mitigation of the effects of climate change, such as increased typhoons and sea level rise (Duke, 2009). However, the mangrove belt is in parts very narrow (only 5-15 m wide) and therefore has poor capacity for resilience and a limited capacity to mitigate the effects of climate change. Improved management of the coast in Kien Giang is one priority for technical assistance of the GTZ project.

1.2. Kien Giang province

Kien Giang is a coastal province in the west part of the Mekong Delta. It is situated from 9°23'50" to 10°32'30" north and from 104°40'00" to 105°32'40" east. The province shares a border with Cambodia in the north; An Giang, Can Tho and Hau Giang provinces in the east and southeast, Ca Mau and Bac Lieu provinces in the south and Thailand gulf in the southwest (figure 1).

Total natural land in this province is 634, 613 ha. Kien Giang has 111,817 ha classified as forest land, including 42,924 ha of special use forest; 30,188 ha of protection forest and 39,335 ha of production forest. This represents 30% of the total forest area in the Mekong Delta (Kien Giang PPC, 2006). Current measures by the Project indicate that some production forests have been converted to rice and shrimp production. The topography is flat and large areas have an altitude of only 0.8 – 1.5 m *asl* and is therefore under severe threat of climate change such as sea level rise. It is projected that 175,680 ha (28.22 % of the total land in Kien Giang) could be inundated by a 1 m sea level rise by 2100 (Mekong River Commission, 2009)

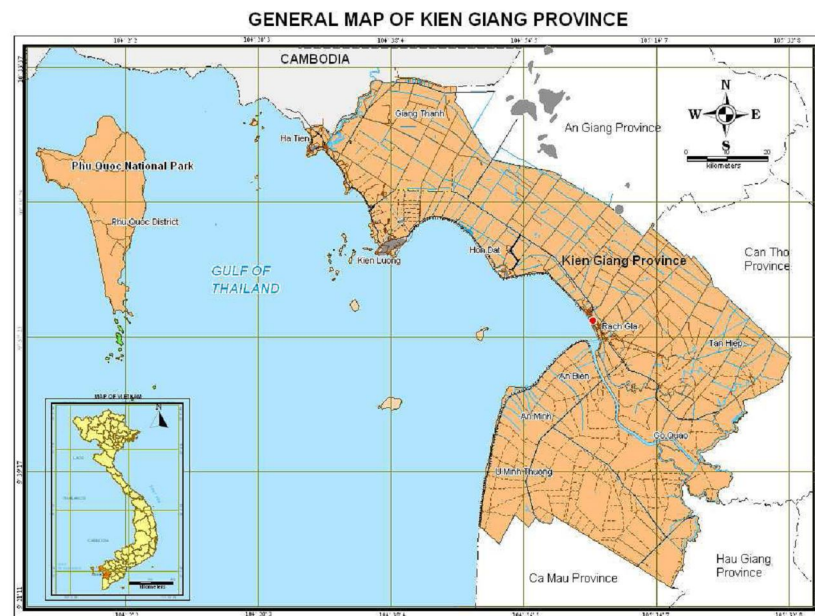


Figure 1. Map of Kien Giang province. Major canals are outlined.

1.3. Drivers of degradation of mangroves in Kien Giang

The coastline of Kien Giang province is 206 km long. Mangrove forests have been degraded by general disturbance, cutting, chemical pollution, poor regeneration growth of seedlings and altered drainage due to canal development. Depleted mangrove areas have also been converted to aquaculture especially shrimp ponds, crop production, tourism and industrial development.

Sea activities: Sea erosion and sea level rise have caused loss of mangrove forest and coastal land in Kien Giang in early 1990's. Current field surveys and remote sensing image interpretation show that an area up to 26 m wide of mangroves and coastlines are lost annually (Duke, 2009).

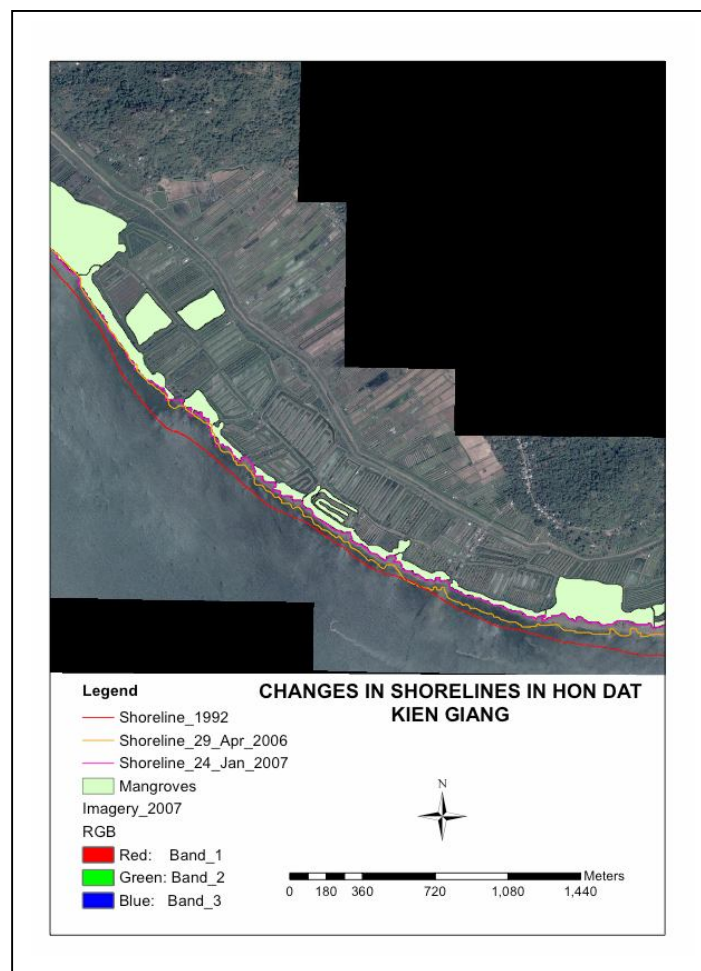


Figure 2. Changes to the shoreline in Hon Dat through different periods (Duke, 2009)

Field assessment of mangrove and coastal status in 2009 found 31% of Kien Giang coast is eroding and 59% of the coast is “at risk” of future erosion with 29% of the mangroves likely to be lost in the near future (Mackenzie, 2009), thus exposing dykes and allowing sea water to break through to the crop lands behind.

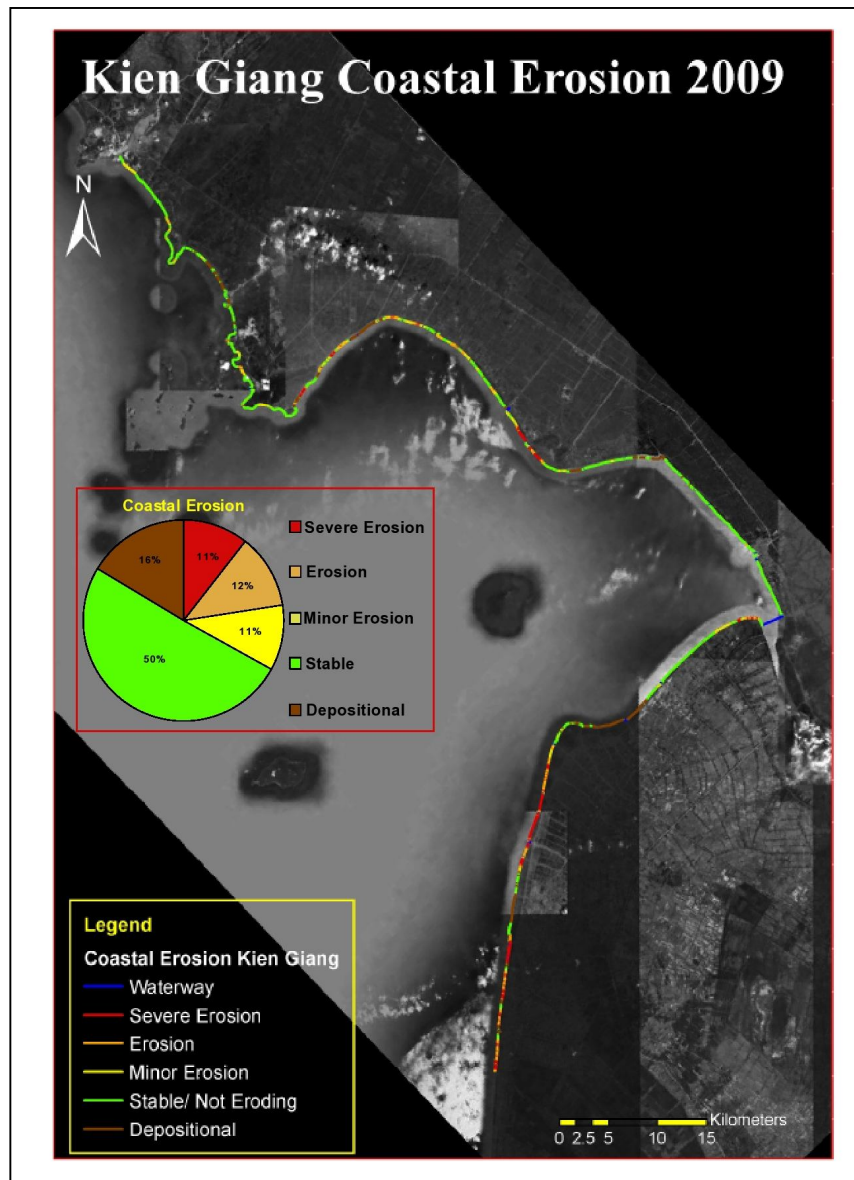


Figure 3. Coast line erosion in Kien Giang

The most vulnerable coastal line and mangrove forest are in An Minh and An Bien districts, where the 7:3 policy is currently being implemented. Erosion has been occurring in a half of coast of these two districts (Mackenzie, 2009).

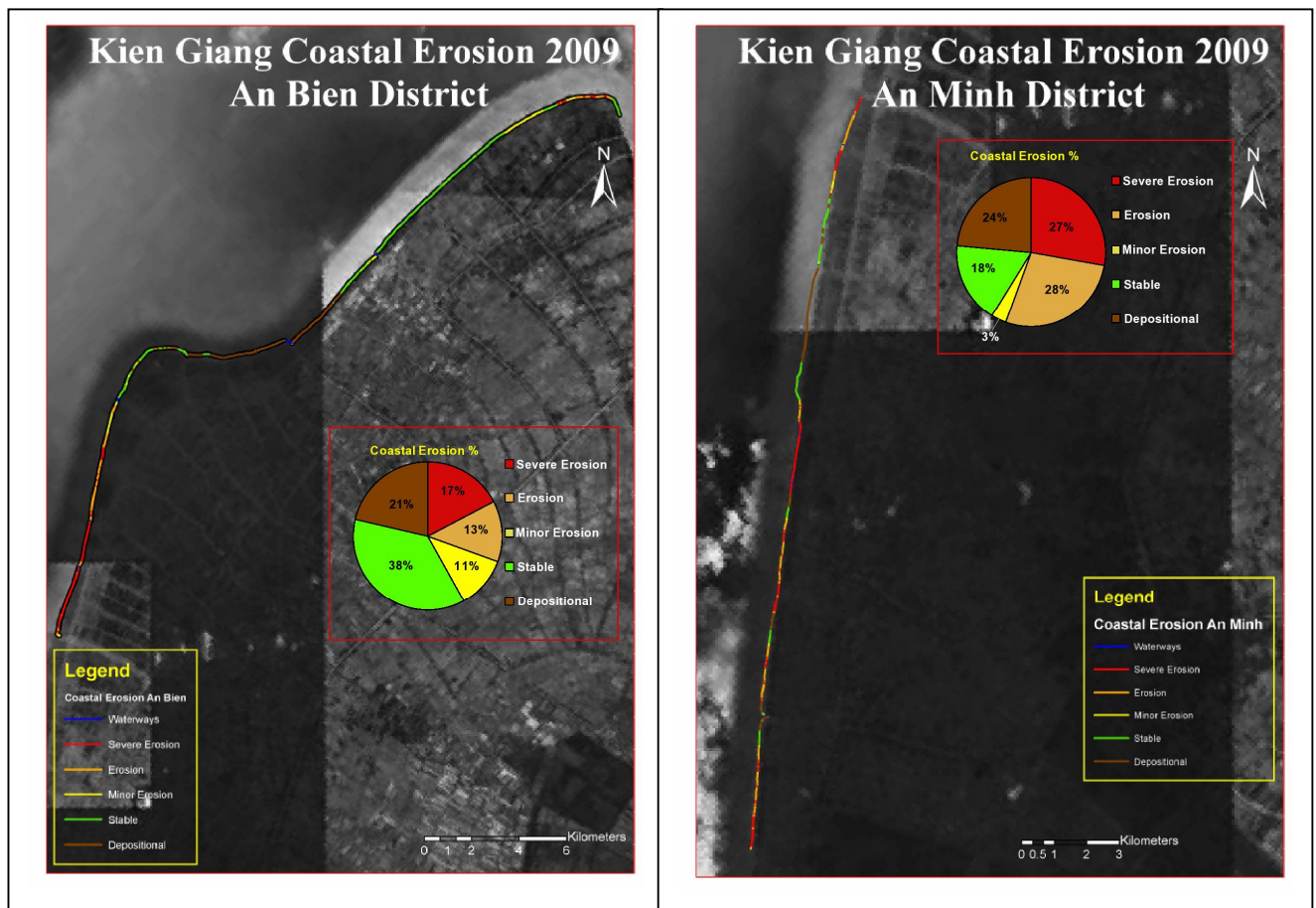


Figure 4. Erosion in An Bien and An Minh districts

Along the shoreline, mangroves are often uprooted by strong wave action and seedlings are smothered by silt as it is deposited in the wet season. They are also uprooted as the silt moves into suspension and then moves from the coastline during the dry season. Seedlings are smothered by rubbish at the end of the wet season. Rubbish also resulted in major dieback of a mature *Avicenia alba* stand in Kien Luong district (Duke, 2009).

Canal development: Kien Giang province has 71 canals that channel high volumes of flood water from the Mekong River to the sea. The opening of the canals in 1997 has not only caused the loss of mangrove forest from canal and sluice gate construction but also from the change in the natural pattern of the sea dynamics and currents, resulting in increased eroding of the coast, particularly around the mouth of the sluice gates.

Conversion of forest land to other purposes: Nearly half of the previously designated natural mangrove forest has been planned for conversion to other land use as a result of the revision of the areas and their planned use for the three types of forest in Kien Giang (Kien Giang PPC, 2006). In Giang Thanh river, Ha Tien town 440 ha of mangroves has been planned for conversion to rice,

shrimp production and will destroy a large area of rare mangrove species (*Limnuzera littorea*) which is listed as a Vulnerable Plant in the Vietnam Red book of 2007. New residential development in Rach Gia city will clear 20 ha of existing mangrove forest. Another plan for tourism development of 400 ha in Rach Tram river, Phu Quoc National park will destroy the largest remaining population of the threatened mangrove species (Coc Do- *Limnuzera littorea*) in Vietnam and other unique ecosystems in this river estuary (Nguyen Xuan Dang, 2009) This will lead to a reduced total area of mangrove forest in the province of 4,909.5 ha.

Illegal cutting for timber, fuel wood, making fish traps is taking place throughout the mangrove forest with some high levels of small- scale local cutting. In An Minh district, for example, 46% of mangroves show signs of significant cutting (Mackenzie, 2009).

Degraded mangrove forests are not able to protect the coastline and breaches in the dykes are occurring as a result. The Kien Giang Province realizes that loss of mangrove forests will result in very large environmental damage to the coastal region and have established Forest Management Boards to protect and rehabilitate mangrove forests

1.4. Mangrove forest management in Kien Giang

Management of the protection forest aims to protect water resources, prevent strong wind, sea reclamation, reduce disaster, protect soil from erosion and protect sea dykes and production land behind them.

1.5. Forest carbon project activities

The GTZ Kien Giang addresses the problem of coastal erosion and assists with the development and implementation of both management and on-ground solutions including:

- A general survey of the mangrove species diversity in Kien Giang;
- Mangrove and coastline mapping via remote sensing and satellite image interpretation;
- The assessment of shoreline condition via a video filming technique. This is a very new method that is applied for the first time in Kien Giang and Vietnam and can be applied to other places (Duke, 2009). This method allows assessing the extent and severity of coastal erosion along the Kien Giang coastline were assessed as areas
 - (i) most at risk of erosion;
 - (ii) where mangroves are largely intact and require greater protection effort;
 - (iii) where seedling establishment is likely to be effective, where physical buffers will be required and where coastal retreat is necessary;
- A biomass, carbon and diversity study, including the feasibility of a REDD project in Kien Giang and the assessment of regeneration needs and potential;
- Contributions to the rehabilitation of shoreline erosion and environmental services of mangrove and livelihood projects in KG.

- Livelihood improvement and environmental awareness raising for local people living in the biosphere reserve and coastal zone in particular.

1.6. Likely costs and opportunity costs of mangrove preservation

Forest restoration under the 661 program is being implementing in Kien Giang by Department of Agriculture and Rural Development (DARD) and Forest Protection Management Boards (FPMB), but this work mainly focuses on planting single mangrove species (*Avicennia alba* or *Rhizophora apiculata*) at the depositional areas. Previous efforts on planting mangroves in high erosion sites failed due to the low investment cost and lack of appropriate rehabilitation techniques.

GTZ Kien Giang project is calculating the opportunity cost for mangrove conversion to other uses based on methodology being developed for conversion of peat forest to palm oil production in Kalimantan- Indonesia in collaboration with the University of Queensland.

A preliminary assessment through field work and calculation of likely local costs for mangrove planting in Kien Giang is being undertaken to adapt the Soc Trang Mangrove Rehabilitation Tool Box (Pham Trong Tinh et.al, 2009) for local conditions. The GTZ Kien Giang Project is attempting to reduce the cost of rehabilitation works (e.g., nursery preparation and tree planting, including wave brake fence installation). Fencing is a practical solution to reduce the energy of sea waves because it breaks up the wave dynamic as well as mitigating damage from rubbish while supporting the fixing in place of the deposited silt. But such fencing is costly and the Project is testing different designs. .

A possible solution could be to construct a wave breaking barrier connected to the land strip at the eastern end of the eroded zone in order to avoid strong currents from entering and further damaging the area. However, in order to decide on such a measure an analysis of the current over time and its possible effects on the shoreline is required.

The current rehabilitation model in the high erosion area is being developed in a collaboration between the GTZ Kien Giang Project, Kien Giang DARD, Forest Protection Management Boards (FPMB) and the Local Womens Union in Vam Ray, Binh Son, Hon Dat and is promising success. This model is applying new techniques for nursery management, mixed species planting including high commercial value timber species (*Xylocarpus granatum*- Xu ổi) and threatened mangrove species (*Lumnitzera littorea*- Cóc Đỏ) and wave break fencing.

1.6. Stake holders in mangrove forest management

Stakeholders and their roles in management of mangrove forest in Kien Giang are identified in figure 5.

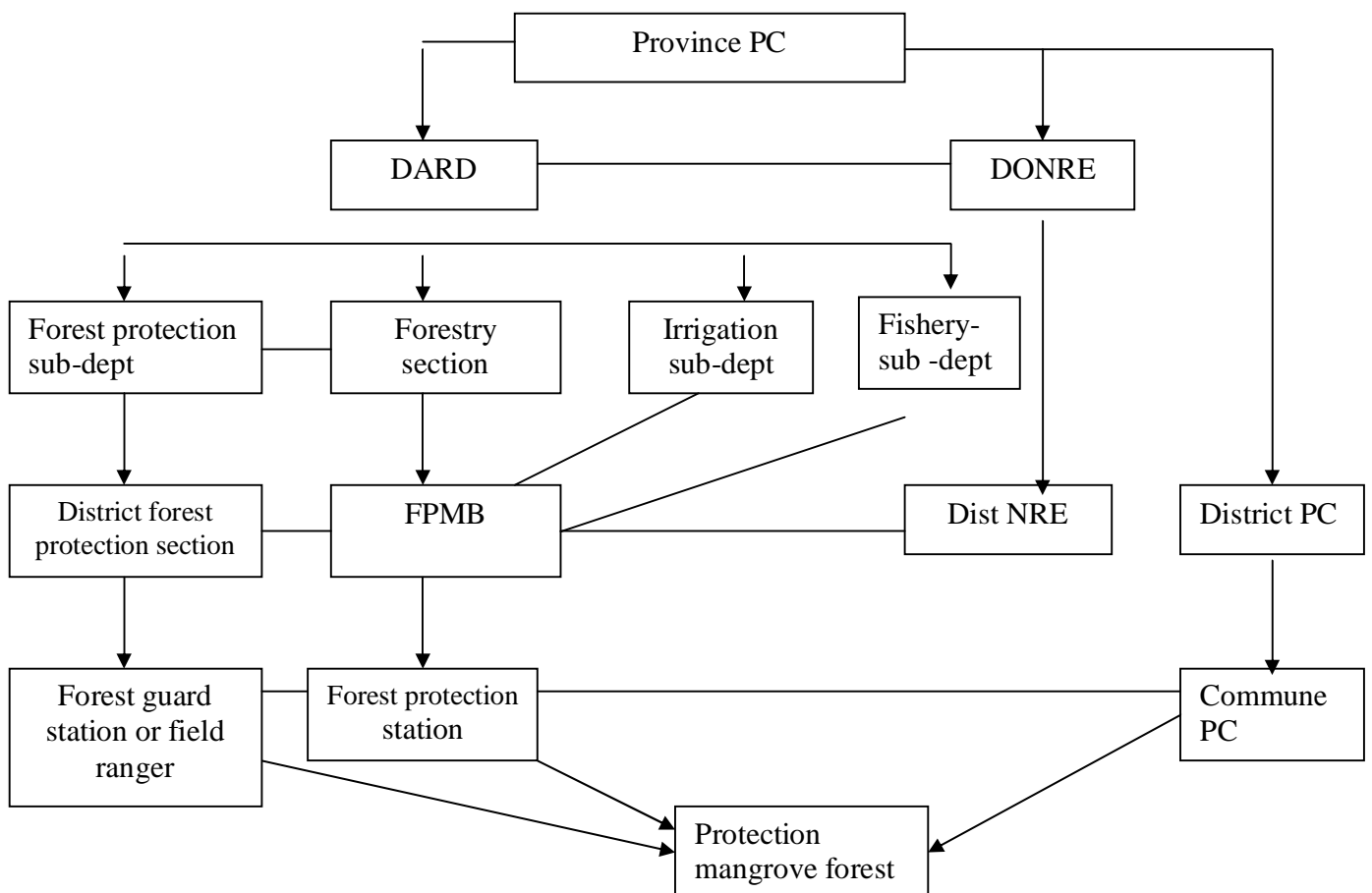


Figure 5. Stakeholders in the management of Mangrove Protection Forest in Kien Giang

The GTZ Kien Giang Project is collaborating with both national and international scientists , particularly from the University of Queensland to undertake mapping to provide the SubFIPI and partner provincial organizations with the latest information on mangrove and coastline status in Kien Giang. This information is being used to develop a mangrove rehabilitation program for Kien Giang under the decision 405/TTg-KTN of the Prime Minister approving the master plan to rehabilitate mangrove forest in Vietnam (period 2008-2015), and Decision No 667/QD/TTg in 2009 approving a program to strengthen and upgrade the sea dyke system from Quang Ngai to Kien Giang, and a KFW supported project is under development.

2. Application of Decision 51/2005/QĐ-UBND on management of coastal protection forest

2.1. Background

Decision 51/2005/QĐ-UBND (decision 51) was introduced by the Kien Giang Peoples Committee, namely “***regulation on plantation and protection of protective coastal forest in Kien Giang***”, aiming to provide enough production land for securing incomes of the local people living along the coast of the province and encourage them to effectively protect mangrove forest. It allows local people who have a forest protection contract with FPMB to use 30 % of allocated land and surface water for crop and fishery production while compulsorily maintaining 70 % of the area under actual forest (often called 7:3 scheme in short).

Decision 51 was developed based on current laws and the government regulations:

- Law of forest protection and development in 2004.
- Decree 01/CP by the government in 1995 on land allocation for agriculture, forestry and fishery production in state enterprises
- Decision 245/1998/QĐ-TT of the Prime Minister on state management on forest and forestland.
- Decision 08/2001/QĐ-TTg of the Prime Minister on management of natural forest belonging special use forest, protection forest and production forest category.
- Decision 178/2001/QĐ-TTg of the prime Minister on rights, responsibilities of households, individuals who have been allocated forest, forest land, land leasing, and forest protection contracts.

2.2. Current management practices for mangrove forest in Kien Giang

Mangrove forest in the Project area is categorized as protection forest. Kien Giang PPC assigned the direct management task to the FPMBs according to article 6 of this decision. As forest owners, FPMBs implement all related activities in protecting, planting and managing this forest ecosystem with the involvement of local people under the protection contract.

To ensure the effectiveness in protection, development and use, the protective mangrove fringe is divided into 3 sub-belts (article 4 of the decision)

- Main protective belt: is the pioneer fringe on the sea reclamation side of the forest. Its functions are wind, wave and soil protection, erosion reduction, and silt fixation. Main species in this belt are *Avicenia spp* and *Sonneratia spp*. This belt is defined from the existing *Avicenia spp* stand to the adjacent seaward depositional site.. This belt mobilizes silt and expands to the seaward side and leaves behind it the stable land with developed forest.
- Extra assistant belt: is the permanent mangrove forest belt. It prevents wind, soil erosion and reduces salinity and contributes to the socio-economic development through its function as a nursery for sea animals, provision of timber and firewood, and security from

erosion. Main species in this sub belt are *Rhizophora spp* and *Casuarina* . This sub-belt is defined as the area from the sea dykes and transportation roads to the boundary of the main protective belt.

- Depositional site: is the buffer zone of the main protective belt. It is 100-200 m wide from the edge of main protective belt toward the sea. This zone protects and expands the g main protective belt through natural sea reclamation processes, while preventing illegal fishing because the draft is too shallow for boat access thereby protecting the main protective belt from access from the seaward side.

2.3. Stakeholders involvement in the Decision

- DARD: Appraises and approves household's land use plan
- Department of Natural Resources and Environment (DONRE): conducts field check with DARD about the assessment of forest status and planning.
- FPMB: Supports forest protection contractors to develop land use plan and record of protection contract for each household, assists in submitting and approving plan, monitors households and instructs them to follow the approved plan during dredging of fish ponds, crop production and protection forest management in general.
- Ranger force: Collaborates with FPMB and Commune authority to patrol and deal with illegal activities
- Commune authority (Peoples Committee): Collaborates with FPMB, ranger force on forest management and conducts state management of forest and forestland as regulated in decision 245/1998 and other regulations.
- Local people, individuals and organizations: prepare land use planning and submit to FPMB, sign contract with FPMB and implement land use plan, forest protection under the supervision of FPMB. Local people set up protection groups to support FPMB, rangers and Commune Peoples Committee in managing the forest, patrolling and dealing with illegal activities.

2.4. Rights of households as forest protection contractors:

Decision 51 establishes the conditions for the mangrove forest protection contract. It regulates main rights and responsibilities of the FPMB (on behalf of the Province as the contracting agency) and of the households (protection contractors).

As protection contractors, people will:

- Have a contract for forest and forestland protection for 50 years
- Be ensured the legal rights and benefits on allocated forestland by law.
- Receive assistance from policies of the government on forest protection and development.
- Receive government compensation for labor costs, investment values in allocated land as forest status, current price in case of acquisition of the contracted land for public use.

- Have right to inherit; transfer achievements from their labour investment during the period of the contract.

To the main protective belt:

This belt plays a main role in protection and sea reclamation, hence, forest contractors are not allowed to thin or harvest trees during the contract period. Contractors are allowed the use of the newly formed depositional land nearby their forest areas to manage and develop.

To assistant protective belt:

- When forest closes its canopy and needs to be thinned to adjust the density of seedlings to maximize production, contractors are allowed to thin up to 20 % trees in the stand but must maintain forest cover at least 60% . Contractors need to obtain permission from the Department of Agriculture and Rural Development (DARD) before thinning. Contractors get 100 % of the thinning products from their allocated forest.
- When forest becomes mature and at the harvestable stage, contractors are allowed to clear cut following rows, belts, or small areas, but annual cutting should not exceed 1/10th of the total forest area. After deducting all harvesting costs, contractors receive 70 % and the government receives 30 % of the proceeds from the harvest.
- Where contractors themselves invest in planting trees, they will receive 100 % of the harvest products from these trees.
- Contractors benefit 100 % of sub-products under the forest.
- Contractors are allowed to use 30% of allocated bare land for aquaculture and crop production in a manner that does not affect the forest resource. They are allowed to dredge canals, develop ponds but are not allowed to harm the existing forest area. Contractors must ensure they stably maintain 70 % of forest within their allocated area. This is the full intended meaning of the 7:3 policy
- Contractors are allowed to use 200 m² of allocated land to build a simple house to live in while protecting the forest.
- All activities related to harvesting, thinning, canal dredging and other land management matters must be planned and accepted by DARD, and supervised by FPMB, local authority and field rangers.

2.5. Compliance with the national policy

Previously, land and mangrove forest have been allocated to households for protection with a contract of 50 years. However, forest protection and management was ineffective, due to the illegal activities to secure the local peoples' livelihood.

In principle, decision 51/2005 was introduced and applied to coastal protective forest management in Kien Giang based on the main context of current national legal policies on forest management and protection. Rights of the local households are selectively aggregated

from current national policies, and decision 178/2001/QĐ-TTg in particular (articles 6, 16,17 and 21).

In the legal aspect of this decision, only FPMB is a forest owner and local people only have a protection contract with the FPMB. However, when looking at the rights of local people who have forest protection contract, the rights of the contracted household are more than just the protection contract.

The strong focus and most important advantage of this decision was that it allows and encourages forest contractors to use up to 30 % of land and surface water to invest in aquaculture and crop production and to thereby generate significant income and secure their livelihood. It aims to support local people overcome the disadvantages of being small holders with fragmented access to production land and surface water. Beyond this instruction, local people submit a plan to expand or merge the existing canals, and /or fish ponds but 70 % of forest area in their allocated area must be maintained as actual forest or compensatory replanting area of trees in other open areas.

2.6. Achievements

Decision 51 went into practice in 2005 and it has received the strong support from FPMB, local authority and local people in particular. This decision is in line with current government strategies and policies on forest protection and management of mangrove forest. Many local households have applied this to invest in expanding surface water for fish production. Their incomes from shrimp, blood shell culture and fish farming significantly increased.

Decision 51 is ultimately aimed to apply to the whole coast line of Kien Giang, however, it currently has been implemented as a pilot in the southern part of the province (An Minh, An Bien districts). After 5 years, 490 households/932 households (52.5 %) have applied this policy. All 7:3 policy applicants have invested in agriculture, fishery production and forest development. This has led to improved income for the local people and increased according to the FPMB the forest cover in this area by 20% (An Minh- An Bien FPMB, 2010).

2.7. Uncertainties.

- Difficult to apply for households who have fragmented bare land and surface water; total allocated land and forest land < 2 ha and have less ability to apply for finance.
- No mechanism for financial support for local people who have not enough existing forest to meet the 70% rule to plant mangrove trees or replant trees to compensate for the cleared forest area used for fish pond development.

- Many poor households could not apply this policy because they have no chance to access capital or low interest rate loans .
- FPMB has jurisdiction over a long coast line with a few technical and field staff, resulting in limited technical support to households, especially for implementing the policy 51 and monitoring
- Complex administrative procedures and weak collaboration amongst provincial agencies on planning, certification handover, field work monitoring and evaluation, and dealing with illegal activities.
- Weak collaboration amongst FPMB, rangers, commune authority, and protection groups on patrolling, dealing with illegal activities.
- There are no detailed guide lines for fines for illegal activities
- As with the national policies, this decision only regulates the benefit sharing from direct values of the forest. It does not yet mention indirect benefits, particularly income from carbon trading, and environmental services.
- If decision 51 is understood as a forest protection contract, local people should receive annual forest protection fees as per the current National legal guidelines, but it has not been applied in the case of Kien Giang.

The result has been that many allocated areas have been improperly managed and severely reducing the protection values of the mangrove forest belt. Current mapping by the Project indicates those areas which are eroded, which are degraded, where the mangrove forest no longer exists, and where the land slope conditions are favourable for replanting. These maps will support the planning and allocation of funds by the PPC and the concerned Departments for rehabilitation and management of the mangrove forest for coastal protection, other environmental services such as a nursery for sea animals and carbon sequestration, and sustainable local livelihood generation

2.8. Proposal solutions

2.8.1. Policy

- Promote the establishment of alternative sources of firewood and building resources.
- Revise and upgrade the detailed content of the decision to clearly clarify the role of stakeholders, their involvement in forest management, rights and responsibilities of FPMB and local people following the change of situation, particularly the benefit sharing from forest environmental services (e.g., carbon trading if it happens in the future)
- Consider developing a policy and scheme for lending money to the poor people to invest in aquaculture and crop production.
- Conduct environmental impact assessment for development programs (infrastructure, tourism facilities, fish farming) that occur in mangrove forest areas.
- Increase the monetary value of mangrove forest resources through the implementation of a REDD carbon and payment for environmental service scheme which would also embrace coastal protection and biodiversity conservation including of sea animals.

- Speed up the procedures in checking, approving household's land use plan

2.8.2. Field work

- Conduct an economic analysis of the 7:3 model to compare with other crops in order to develop recommendations for refining the program and developing investment opportunities which are in accord with the legal requirements for mangrove forest and coastal management.
- Employ more technical staff and their time to support households in preparation and submission of household's land use plan for approval.
- Strengthen collaboration amongst agencies (FPMB, rangers, commune people committee and local people) on forest protection and development.
- Complete surveys to evaluate biomass, carbon sink, and protective functions of mangrove forest to enable calculation of their full value, particularly indirect values of mangrove forest that provide services for the community that live and work outside the forest edge capture sea fishing services from the spawning and nursery role of the forest. This in turn provides information for decision makers.
- Conduct an evaluation of the current demonstration models on mangrove restoration to capture lessons learned and plan cost effective future scale up with the participation of all involved stakeholders.

2.8.3. Capacity building and awareness

- Highlight the scale, severity and consequences of the coastal erosion problem and the importance of mangroves through an awareness campaign; encourage and mobilize participation of all involved stakeholders in protection and development of mangrove forest. The Project supports TV and radio programs dealing with environmental management issues, works with the Women's Union and Youth Union and Commune officials in environment awareness and sustainable livelihood projects. It also supports a novel primary school program on education about the environment.
- Capacity building for FPMB staff and relevant agencies on planning, field implementing, and monitoring and evaluation skills in particular.

3. Conclusion

Current management practices in mangrove management are putting the coastline of Kien Giang at high risk of erosion from sea level rise. High levels of small -scale illegal cutting, larger scale conversion of mangrove to aquaculture production and associated canal development have increasingly fragmented this ecosystem. As a result, it has significantly decreased the resilience of mangroves to the natural pressures such as sea waves, strong currents and typhoons. This problem is likely to become more severe under present climate change and sea-level rise predictions.

There is a significant effort to support managing and use of mangroves in an effective way from the Province. In line with national policy, the introduction and application of decision 51/2005/QĐ-UBND on management of coastal mangrove forest in Kien Giang, is a practical solution. This decision has prioritized and integrated livelihood improvement for the local population living in the coastal zone with protection and development of mangrove forest for ecological service functions and adaptation to climate change effects. Although, the decision has been implemented as a pilot with initial achievements, it still has a great number of limitations in practice.

The solution should embrace

- focus on education to improve awareness at all levels of the value of mangrove forests and the need to protect them to mitigate the effects already taking place of climate change.
- policy upgrading that defines the benefit sharing from indirect values such as carbon trading and environmental services such as through the implementation of a REDD, Biodiversity Conservation and PES scheme.
- the provision of an alternative source of firewood and building materials..
- the development of a credit scheme that can be accessed by the poorest people.
- capacity building for Agency staff to improve their practical (hands on) knowledge of how to implement mangrove forest land management activities and reduce administrative procedures for planning, approving and monitoring the land use plan for individual households.

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