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

Awareness Survey and Assessment on the Environment and Coastal Natural Resource Management of Soc Trang Province

PanNature

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Acknowledgements

This report presents results of a collaborative study for the project Management of Natural Resources in the Coastal Zone of Soc Trang province, led by PanNature and assisted by a team of seven local staff of Long Phu, Vinh Chau and Cu Lao Dung districts' people committees. PanNature would like to express our sincere thanks to these district staff for their enthusiasm and responsible performance during the mission.

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The survey would have been impossible if local villagers and authorities in Vinh Chau, Long Phu and Cu Lao Dung had not participated in village meetings and interviews. PanNature is very thankful to all the people we met and worked with during the survey.

1. Introduction

1.1 Project Background and Objectives

Soc Trang is a poor coastal province in the south east of Vietnam. In the past, a discontinuous belt of natural mangrove was situated along the coastal line of the province and along the Dinh An and Tran De estuaries where the Mekong River (also known as Hau River) flows into the sea. Mangrove forests are only found in three districts: Cu Lao Dung, Vinh Chau and Long Phu. The mangrove ecosystem and coastal resources are very important for sustaining local livelihoods, local environmental security and local socio-economic development.

Some of the mangrove forests in Soc Trang were destroyed during the American War (also called the Vietnam War, 1958-1975), and then recovered through natural regeneration and new establishments on mud flats, and new plantations. In the last two decades the mangrove forests have been seriously decreased due to the expansion of shrimp farming, agricultural production and coastal dyke construction. Thousands of hectares of mangrove forests in Soc Trang have disappeared which has:, reduced their protective functions; caused a decline in marine resources and resulting in increased damage and forest cover loss caused by strong waves, tidal actions and natural disasters. These changes negatively impact local incomes, worsen local living conditions, and raise additional social difficulties and conflicts. Existing environmental and socio-economic problems are caused by the absence of sustainable solutions for managing, using and protecting coastal natural resources, including mangrove forests. In particular, local authorities did a poor job in carrying out their responsibilities in terms of law enforcement to challenge problems arising from the expansion of shrimp farming, which has been promoted as a priority for local economic development.

To solve those problems, Soc Trang Provincial People Committee has worked in cooperation with the German Technical Cooperation (GTZ) to implement the project "*Management of Natural Resources in the Coastal Zone of Soc Trang Province*". The Soc Trang Forest Protection Sub-department is the focal point for executing and implementing this project. The goal of the project is for the coastal wetlands of Soc Trang Province to be protected and sustainably used for the benefit of the local population. Therefore, the project specifically aims to promote coastal co-management mechanisms among resource users (local community, shrimp farmers) and local authorities from the commune, district and provincial levels.

To achieve the project objectives, it is of greatest importance that local authorities and social organisations have sufficient knowledge and understanding of sustainable management of coastal natural resources (Result 5). In addition, local authorities, social organisations and the local community must have proper awareness of environmental issues (Result 6). To verify these outcomes, the project has to collect baseline data using a field survey in the project area. This survey will help to assess the awareness of local authorities, social organisations and local villagers towards the environment and management of coastal natural resources. This survey also creates a good opportunity for training and improving the capacity of project staff at districts in terms of awareness assessment, data analysis and interpretation skills.

PanNature was selected to implement the activity "*Assessment about the awareness of coastal zone management and general environmental awareness in Soc Trang Province*". From 5-20 May 2008, three PanNature researchers worked in cooperation with project counterpart staff at the province, district and commune levels to carry out assessment activities in Soc Trang City and the districts of Cu Lao Dung, Vinh Chau and Long Phu. This technical report presents the results of the field survey. It describes the local awareness on environmental issues and management of coastal resources of different target groups of Soc Trang Province.

1.2 Study Objectives

The study aims to investigate the levels of awareness and attitudes of local communities and other stakeholders towards general environmental issues and the sustainable use and management of coastal natural resources in three districts of Soc Trang Province - Cu Lao Dung, Vinh Chau and Long Phu. At the

same time, local district project staff were trained on-the-job to enable them to carry out awareness assessment studies in the future.

1.3 Study Contents and Scope

1.3.1 Study Site Selection

5 villages of 5 communes in the three districts were selected for the survey:

- Cu Lao Dung District: Vam Ho Village (An Thanh Nam Commune);
- Long Phu District: Cho Village (Trung Binh Commune); and
- Vinh Chau District: Tan Nam Village (Vinh Tan Commune), Au Tho B Village (Vinh Hai Commune) and Zone 6 (Vinh Chau Town).

All of these villages and communes are located along the Hau River and its estuaries, where mangrove forests exist and/or are close, and where local lives and livelihoods and their socio-economic activities are significantly associated with the exploitation and use of soil, water, forest and coastal aquatic resources. The selected sites are representative in terms of anthropology, covering the three typical/key ethnicities in Soc Trang - Khmer, Kinh and Hoa. The selection also ensures that both indigenous communities (mainly rice farming, fishermen) and non-indigenous people (from other locations who carry out commercial activities and especially aquaculture production) are covered in the study.

In addition, the study also expanded survey activities to other areas such as Cu Lao Dung Town, Kinh Ba Village and Long Phu Town. In these areas, researchers observed local activities relating to the exploitation, transportation and trade of natural aquatic products (e.g. crabs, clams) from mangrove forests and mud flats, as well as the current environmental situation for residential areas in towns and ports.

1.3.2 Target Groups

The four target groups that were interviewed as part of the survey were:

- **Local communities:** mainly indigenous people from the five villages of Vam Ho, Cho, Tan Nam, Au Tho B and Zone 6, whose lives are closely associated with traditional agriculture, livestock breeding, fishing, aquaculture farming or business and services;
- **Local authorities (provincial):**
  - *Provincial officials* interviewed: Provincial Communist Party Committee; Provincial People's Committee; Office of People's Council, Department of Science and Technology; Department of Natural Resources and Environment; Department of Agriculture and Rural Development; Sub-department of Forest Protection; Office of Environmental Police; Centre of Agriculture Extension; Centre for Fishing Extension; Soc Trang Fishery Association; Soc Trang Farmers' Association; Women's Union; and Youth Union;
- **Local authorities (district and commune):**
  - *District officials* interviewed: District People's Committee; People Committee; People Council; Committee of Fatherland Front; Department of Agriculture and Rural Development; Department of Economy; Department of Natural Resource and Environment; District Forest Protection Section; Agricultural Extension Station; Fishing Extension Station; District Fishery Association; Department of Education and Training; Department of Culture and Information; District Radio and Television Station; Department of Health; District Youth Union; District Farmer's Association; and District Women's Union; and
  - *Commune officials* interviewed: Leaders of Communal Communist Party Committee; Communal People's Committee; people in charge of agriculture, aquaculture and land administration; heads of villages; and representatives of commune social organisations such as Women's Association, Youth Union, and Farmer's Association;

- **Business sector:** including representatives from: enterprises and private services related to fish and shrimp farming; cooperatives of clam management and exploitation; and aquaculture processing.

1.3.3 Study Contents

In order to achieve the overall objective of the study, more detailed objectives and content were developed for each target group.

1.3.3.1 Local Communities

In terms of local communities the study aimed to identify:

- Their knowledge and understandings of the richness and changes in local natural resources such as water, soil and biodiversity, and the significance of using and conserving such resources over the long term;
- Their attitudes towards the values of nature and towards community support and participation in management of coastal zones and conservation of natural resources; and
- Their awareness of human-induced damages to local natural resources, and interrelations between their attitudes and real behaviours towards local natural resources.

The study also tried to assess the relationships between the awareness levels of local community members and their gender, age, ethnicity, education, occupation and living conditions. The insight from such an assessment could help the project to propose appropriate solutions to enhance local awareness and attitudes in sustainable management and use of coastal resources.

1.3.3.2 Local Authorities and Social Organisations at the Province, District and Commune Levels

The study aimed to assess the awareness of local authorities and social organisations, their perceptions towards the environment and their knowledge of sustainable management of coastal natural resources through identifying:

- Their awareness and attitudes towards natural values and the role of local communities and stakeholders in resource conservation and coastal zone management;
- Their knowledge of the situation, changes, causes and consequences of over-exploitation and unsustainable management of coastal resources; and
- Their awareness of principles and ethical viewpoints for sustainable management of coastal zones, as well as their thoughts and concerns towards supporting environmental protection efforts.

1.3.3.3 Aquaculture Business Sector

For participants from the aquaculture business sector, the study aimed to identify:

- Their awareness and knowledge of natural values and principles of coastal resource management;
- Their awareness of the situation, causes and consequences of natural resource degradation related to unsustainable farming, production, processing and other livelihoods; and
- Their willingness to apply environmentally friendly techniques in aquaculture, and to show responsibility and support for environmental protection efforts.

1.4 Study Methodology

1.4.1 Secondary Information/Data Collection

Researchers collected and reviewed all relevant "Soc Trang Project" documents. These references provided secondary information with basic insight on the operational frameworks of the project, project sites and socio-anthropological characteristics, which was then used to design questionnaires.

1.4.2 Primary Information/Data Collection

1.4.2.1 Semi-structured Interviews

(a) Questionnaires:

Three questionnaire forms were designed to interview the three target groups (see Appendix 1). Each questionnaire consisted of a set of open questions relating to the study contents for each target group (as presented in Section 1.3.3). A set of potential responses were provided for each question. During interviews, the researchers directly marked the options that were right and/or relevant to the responses of local respondents. This method helped estimate levels of awareness and understanding of different groups as well as their attitudes towards the environment and sustainable management of coastal resources.

(b) Interview sample:

Researchers conducted 285 individual interviews covering: households in selected villages; local authority's leaders and staff; representatives of social organisations of the province, districts and communes; and representatives of aquaculture enterprises/business services. Table 1 below presents details on the sample sizes of each target group and location. The number of samples (questionnaire forms) obtained from each target group were:

- Local community: 160 samples (forms);
- Provincial authorities and social organisation staff: 15 samples (forms);
- District and commune authorities and social organisation staff: 96 samples (forms); and
- Aquaculture enterprises/business service: 14 samples (forms).

Table 1. Study sample on target groups and locations.

Area	Local villagers	Provincial authorities	Authority and social organisations officials		Business	Notes
			District	Commune		
Soc Trang City		15				
Long Phu District	35		14	10	5	Cho Village, Trung Bình
Cu Lao Dung District	32		19	7	2	Vam Ho Village, An Thanh Nam
Vinh Chau District	34		14	13	7	Tan Nam Village, Vinh Tan
	26			9		Au Tho B Village, Vinh Hai
	33			10		Zone 6, Vinh Chau Town
Total	160	15	47	49	14	

1.4.2.2 Village Meetings – Participatory Rural Appraisal

At village meetings in Vam Ho (An Thanh Nam), Cho (Trung Binh), Tan Nam (Vinh Tan) and Au Tho B (Vinh Hai), researchers applied Participatory Rural Appraisal (PRA) tools, including: Village Historical Timeline and Local Resources Changes, Problem Tree, Problem and Cause Ranking. The PRA tools helped identify: local community awareness and understanding about the environment and coastal resource problems; causes of key human behaviour affecting local resources and subsequent consequences; and possible communication, education and awareness solutions to solve existing problems and change community behaviour. Findings from these discussions also helped interpret quantitative responses obtained from questionnaire forms. This can help to explain possible interrelationships between local community awareness and understanding, and their existing behaviours.

1.4.2.3 Semi-structured Interviews and Group Discussion

Researchers carried out a series of discussions and informal interviews with various leaders and senior staff from provincial departments(e.g. Fishery Association, Aquaculture Extension Centre, Forest Protection Sub-Department, Department of Natural Resources and Environment) district departments (e.g. Natural Resources – Environment, Agriculture, Aquaculture Extension, and Forest Protection), communal/village leaders, businessmen and the owners of shrimp ponds. This enabled the researchers to investigate in depth local histories, community lives, environmental concerns, and interest in the management and use of mangroves, aquatic products, land, and coastal water resources.

1.4.2.4 Observation of Community Behaviours

While conducting fieldwork, researchers amassed a good collection of meaningful information by observing the real practices of local villagers harvesting crab in the mud flats, farming shrimp and farming other agricultural products.

1.4.3 Information/Data Consolidation and Analysis

The information collected from questionnaire interviews was then consolidated and analysed using a spread sheet. The frequency of descriptive statistics and cross-tab analysis were the parameters used to examine the relationship between the level of awareness/attitude and influential factors such as gender, age, education and occupation. For provincial authority and social organisation officials, and business groups, the study results were analysed in a qualitative way due to small sample sizes (fewer than 15). The data collected using secondary surveys was also used to interpret and the findings of statistical analysis.

1.4.4 Implementation Process

PanNature's study team closely collaborated with the project staff of three districts to conduct on-site assessments. The study included three consecutive activities:

- Training for local staff (refer to Table 2) on interview methods for use with local communities, authority senior staff, and business /enterprise representatives (1 day on 6 May 2008);
- PanNature research team guiding and working with district staff to conduct field surveys and interviews (11 days, from 7-17 May 2008); and
- Training and guiding district staff on the use of spread sheets (Microsoft Excel) for storing and analysing survey data (1 day on 18 May 2008).

Table 2. List of local authority staff joining in the training of survey methods.

No	Full name	Organisation	Notes
1	Duong Tan Vu	Soc Trang Sub-department of Forest	
2	Cao Ngoc Trung	Soc Trang Sub-department of Forest	
3	Le Vu Phuong	Cu Lao Dung Division of Land Use	The survey in Cu Lao Dung led by Nguyen Viet Dung
4	Le Minh Doan	Cu Lao Dung Division of Land Use	
5	Thai Quoc Toan	Cu Lao Dung Division of Agriculture	
6	Nguyen Thanh Nhan	Cu Lao Dung Division of Natural Resource and Environment	
7	Nguyen Van Quan	Long Phu Division of Agricultural Extension	The survey in Long Phu led by Nguyen Danh Tinh
8	Vo Thanh Tam	Long Phu Division of Aquaculture Extension	
9	Nguyen Thanh	Long Phu People's Council-Committee Office	
10	Bui Nhu Y	Vinh Chau Division of Natural Resource and Environment	The survey in Vinh Chau led by Hoang Xuan Thuy
11	Ly Chi Hieu	Vinh Chau Division of Aquaculture Extension	
12	Thach Minh Phue	Vinh Chau Division of Economy	

The study team divided into groups and carried out field surveys and interviews at the same time in the three districts of Long Phu, Cu Lao Dung and Vinh Chau. Each group consisted of local district staff and was led by a PanNature researcher. The staff of the Soc Trang Forest Protection Sub-department supported researchers in arranging meetings with provincial leaders and senior officials. A detailed schedule of the survey is presented in the following Table 3 below.

Table 3. Process and schedule of the survey in Soc Trang.

Date	Place and Activity			
	Soc Trang	Cu Lao Dung	Long Phu	Vinh Chau
06/5/08	Training for local officers on survey method			
07/5/08 - 14/5/08		- Interview district authorities, officials - PRA; interviews in Vam Ho village - Interview An Thanh Nam authorities and aquaculture businesses	- Interview district authorities, officials - PRA; community interviews in Cho village - Interview Trung Binh authorities and aquaculture businesses	- Interview district authorities and officials - PRA and interview in Zone 6 - PRA and interviews in Tan Nam village - Interview authorities of Vinh Tan and Vinh Chau town and aquaculture businesses
15/5/08 - 17/5/08	Interviews with provincial authorities and officials			- PRA and interview in Au Tho B Village - Interview Vinh Hai authorities, aquaculture businesses
18/5/08	Training on applying MS Excel in data analysis			

2. Study Results

2.1 Socio-economic Characteristics of Study Sites

As mentioned, the study was implemented in the coastal communes An Thanh Nam (Cu Lao Dung District), Trung Binh (Long Phu District), and Vinh Tan, Vinh Hai and Vinh Chau Town (Vinh Chau District). These communes are highly populated and range from more than 1,500 households (An Thanh Nam Commune) to over 5,100 households (Trung Binh Commune), and are characterised by a diversified ethnic structure. Khmer people account for a major percentage of the population in the communes of Vinh Chau District, particularly in Vinh Tan, with a ratio of 65%. Meanwhile, in Trung Binh Commune, Hoa people (also known as Chinese Vietnamese) make up the largest ethnic group of the population. In An Thanh Nam, Kinh people (also known as Vietnamese) are the majority, while Hoa people are far fewer in number (Table 4).

Table 4. Population, ethnic and poverty characteristics of target communes[1].

District, communes	Population	Numbers of households	Percentage of poor households (%)	Percentage of households in each ethnic minority (%)		
				Kinh	Khmer	Hoa
Cu Lao Dung	**63,928**	**13,526**	**27.3**	**94**	**6**	**0.1**
An Thanh Nam	6,577	1,513	34.5	77.4	22.4	0.1
Long Phu	**186,125**	**39,233**	**26.7**	**64**	**3**	**33**
Trung Binh	25,152	5145	23.3	64	2	30
Vinh Chau	**149,752**	**30,642**	**34.4**	**30**	**52**	**18**
Vinh Hai	19,014	3,819	22.1	25.5	47	27.5
Vinh Tan	14,018	2,845	56.1	29.5	64	6.5
Vinh Chau town	15,850	3,058	14.6	38	20	42

Thanks to state investment, infrastructure in these communes is good, with a system of constructed roads to every village and other social facilities such as communications networks and health care stations. However local people are still struggling. The rate of poor households is quite high, particularly in Vinh Tan (more than 56%) and An Thanh Nam (more than 34%). Comparing with the Kinh and Hoa people, Khmer are commonly much poorer. The illiteracy rate is still high, mainly among Khmer women. In recent years, natural disasters and livelihood depletion were the main causes leading to a significant proportion of local villagers being unemployed. Many households became landless and had to work as labour for hire on local farms and/or move to find jobs in Can Tho or Ho Chi Minh City. Many youths mentioned a common phenomenon in which local girls were attempting to marry Taiwanese or Koreans as a good way to help them and their families overcome current poverty levels, particularly in Cu Lao Dung District.

2.2 Awareness and Attitudes of Local Communities

2.2.1 Sample Characteristics

From 7-17 May 2008, researchers carried out random household interviews in the villages of Vam Ho (An Thanh Nam), Cho (Trung Binh), Tan Nam (Vinh Tan), Au Tho B (Vinh Hai) and Zone 6 (Vinh Chau). A set of 160 samples were collected (n=160), that is, 160 villagers (as household representatives) were interviewed. Table 5 below summarises the data from the community sample in terms of the variables of gender, age, ethnic, education, literacy level, life expectancy in the region, occupation/main income and richness/poverty ranking. The features of the community sample are described as follows:

- The percentage of men interviewed was 63.6%, approximately 2/3 higher than the women (only 33.8%). This difference is caused by the fact that it is easier to approach men for interviews. Many women did not understand the common language (Vietnamese) or tended to be afraid of talking with

[1] Figure referenced from A Baseline Survey in the Coastal Zone of Soc Trang Province: Livelihood Assessment and Stakeholder Analysis by Olivier Joffre and Luu Hong Truong (2007).

strangers. In some cases, women just refuse to talk to strangers. Their answers are always “I don’t know” or “wait for my husband/father to come home to help you”;

- Most of the respondents were adults ranging from 17 to 60 years old (about 87.5%), of which the group of 17-40 year olds – considered the most influential to coastal natural resources – accounts for 40%;
- Most of the respondents were ethnic minorities: Khmer (43.8%), Chinese-Vietnamese (21.9%);
- Most of respondents were able to speak Vietnamese (72.5%), but only a small proportion (6.7%) had a high school education. The illiteracy rate is relatively high (18.8%), mainly among women;
- Local livelihoods and income sources come mainly from the exploitation of coastal natural resources, of which exploitation of aquatic products makes up 35.6%, agriculture 26.9%, and aquaculture farming 15.6%. Other income sources include gardening, trade, service, hired labour and working in local factories;
- Up to half of the interviewed households are poor (48.1%), and these are predominantly Khmer people. Only 15.6% are rich and 35.6% had average income levels. The wealth level of each interviewed household was provided by village leaders. Local poverty is closely linked to the shortage of land for cultivation, business/production failures, outstanding credit debt, and the habits/attitudes of "living today and don’t care for tomorrow”; and
- With regard to each ethnicity, there is likely a geographical principle for population distribution, in which Khmer communities usually live near rivers and the sea; their lives are closely associated with rice farming and the exploitation of aquatic products in mud flats and tidal areas. Chinese-Vietnamese (Hoa people) however, commonly live in towns and are associated with production, commerce and services. The majority population, Kinh people, live far away from the coast and most of them produce wet rice and plant fruit trees; some of them practice intensive aquaculture farming.

Table 5. Statistics of the samples of local community (n=160).

Features		Quantity	Percentage (%)
Gender	Male	106	66.3
	Female	54	33.7
Age	Below 16	4	2.5
	16 – 40	75	46.9
	41 – 60	65	40.6
	Above 60	16	10
Ethnicity	Khmer	70	43.8
	Hoa	35	21.9
	Kinh	55	34.4
Education	Illiterate	30	18.8
	Primary	86	53.8
	Secondary	33	20.6
	High school	10	6.3
	Above high-school	1	0.6
Ability to write Vietnamese	Fluent	116	72.5
	Little	40	25
	Unable to write	4	2.5
Self-ranking in economy	Fair/Rich	25	15.8
	Average	57	35.4
	Poor	78	48.7
Occupation/ Main income	Crop farming		26.9
	Fishery catching		35.6
	Aquaculture farming		15.6
	Gardening and services		12.6
	Others		

2.2.2 Community Awareness of the Roles and Importance of Coastal Resources

When asking local villagers how they recognise the importance of coastal resources and mangrove forests in their areas, most of them (86%) said that they are very important to their lives and villages. Among the remainder, about 9.5% of villagers responded that coastal resources and mangrove forests had no value, while another small proportion of 4.4% did not mark to show their opinions (see Chart 1). This means that nearly 14% of local coastal inhabitants, mainly in Vinh Chau or those running small trade and service activities, had not yet recognised the importance of mangrove forests and other resources.

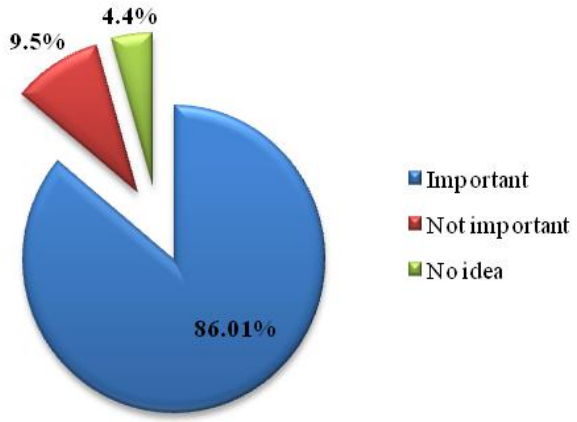


Chart 1. Percentage of awareness of the importance of coastal resources.

When asking local villagers whether they are exploiting and using coastal resources, more than three-quarters of responses confirmed that they are directly exploiting resources, while the rest said that they are not.

Having asked local villagers to name what kinds of coastal resources they are exploiting and using, as shown in Chart 2, the study found that few people could mention more than four kinds of common coastal resources in their locations (among those mentioned include coastal wetlands, water resources, aquatic animals, mud flat, and mangrove forests). Only 2.5% of respondents, that is, 40 people, who were all Kinh, mentioned more than four kinds of coastal resources.

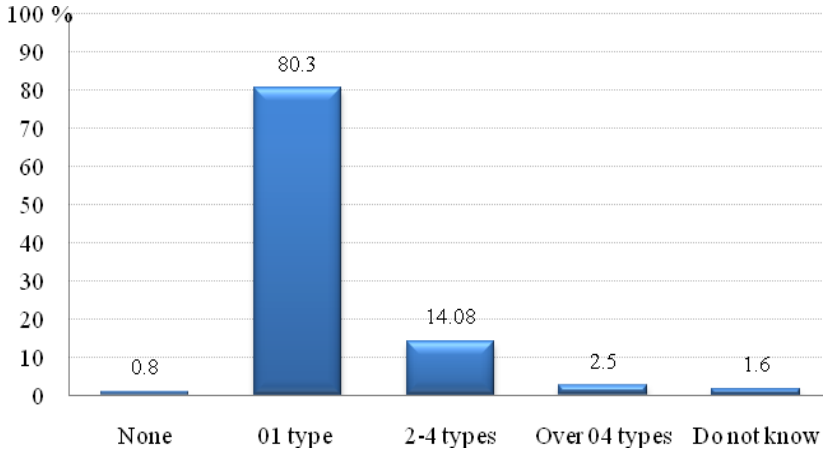


Chart 2. Percentage of local people who can name coastal resources they are exploiting and using.

Chart 2 also shows that 80.3% of local villagers could only list one kind of coastal resource they are exploiting and using. Most of these respondents are minority Khmer and Hoa people, with ratios of 91% and 84%, respectively. The resources they usually mentioned were either aquatic resources or surface water resources. About 14% of interviewed villagers can mention from 2 to 4 types of coastal resources among aquatics, water, land and/or mangrove forests.

When questioning local villagers what advantages their coastal areas may have, only a few respondents, about 5.8%, could list more than 5 advantages including providing aquatic products, housing materials (e.g. *Nypa* leaves), land shrimp-farming, suitable place for rice and fruit-tree plantation, port construction, or preventing destructive tidal rising (see Chart 3). This chart also shows that 15.5% of respondents could mention from 3 to 5 advantages of coastal areas. The percentage of local villagers that could not mention more than 2 advantages was estimated at 71%, commonly the availability of aquatic resources and protection functions of mangrove forests against high tidal rise and salty water intrusion. The study found that none addressed spiritual or entertainment values (e.g. tourism) or other income generation opportunities from their coastal areas.

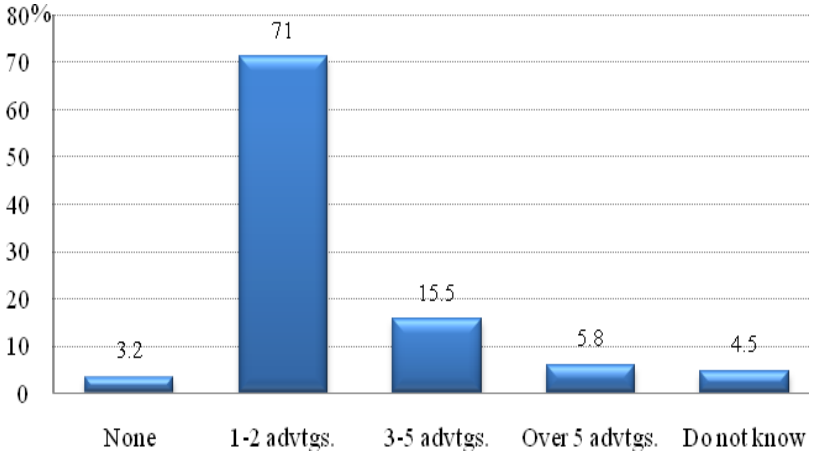


Chart 3. Percentage of people knowing the advantages of coastal zone.

There was a clear difference among ethnicities in regard to their awareness of the coastal zone's values and advantages. The study found that only Kinh people could mention up to five advantages of their coastal zones, while most Hoa and Khmer people could not mention more than 2 advantages. All the respondents who "did not know" (4.5%) or said their coastal zones "have no value" (3.2%) were Khmer and Hoa minority people. Most of these people are among the illiterate group.

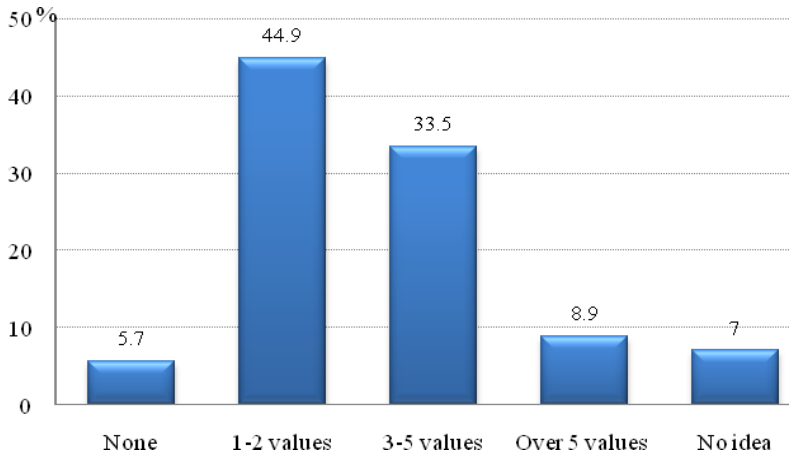


Chart 4. Percentage of community perceptions of the value of mangrove forests.

When asking local people about the values and importance of mangrove forests, nearly 6% of respondents thought they did not have any role or value, while another 7% did not give any response as shown in Chart 4. In total, over 87% of respondents could specify at least 1 value implication of mangrove forests. Nearly 45% could specify 1 to 2 values, 33.5% could list 3 to 5 values, and nearly 9% could specify more than 5 values.

Comparing local ethnic groups, the majority of Kinh people (76%) could specify more than 3 values of mangrove forests, much higher than the ratios for Hoa and Khmer people (12%). The study also found that among those respondents who "did not know", or said that mangrove forests "have no value", the majority were Hoa and Khmer people with ratios of 55.6% and 33.3%, respectively. Most of these respondents were illiterate or only had a primary education.

As shown in Chart 4, over 87% of respondents could list at least 1 value or role of mangrove forests. The values commonly stated by local people were “preventing wave, wind, storm, tidal strength, tsunami” and/or “ensuring stable beach, reducing erosion” and/or “preventing salt intrusion”. The study found no responses from local villagers mentioning other roles of mangrove forests such as an ecotourism attraction, absorption of pollutants and carbon dioxide, or reduction of negative impacts of climate change.

The study also observed that most respondents avoided or refused to mention the uses of mangrove forests, with only a small number of respondents stating that mangrove forests could provide “natural aquatic products” for their lives or “forestry products, wood, bird, snake, honey...for local consumers”. These people were aware that mangrove forest are protected under law by forest rangers, border soldiers and local authorities and that exploiting forestry and aquatic products in mangrove forests was illegal and prohibited.

2.2.3 Community Awareness about the Changes in Local Environment and Resources

When asking local villagers if natural aquatic resources in their locations had changed over the last ten years, the study found that 86.5% of respondents said there had been changes, while nearly 14% said that the resources were remaining unchanged or that they do not know about any changes. Chart 5 shows that 72.5% of respondents said that natural aquatic resources in their locations had been reduced, while only 14% of respondents said those resources had increased. During the survey, many local villagers in An Thanh Nam, Vinh Tan and Vinh Hai communes described how amazingly abundant natural aquatic resources – particularly fish, shrimp and crabs – were in these areas prior to 1990, as directly witnessed by themselves. However they also described that the same resources were now becoming a scarcity.

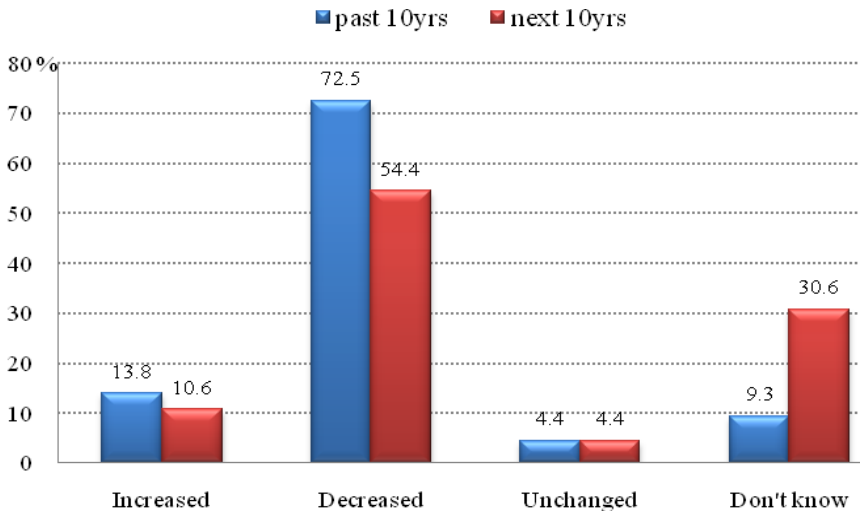


Chart 5. Community responses regarding changes in local natural aquatic resources.

When asking local villagers to predict the future of local natural aquatic resources for the next 10 years, only a small proportion of respondents believed that those sources would increase and remain unchanged, with respective ratios of 10.6% and 4.4%. A much higher proportion, an estimated 54.4% of respondents, predicted that resources would decrease over the next 10 years. An explanation of these pessimistic predictions was that many people assume that the current poverty will continue motivating local people to over-exploit natural aquatic resources for their survival, and thus such resources will continue to be exhausted. The study also found that nearly 31% of respondents could not predict the trend of change in natural aquatic sources in the locations over the next 10 years.

When asking local villagers if the area of mangrove forests in their locations has changed over the last ten years, as shown in Chart 6, 50.3% of respondents said that the area had increased. However, 33% responded that this area has decreased locally. Chart 6 also shows that 9.4% of respondents said that there had been no change in the size of local mangrove forests over the last 10 years, and another 7.7% of respondents did not know if any change had taken place in their areas.

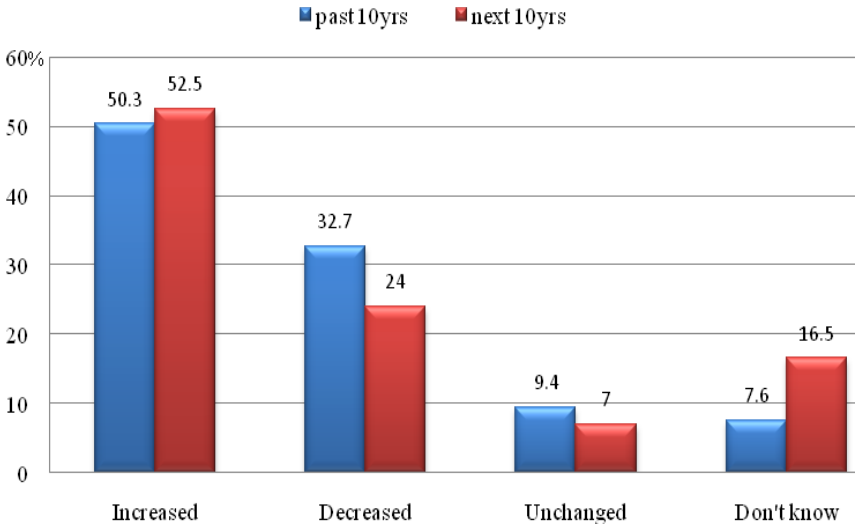


Chart 6. Community responses regarding the change in local mangrove forests.

When asking local villagers to predict the future status of local mangrove forests for the next 10 years, it was found that about 52.5% of respondents believed that the forest area would increase. They assumed that good protective practices, the encroachment of mud flats, and afforestation projects would cause the area of local mangroves to increase. On the other hand, 24.1% of respondents said that the area of local mangrove would decrease, mainly due to coastal erosion and coastal forest destruction. 7% of respondents said that the area would remain unchanged over the next 10 years, while the remaining 16.5% of respondents could not predict any change to the area of local mangrove forests in coming years.

When asking local villagers if the area of agricultural land in their locations had changed over the last ten years, their feedback varied quite widely. As shown in Chart 7, nearly 35% of respondents said that it had decreased; more than 30% said that it had increased; 16.5% said it remained unchanged; and the remaining 18.4% of respondents "did not know". The study observed that local villagers did not have any official information and were not informed about the area of agricultural land or land-use planning in their locations.

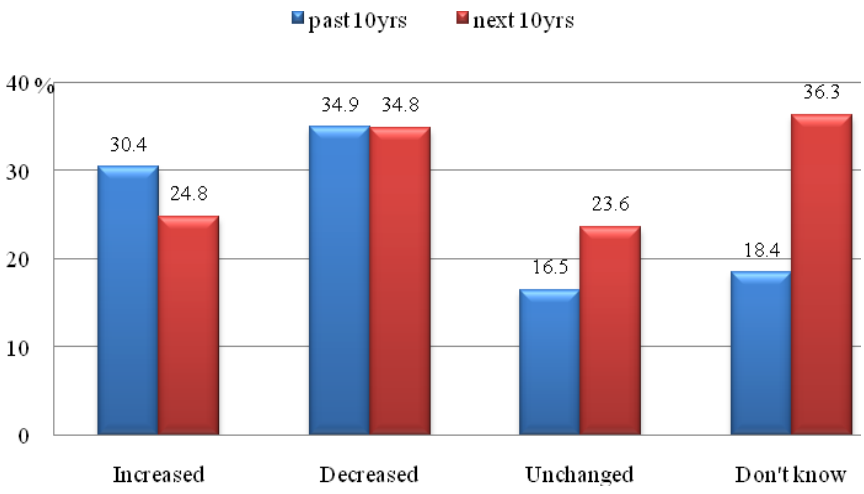


Chart 7. Community responses regarding changes to the area of coastal agricultural land.

The study asked local villagers about the future of local agricultural land area and found that 33.8% of respondents could not make predictions about this, while a lower percentage, 23%, said that it would remain unchanged. The percentage of respondents who predicted the area would decrease was quite a bit higher than those who said it would increase, 34.8% and 24.8% respectively. Local villagers reflected that changes to the area of agricultural land in the coastal zones were very much driven by the development of aquaculture farming and highly market-attractive agricultural products, e.g. red and violet onions, and other subsidiary crops.

When asking local villagers if the area of aquaculture farming in their locations had changed over the last ten years, the study found that the majority of the respondents recognised an increase and expansion in aquaculture farming. Over 63% of respondents had recognised this change, while another 18.5% did not know if such a change had happened in their area (see Chart 8). Very few respondents (5.1%) said that the area of local aquaculture farming had decreased, while another 13.4% of respondents assumed that the area had remained unchanged over the last 10 years.

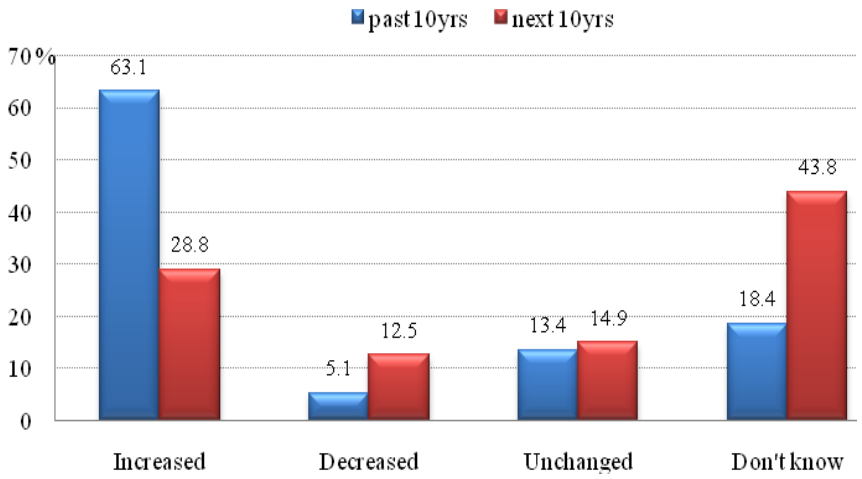


Chart 8. Community responses on changing in the area of aquaculture farming.

When asked to envision the area of aquaculture land over the next 10 years, most of the respondents (43.8%) said that they could not predict the situation, because there were many uncertainties associated with the possibility of aquaculture expansion in their areas such as outbreak of disease, quality of water supplies, weather changes, market demands and prices. Only 12.7% of respondents assumed that the area would be reduced as they were now faced with low farming yields, high investment for farming, low prices for shrimp selling, and credit debts that they were currently not able to pay. The study found nearly 29% of respondents assumed that the area would be larger, while another 14.9% said it would remain unchanged over the next 10 years.

When asking local villagers about their perceptions regarding changes in the area of coastal mud and tidal flats in their locations, the majority of respondents (63.5%) agreed that these habitats had expanded over the last 10 years (see Chart 9). They explained that mud deposition and expansion of coastal estuaries were annual events and naturally occurring processes in their areas. They also said that protecting and planting mangrove forests contributed to mudflat expansion in their areas. However, only 46.9% of respondents believed that these mudflats would continue to expand over the next 10 years.

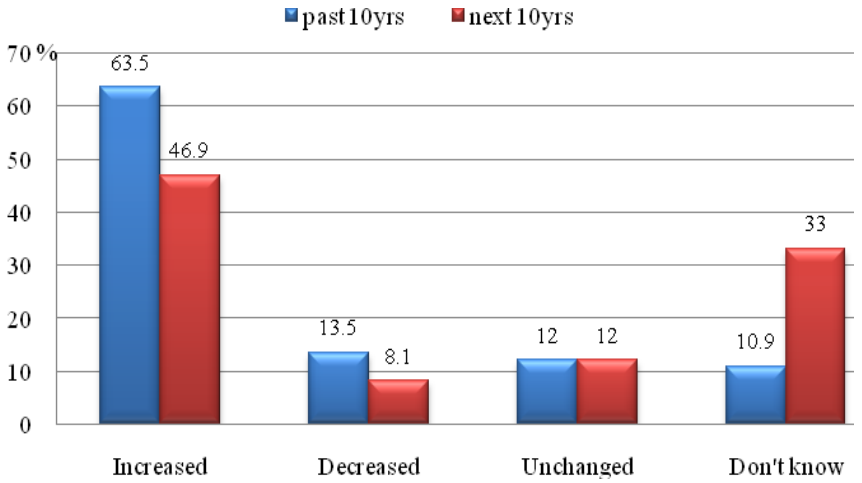
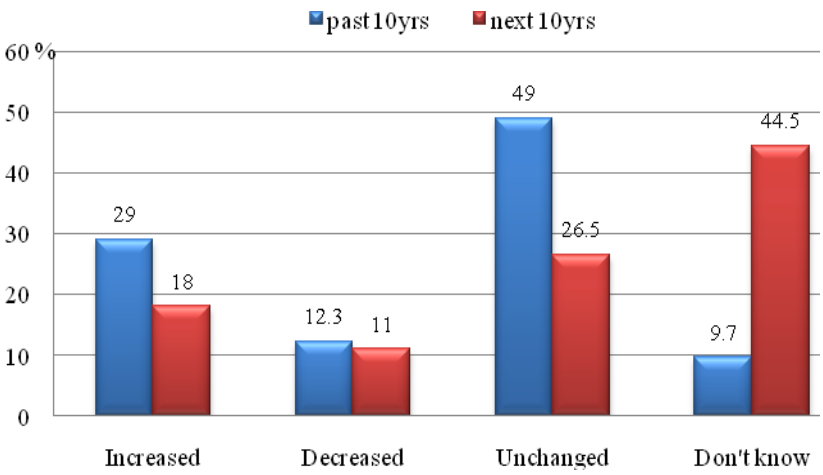


Chart 9. Community responses regarding changes in the area of mud flats

Another 13.5% of respondents said the area of mud flats had decreased over the last 10 years, and 10.9% of respondents said that they were not aware of any changes to mud and tidal flats in their areas. The study also found that the number of respondents who did not know how such habitats would change over the next 10 years rose to 33%. Very few respondents (7%) believed that these habitats would continue to decrease in size over the next decade. There were a similar number of respondents (12%) who felt that the area of mud and tidal flats remained unchanged over the past decade and would remain so for the coming decade.

When asking local villagers about the quality of drinking water in their locations, nearly 50% of respondents said that no change had been observed. Another 9.7% of respondents said that they did not know if any change had occurred to this resource over the last decade (see Chart 10). Only 29% of respondents said that their drinking water quality had improved over the last 10 years, which was higher than the number of respondents who thought that drinking water quality had worsened in their locations.



The study found that a high percentage of respondents (44.5%) could not predict how drinking water quality would change over the next decade, while a lower percentage of respondents (26.5%) said it would remain unchanged. About 11% of respondents thought that the quality would decrease over the next 10 years, which was lower than the number of people who predicted that the quality of drinking water being used would improve (18.1%).

Chart 10. Community feedback regarding changes in the quality of drinking water.

2.2.4 Community Awareness regarding the Consequences of Mangrove and Resource Destruction

The interviewers asked local villagers to talk about consequences that might occur if mangrove forests in their locations were seriously destroyed. As shown in Chart 11, most of the respondents (75.8%) thought of one or two consequences including “rice field, shrimp ponds, mud flats, fresh water resources, and channels contaminated by salty water”, “dyke erosion and collapse”. These consequences were commonly mentioned by local villagers during interviews.

About 19.7% of respondents listed at least three consequences of mangrove forest destruction. However, only a few of these respondents mentioned that a consequence of mangrove destruction would be the exhaustion of natural resources, such as fish and shrimp. The study also found very small percentages of respondents who did not know any consequences of mangrove loss (2.5%) or even said that there would be no consequence at all.

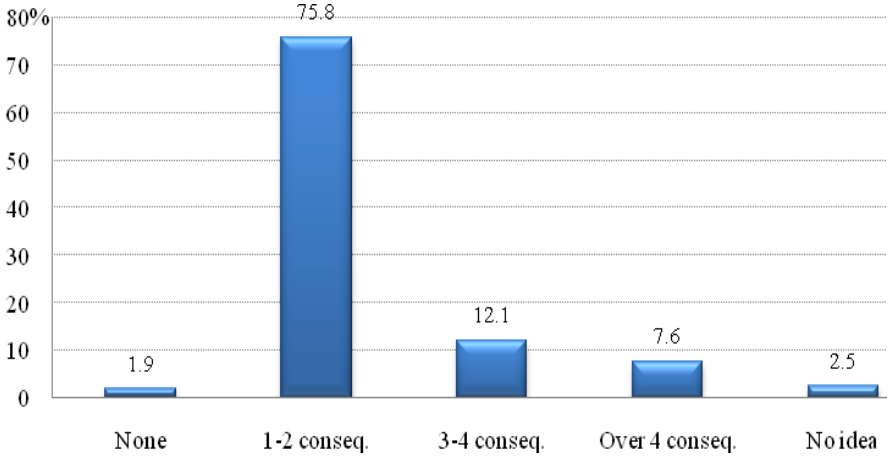


Chart 11. Community awareness regarding the consequences of mangrove destruction.

When asking local villagers if the changes in coastal resources in their locations had affected their production and livelihoods, more than 42% of respondents said that they did not know if the degradation of coastal resources had affected the productivity and yield of their aquaculture farming. Most of people who gave this answer were not directly involving in aquaculture farming, but were cultivating rice crops, fishing

and producing commercial services. The study also found that 30% of respondents said the productivity and yield of aquaculture farming had improved, while another 22% said that productivity had decreased (see Chart 12).

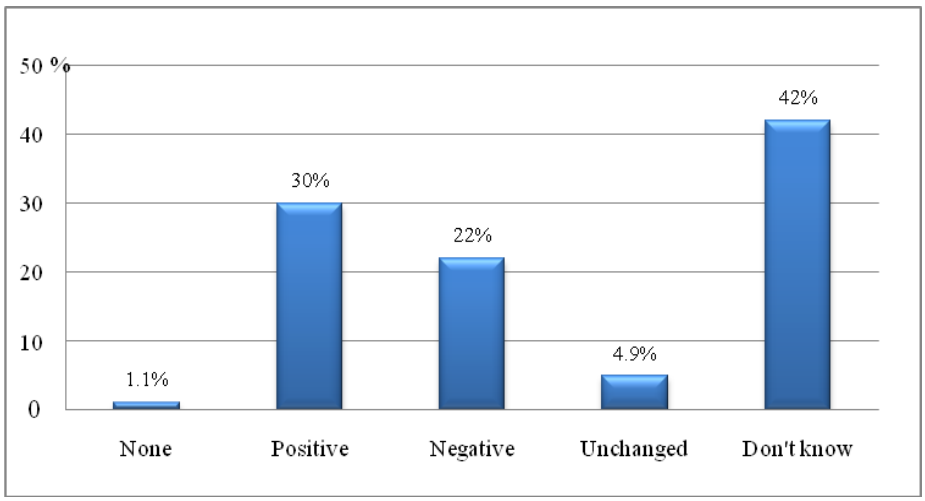


Chart 12. Community opinion regarding the effects of resource changes on aquaculture productivity.

The interviewers asked local villagers how their lives had been affected by the changes in coastal resources over the last years in their locations. As seen in Chart 13, the number of respondents who said that their family's finances and health became worse made up the highest proportion with 36.7%, while a slightly lower percentage (33.5%) saying that their lives remain unchanged. Only 20.3% of respondents said that their lives had become better. The remaining 9.5% of respondents said that they do not know if changes in coastal resources had affected their lives.

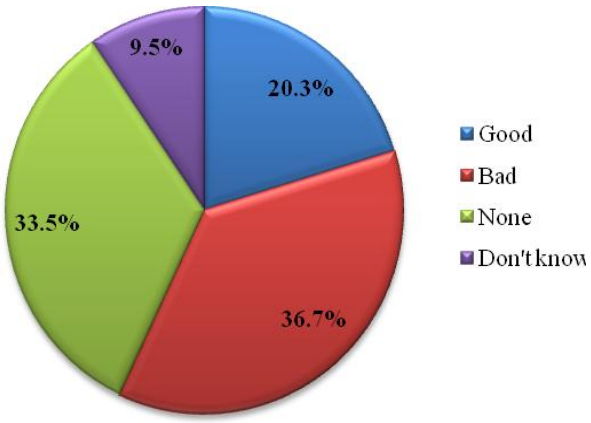


Chart 13. Community opinions regarding the effects of coastal resource changes to their lives.

2.2.5 Community Awareness and Participation Towards Mangrove Protection

When asking local villagers if it was necessary to preserve the remaining mangrove forests in their locations, the study found that 89.9% of respondents (141 persons) said that this should be done, while only 5 respondents (10.1%) said that it was unnecessary. All of the respondents in An Thanh Nam stressed that maintaining mangrove forests was important in order to protect dykes and the seashore from erosion, and to protect against strong waves and storms. In addition, during the interviews, 14 villagers remained silent and did not give answers to this question.

When asking local villagers if they should continue encouraging or allowing inhabitants and businesses to exploit coastal mangrove forests and the environment, and to convert cultivated land into aquaculture farming, it was found that 85% of respondents said that this should not be done, because they need mangroves to protect the dykes and the seashore from erosion. The rest of the respondents expressed support for this since they believed that expanding aquaculture farming would create more jobs and thus they would have the opportunity to generate more income.

The study asked local villagers to point out what activities they had participated in, in order to protect, manage and properly utilise mangrove forests and other coastal resources in their locations. As shown in

Chart 14, the activity that local villagers were most involved in was village meetings to discuss local resource management and protection. More than 66% of respondents said that they had participated in this type of activity, which was sometimes organised by local rangers.

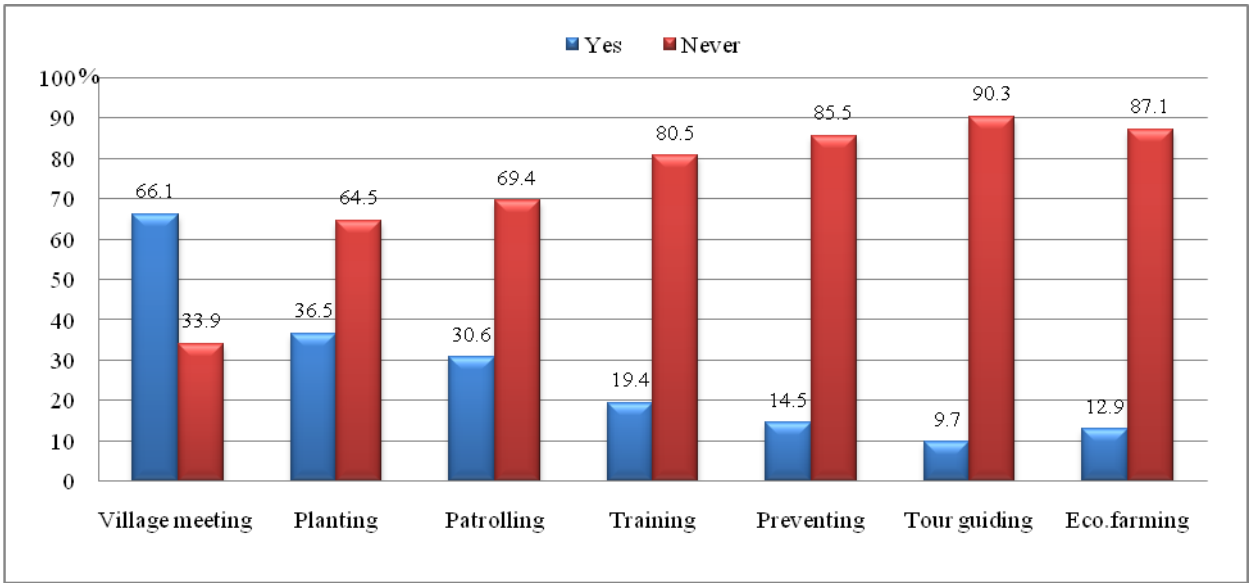


Chart 14. Types of local participation in managing, protecting and using coastal resources.

Other mangrove protection and utilisation activities that local villagers participated in (including percentages) were:

- Guiding visitors so they can enjoy local landscapes and customs (9.7%);
- Raising ecologically friendly shrimp-farming (e.g. mangrove mixed shrimp farming) - (12.9%);
- Informing and assisting local authorities to prevent destructive aquatic exploitation and mangrove forest destruction (14.5%);
- Attending sustainable aquaculture farming training (e.g. *keo* fish farming) (19.4%);
- Accompanying local authorities to patrol mangrove forests and coastal zones (30.6%); and
- Planting mangrove forests (35.5%).

2.2.6 Community Awareness Regarding the Roles of Local Villagers and other Stakeholders

When asking local villagers who should manage local mangrove forests, the majority of the respondents (57.7%) said that the task should be performed by forest rangers (e.g. forest protection division) (see Chart 15). Meanwhile, 35.2% of respondents indicated that households should be responsible for the task and 24.5% said that the Communal People's Committee (also locally called local authority) should be responsible.

Most of the interviewed villagers did not agree that businesses, local agencies for environment and natural resources (such as Department of Natural Resources and Environment) and local authorities should be key actors in managing local mangrove forests. The percentages of people who disagreed in regard to these stakeholders were 97.9%, 96.5% and 74.8%, respectively. The study also found that 41.5% of respondents said that forest rangers should not be involved in managing local mangrove forests.

While in the previous question more than 35% of respondents indicated that mangrove management should be assigned to local households in the affected areas, only 26.5% of respondents indicated that they were the persons responsible for managing and protecting that resource (see Table 6). Additionally, the study found that nearly 34% of respondents said that they did not know if they had any role in regards

to local mangrove forests. Only 17.9% of respondents said that they were the ones who were exploiting and utilising mangrove forests, and another 15.2% of respondents said that they were acting as both users and protectors of local mangrove forests. The study also found that a small number of local villagers (6.6%) said that they had no role at all in forest management and protection.

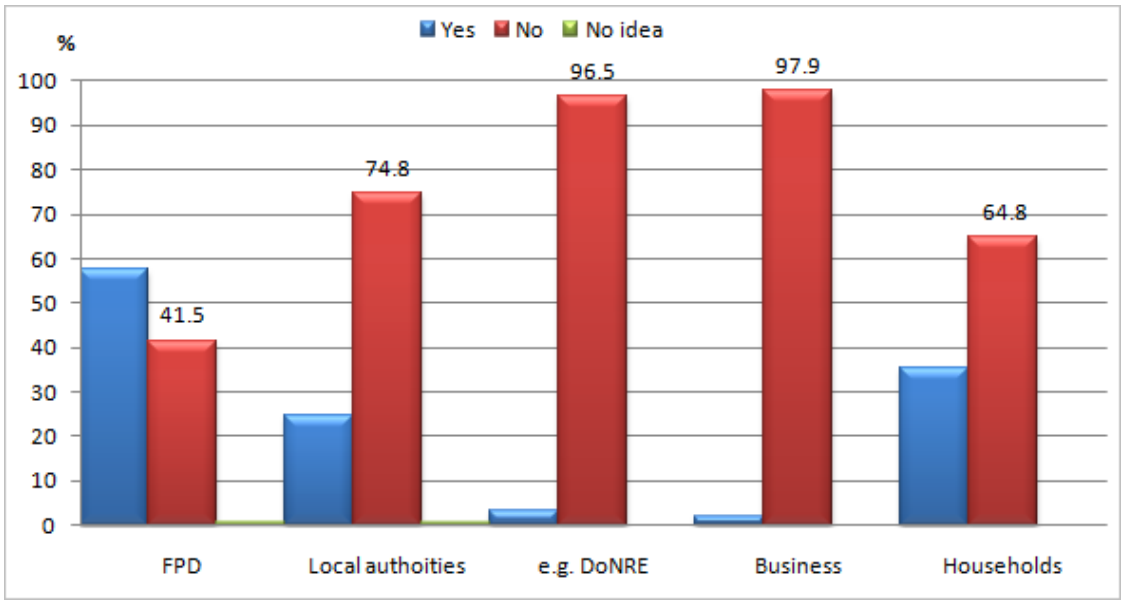


Chart 15. Community perception regarding key actors in mangrove forest management.

Table 6. Community's recognitions of their roles in regards to mangrove forests.

Roles/Implications	Numbers	Percentage
Acting as forest exploiter/users	27	17.9
Acting as both forest users and protectors	23	15.2
Acting as forest protectors/managers	40	26.5
Having no implication towards managing local mangrove forests	10	6.6
Don't know	51	33.8
Total	151	100

(Note: Nine villagers did not answer this question)

The study asked local villagers if they had heard of (the terminology) "climate change" and found that (as shown in Chart 16) most of the respondents (80.9%) said that they had never heard of it, while 18.5% of respondents confirmed that they had heard the terminology via broadcast radio and television. All of the villagers who had heard of "climate change" were Kinh people living in An Thanh Nam or Vinh Chau town.

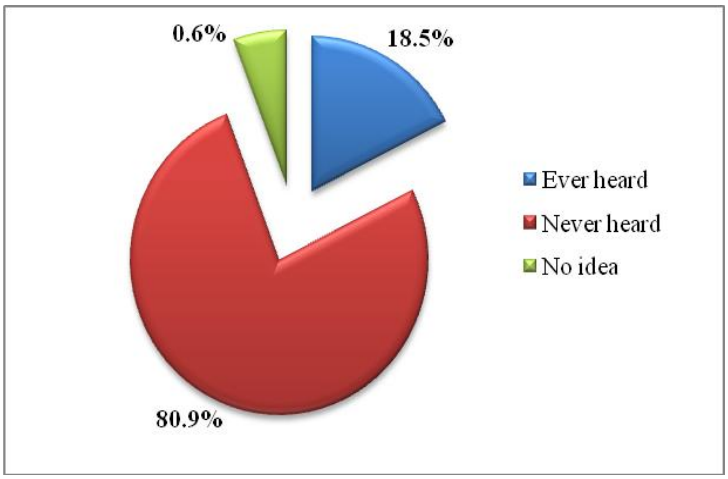


Chart 16. Community knowledge about climate change

2.3 Awareness of Local Authorities at District and Commune Levels

2.3.1 Sample Characteristics

The study received 96 responses from local officials and staff, of which 47 responses came from the district organisations in Vinh Chau, Long Phu and Cu Lao Dung, and 49 from the communal authorities of Trung Binh, An Thanh Nam, Vinh Tan, Vinh Hai and Vinh Chau Town.

As shown in Table 7 below, most of respondents were male staff, while 18% were women. This imbalance was foreseen by the study team, as the number of female employers is much lower than the number of male employees in such district and communal offices. In addition, most of interviewed officials/staff were Kinh people (84.4%), and nearly 65% of respondents were born and raised locally in the areas where they were now working. About 76% of respondents had been working for the local authorities for at least 5 years, of which 37.5% of respondents had more than 15 years of experience.

In regard to education, it is estimated that nearly 45% of the local authority officials and staff had obtained a college education, while just 26% of them had a university education. The rest of the respondents (29.2%) had a high-school education, with– most of these people working for social organisations such as Women's Unions, Youth Unions, and Farmer's Associations at the communal level.

Table 7. District and commune authority staff statistics.

Features	Index	Number	Percentage
Gender	Male	79	82.3
	Female	17	17.7
Geographical origins	Locally	62	64.9
	Others	34	35.1
Ethnicity	Kh'mer	11	11.5
	Chinese-Vietnamese	4	4.2
	Kinh	81	84.3
Education	High school	28	29.2
	College	43	44.8
	University	25	26
Working duration	Less than five years	23	24
	5 – 15 years	37	38.5
	More than 15 years	36	37.5

2.3.2 The Frequency and Source of Information Access

The interviewers asked local authority officials and staff how often they receive information related to management, protection, exploitation and utilisation of coastal resources and mangrove forests in a general and/or local context. As shown in Chart 17, the study found that local authority officials and staff had paid attention to such information, but to different extents. 28% said that they often got information about coastal resources on a weekly basis; 54% regularly got such information on a monthly basis; the remaining 17% were among those who paid little attention to such information at a frequency of every two months or less.

In regard to those respondents who got information on a weekly and monthly basis, the study found that newspapers and television were key information sources, of which the People (Nhan Dan) and Soc Trang Newspapers (paper-based) were common information channels for local authority organisations in Vinh Chau, Long Phu and Cu Lao Dung.

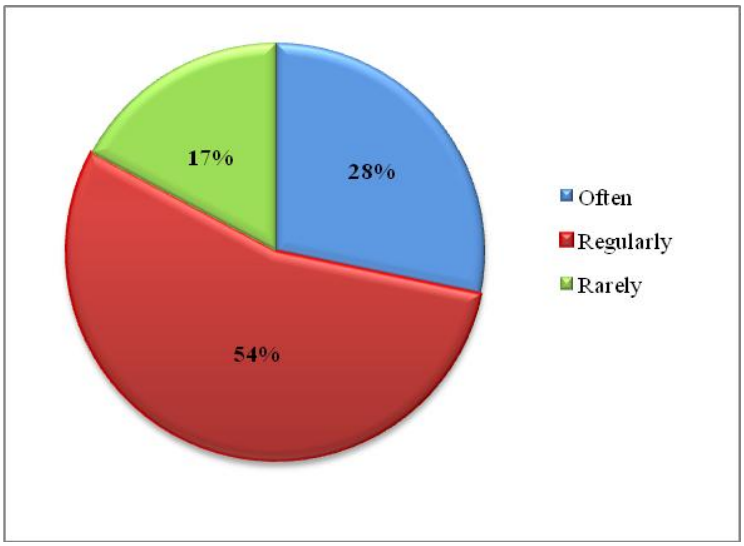


Chart 17. Frequency with which local authority officials and staff obtained information relating to coastal natural resources (Note: Often-Weekly; Regular or Normal - Monthly; Rarely-Every 2 months or less).

Few local officials and staff considered broadcast radios, technical reports and/or meeting or workshop materials as major channels for them to obtain information about coastal resources. The study observed that only young officials and staff in the district organisations accessed the internet; some of these people in Cu Lao Dung and Vinh Chau said that they sometimes had read news related to coastal resources in general from common online newspapers such as VietnamNet (www.vietnamnet.vn) or Vnexpress (www.vnexpress.net).

2.3.3 Local Authorities' Awareness Regarding Changes in Local Coastal Resources

When asking local authority officials and staff if they knew of any changes in local natural aquatic resources over the last 10 years, almost all the respondents said that these resources had changed. 63% said that local aquatic resources had decreased and 30% said that they had increased (see Chart 18). According to the former respondents, such resource degradation resulted from the following causes:

- Poverty among coastal inhabitants, leading them to practice overexploitation and/or destructive exploitation (e.g. electric, explosive, fish-poison) and exhausting juvenile populations;
- Low level of awareness among local villagers regarding the proper protection and utilisation of aquatic resources over the long-term;
- Water pollution due to water from shrimp-farming and run-off of pesticides and chemical fertilisers overused by local villagers for agricultural cultivation;
- Increase in number of people exploiting local aquatic resources (e.g. shrimp, crabs);
- Poor law enforcement by local authorities to properly control local villagers from exploiting aquatic resources; no local regulations for seasonal fishing;
- Clearance of local mangrove forests leading to habitat loss for juveniles.

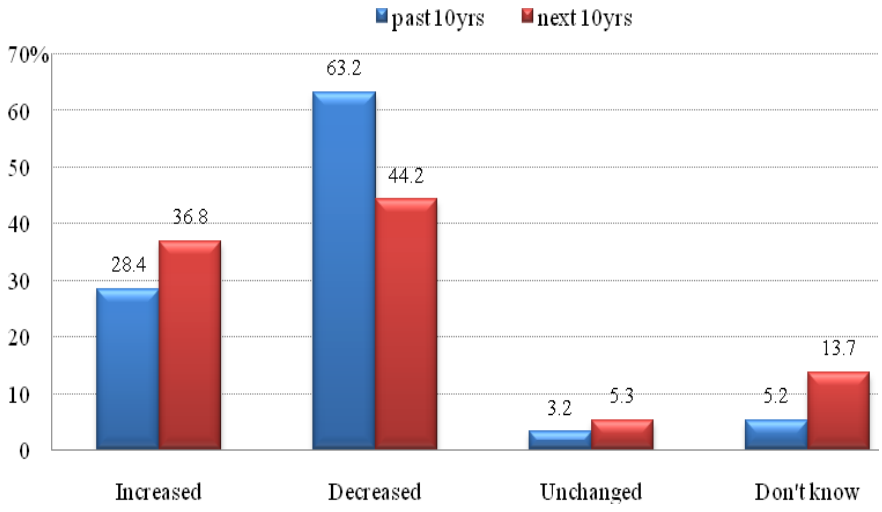


Chart 18. Perceptions of local authorities regarding changes in natural aquatic resources.

When addressing the change in local natural aquatic resources over the next 10 years, the study found that 44.2% of respondents believed that the resources would decrease, mainly because they thought local villagers and authorities could not stop the above mentioned causes. Another 36.8% said that natural aquatic resources in their locations would increase because they believed that the management and utilisation of such resources would be strengthened, local awareness on sustainable aquatic exploitation and farming would improved, and protection and management of mangrove forests and mud flats would be effectively achieved.

When asking local authority officials and staff if they are aware of any changes in the area of local mangrove forests over the last 10 years, the study found that nearly 60% of respondents said that it had increased, while 23% said it had decreased (see Chart 19). Despite a large-scale conversion of mangrove forests into shrimp farms, which took place in the Cu Lao Dung, Long Phu and Vinh Chau districts in 1990s, nearly 18% of respondents said that the area of local mangrove forests had remained unchanged and/or did not know.

Many officials and staff said that good performance by rangers regarding mangrove forest protection, more planting of mangrove forests by projects, and natural regeneration of mangrove forests on new mud flats were the causes leading to an increase in the forest area over the last years. During the interviews, however, none of the local officials or staff could specify what changes in local forest area had occurred in their area over the last 10 years (whether land had been cleared, planted, or was newly regenerated), or provide concrete data.

The study also found that a majority of respondents (64.5%) predicted that the area of mangrove forests in their locations would increase, and another small percentage (14%) said it would decrease over the next 10 years.

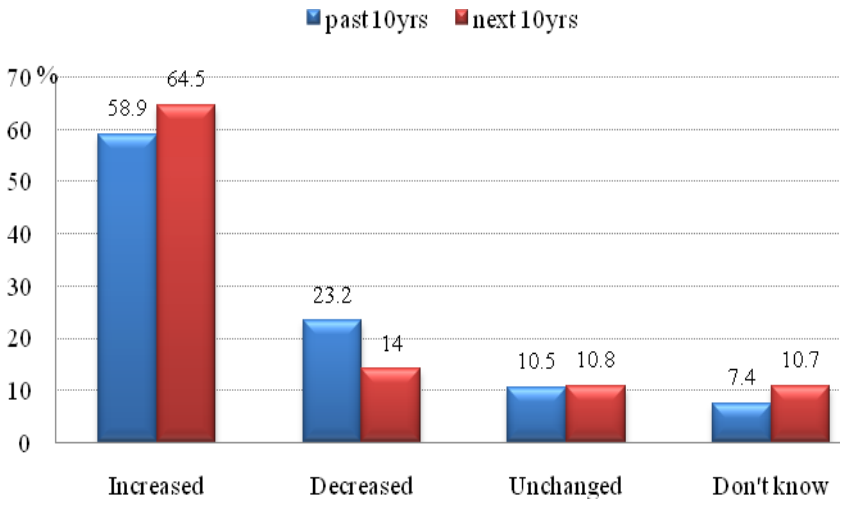


Chart 19. Perceptions of local authorities regarding changes in the area of mangrove forests.

The study asked local authority officials and staff how the area of local agricultural land, including rice fields, subsidised crops and fruit-tree plantations, had changed over the last 10 years. As shown in Chart 20, more than 55% of respondents said that the area had decreased due to the large agricultural land area in the Long Phu, Vinh Chau and Cu Lao Dung districts being converted into aquaculture farming over the last years.

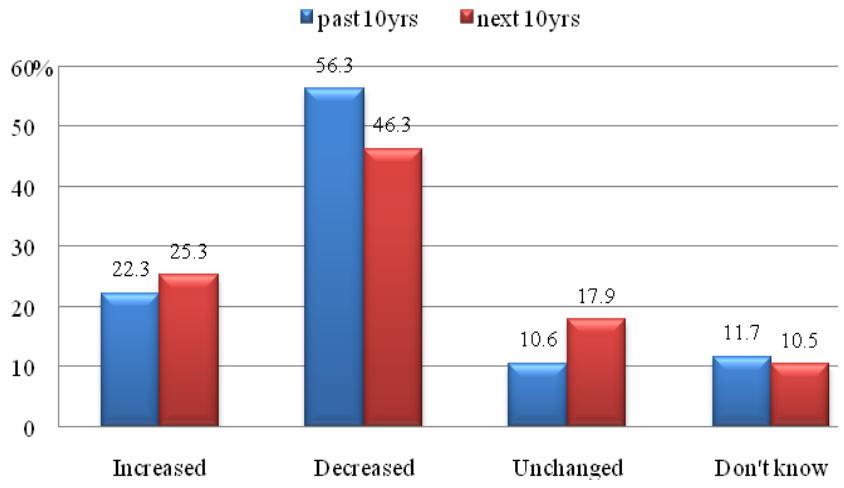


Chart 20. Perceptions of local authorities regarding changes in the area of agricultural land.

More than 22% of respondents said that the area of agricultural land in their locations had increased. The study also found that 10.6% of the respondents said that the area had remained unchanged, and nearly 12% did not know if that area had changed. Based on these facts, about 45% of local authority officials and staff did not pay attention and/or did not have adequate information about the status and changes in agricultural land in their locations.

Envisioning the future of agricultural land, more than 46% of respondents predicted that the area would decrease, while another 25.3% said it would increase. In addition, more than 10% of respondents said that they could not predict changes in the area of agricultural land for the coming years.

When asking local authority officials and staff how the area of aquaculture farming had changed over the last 10 years, more than 82% of respondents confirmed that there had been an increase in the area of aquaculture farming land (see Chart 21). Actually, there had been a significant increase in aquaculture land in Soc Trang from 18,000 hectares in 2000 to 34,000 hectare in 2005. However, the remaining percentage (18%) had not recognised this change and some people (7.4%) indicated that the area had decreased over the last years.

Chart 21 also shows that more than 40% of respondents predicted that the amount of aquaculture land in their locations would increase over the next 10 years. The remaining percentages - all more than 20% - belong to those local officials and staff who predicted that the area of aquaculture farming in their locations would decrease or remain unchanged over the next 10 years.

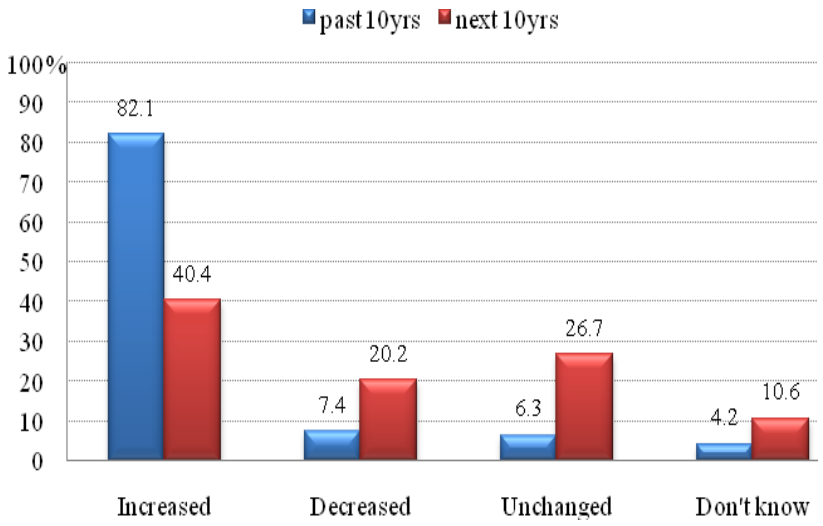


Chart 21. Perceptions of local authorities regarding changes in the area of aquaculture land.

The study asked local authority officials and staff about changes in the area of coastal mud flats over the last 10 years. Mud flats are important coastal habitats in which mangrove forests and aquatic creatures regenerate and live, and thus they play an important role for local livelihoods. The formation and expansion of mud flats in Soc Trang's coastline is a dynamic process, which depends heavily on sedimentation and erosion along the coast that is influenced by the flow regime and sediments of the Mekong river, the tidal regime, and monsoon winds.

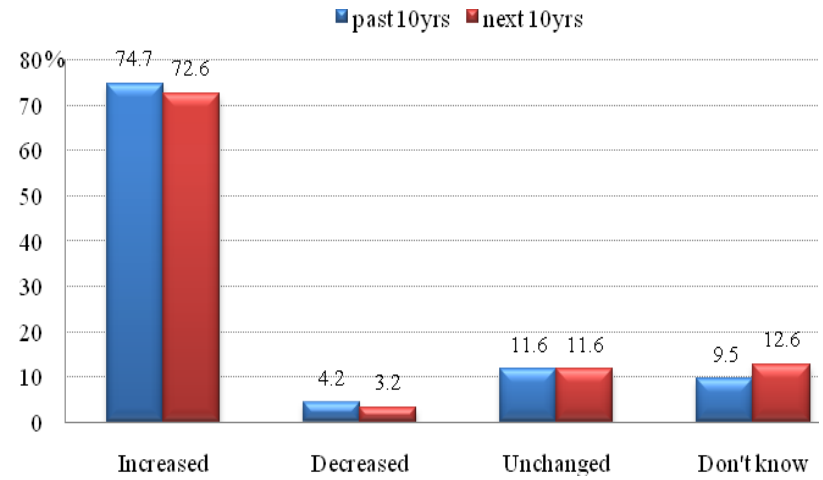


Chart 22. Perceptions of local authorities regarding changes in the area of mud flats.

As shown in Chart 22, nearly 75% of local authority officials and staff agreed that the area of mud flats along Soc Trang's coastal line had expanded and increased. A similarly high percentage (72.6%) predicted that over the next 10 years these mud flats would continue expanding as a natural process in which more sedimentation would be created along with the development of well-protected mangrove forest belts along the coastal line. Nearly 10% of respondents were not aware of changes in mud flats over the last 10 years, many of them young staff with less than 5 years of working experience in those districts.

When asking local authority officials and staff about the quality of drinking water, nearly 75% of respondents said that drinking water had improved over the last 10 years (see Chart 23). They stressed that their coastal inhabitants had greatly changed their behaviours by using cleaner water sources for drinking, instead of using water from channels as they used to do. They said that using clean water from drilling-wells, rainwater tanks, water-pumping towers and water supply stations was now common in coastal communes.

The study, however, found that nearly 18% of respondents said that the quality of drinking water in their locations had declined. They assumed that surface water in their locations had been polluted due to local overuse of pesticides and chemical fertilisers in agricultural cultivation, untreated waste water from aquaculture farming and seafood processing plants discharging freely into rivers and channels. Some local officials complained that the expansion of aquaculture farming had also led to a reduction in underground water.

Envisioning drinking water quality over the next 10 years, 58.5% of respondents assumed that drinking water would be better in the future, while 21.3% predicted that it would be worse. Nearly 10% said that the quality would remain unchanged, while 10% said that they could not predict how the quality of drinking water would be over the next 10 years.

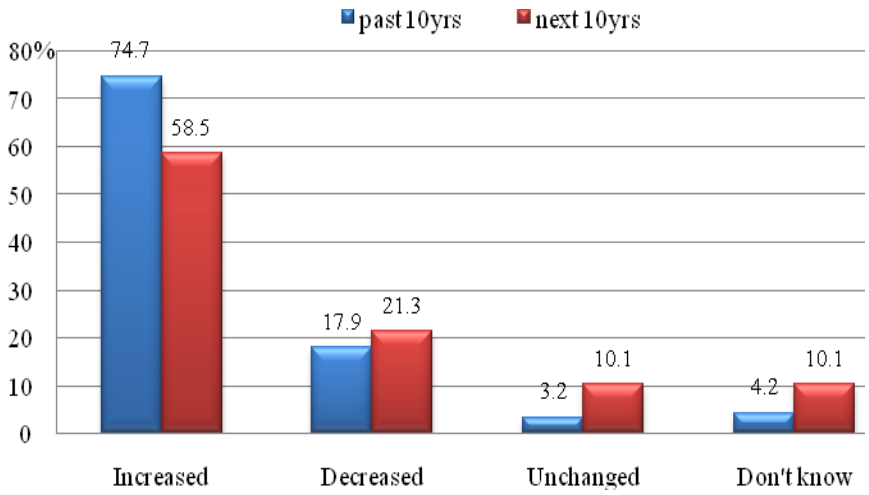


Chart 23. Perceptions of local authorities regarding the quality of drinking water.

2.3.4 Local Authorities' Awareness Regarding Threats and Interventions to Local Coastal Resources Management

The study asked local authority officials and staff to rank the level of harmfulness of different, common (potential) influences on coastal resources in their locations. The results of this assessment are presented below in Table 8.

According to Table 8, the threats that local authority officials and staff considered "very harmful" to local coastal resources - which were all mentioned by more than 50% of respondents - include destructive fishing (81.9%), abuse of pesticides and herbicides in agricultural cultivation (77.7%), discharge of untreated waste water from shrimp-farming into the environment (76.3%), clearance of mangrove forests for aquaculture farming (71.7%), oil spills from ships/boats into rivers and (65.6%), and sea level rise (52.2%).

Table 8. Local authorities' awareness of threats to local coastal resources (unit: percent).

Threats	Very harmful	Harmful	Harmless
Clearance of mangrove forests for aquaculture farming	71.7	25	3.3
Intensive aquaculture farming	21.3	70.2	8.5
Unplanned development of shrimp-farming	49.5	38.7	11.8
Discharge of untreated waste water from shrimp-farming into the environment	76.3	22.6	1.1
Abuse of pesticides, herbicides in agricultural cultivation	77.7	19.1	3.2
Destructive fishing by electricity, explosives, toxic herbs	81.9	17	1.1
Oil spills from ships/boats into rivers and channels	65.6	33.3	1.1
Waste water and solid waste from plants (e.g. seafood processing, ship-repairing, ice-production)	19.8	77	3.3
Invasive species (*Pomace canaliculata* snail. *Mimosa pigra)*	34	61.7	4.3
Construction of roads, settlements, and boat stations	14	21.5	64.5
Sea level rise / climate change	52.2	40.4	7.4

The threats that were ranked as most "harmful" include: waste water and solid waste from plants (77%), intensive aquaculture farming (70.2%), and invasive species encroachment (61.7%). On the other hand, the threat that local authorities ranked as least harmful to coastal resources was the construction of roads and settlement areas, which 64.5% of respondents indicated was harmless.

The study used a another question to further investigate the awareness of local authority officials and staff about the potential impacts of climate change in Soc Trang's coastal areas. Only 45 people (out of 96) gave responses, and it was found that many of the people who did not answer were the leaders of social organisations (e.g. Women's Unions, Fatherland Front) as well as staff of the Environment and Natural Resource Division and Agricultural Department, particularly of the Cu Lao Dung and Vinh Chau districts. Of the 45 respondents, most stressed that climate change was closely associated with heavier rains, severe storms, and prolonged drought, and would result in serious decline and loss in terms of crop yields. Few respondents addressed the issues of sea level rise and its potential economic, social and ecological impacts and risks for Soc Trang's coastal areas.

The study asked local authority officials and staff to assess the efficiency of different interventions for effective management of coastal resources, which might have already taken place in their locations. The results of this assessment are presented in Table 9 below.

Interventions that were considered by many local authority officials and staff as having a good performance (over 50% of respondents) include:

- Management, protection and development of coastal mangrove and wetlands (63%);
- Land use planning for aquaculture farming and agricultural cultivation (57.4%);
- Promoting community participation in sustainable management and utilisation of coastal resources (53.3%); and
- Inter-sectoral coordination for effective law enforcement in coastal management (51.1%).

Interventions which many respondents considered as having a bad performance include:

- Control and prevention of solid waste and waste water in aquaculture farming (44%);

- Mitigation of pesticide and herbicide abuse in agricultural production (31.5%);
- Equal sharing of benefits generated from coastal resources among involved stakeholders (28.1%); and
- Control and prevention of destructive fishing (27.5%).

Table 9. Local authorities' awareness regarding the efficiency of intervention performance for coastal resource management (unit: percent).

Interventions	Good	Moderate	Bad
Management, protection and development of coastal mangrove	63	28.3	8.7
Land use planning, aquaculture farming & agricultural cultivation	57.4	23.4	19.2
Control and prevention of destructive fishing	47.3	25.3	27.5
Disease control and prevention in aquaculture farming	39.1	37	23.9
Control and prevention of solid waste, waste water in aquaculture farming	27.5	28.5	44
Mitigation of pesticide and herbicide abuse in agricultural production	29.3	39.2	31.5
Environmental impact monitoring of aquaculture farming, processing plants	28.3	44.6	27.2
Control and elimination of invasive alien species	31.1	45.6	23.3
Application of environmentally friendly techniques in aquaculture farming	38.9	38.9	22.2
Promoting community participation in sustainable management and utilisation of coastal resources	53.3	29.3	17.4
Inter-sectoral coordination for effective law enforcement in coastal mgt.	51.1	37	12
Equal sharing of benefits from coastal resources among stakeholders	30.3	41.6	28.1

As an explanation for good performance in coastal mangrove management and protection, many local authority officials and staff referred to the existence of forest rangers (e.g. forest protection divisions) in their locations, and mangrove plantation activities, which were implemented in recent years in survey districts. In addition, they also frequently mentioned the Cu Lao Dung Clam Cooperative as performing well in: promoting community participation in sustainable management and use of coastal resources; and managing resource access and conflicts among local villagers and authorities. This cooperative was initiated and established in early 2008 by the Cu Lao Dung District's People Committee. It engaged 100 poor households in the An Thanh Nam and An Thanh III communes to participate as cooperative members in order to protect and exploit natural clam populations in a defined tidal area of 800 hectares for commercial purposes, based on a mutually agreed upon business plan. Many people said that the local authorities proposed replicating this model in Vinh Hai Commune (Vinh Chau District) and Trung Binh Commune (Long Phu District).

Though many local authority officials and staff said that local planning for aquaculture and agricultural land use was working well, none could provide relevant information, data or evidence to support this conclusion.

2.3.5 Local Authorities' Level of Awareness Regarding Necessity, Challenges and Participation Regarding Coastal Resources Management

The study asked local authority officials and staff if it was necessary to maintain the remaining mangrove forests and wetlands in their locations. As shown in Chart 24 below, most of the respondents (89.5%) said "yes" to confirm the necessity of maintaining the remaining local mangrove forests and wetlands. Only 8.4% of respondents said they do not know if it was necessary to maintain such resources. The study also

found that very few local officials and staff (2%) said that it was not necessary to keep the remaining mangrove and wetlands in their locations.

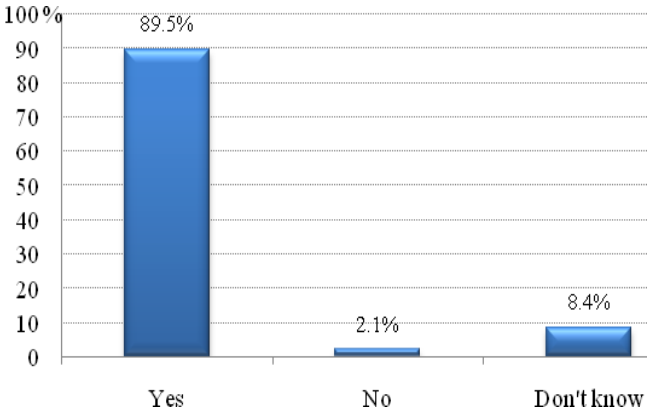


Chart 24. Local authorities' perceptions of the necessity for maintaining local mangrove forests.

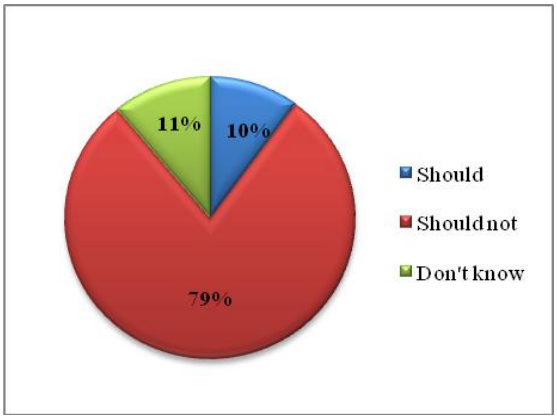


Chart 25. Local authorities' perceptions regarding encouraging the expansion of aquaculture farming.

The study also asked local authority officials and staff if they should continue encouraging and/or permitting people and business to clear coastal mangrove forests and convert them to agricultural land for expanding aquaculture farming. As shown in Chart 25, nearly 80% of respondents said this should be stopped, while another 10% said this should continue to be encouraged in order to expand aquaculture land. Another 12% of respondents were unable to give an answer as to whether or not people and business should or should not be encouraged to do so.

The study asked local authority officials and staff to determine the difficulties and challenges that their local authorities faced in facilitating sustainable management, protection, exploitation and use of coastal resources in their locations. The following findings outline those difficulties and challenges that were commonly mentioned by respondents:

(a) Policy challenges:

- There were no strict regulations to enforce local coordination and cooperation;
- Land use planning was not appropriate;
- Some policies relating to coastal zone development were not supported by villagers, particularly job creation for coastal poor, support for aquaculture farming (e.g. disease prevention, price guarantee);

(b) Regulatory weakness:

- Poor law enforcement of violations relating to resource use conflict;
- Lack of locally relevant regulations/guidelines for effective management and exploitation of coastal resources;

(c) Organisational challenges:

- Capacity of grassroots authorities was weak;
- Lack of permanent staff in charge of resource management at the communal level;
- Cooperation between departments/divisions was ineffective;

(d) Community challenges:

- Community awareness regarding coastal resources was low;
- Local livelihoods were still very dependent on the exploitation of coastal natural resources;
- Passive attitudes – villagers were always looking for charity aid/support from the government and social organisations, rather than actively searching for alternatives;

(e) External difficulties/challenges:

- Backward techniques still being used by poor villagers for fishing and aquaculture farming;
- Local villagers' production processes were currently unable to meet global demands for seafood trade and consumption such as Global GAP;
- Aquaculture farmers were faced with unstable markets and/or not connected directly with favourable markets yet, which results in a loss of profits to intermediates;

To overcome the existing difficulties and challenges in promoting sustainable management, protection and utilisation of coastal resources for better lives, local authority officials and staff proposed a set of solutions as follows:

- Force all affected departments and organisations (or stakeholders) to strictly and adequately comply with their tasks and responsibilities in coastal resource management and development, as assigned by the Government;
- Develop and promote proper co-management mechanisms for sustainable management and utilisation of coastal resources;
- Strengthen effective law enforcement to protect coastal resources;
- Carry out informed/participatory long-term planning for each type of land, balancing land use between aquaculture farming and cropping to ensure food security and maintenance of resource assets for cross-generational rural development;
- Assist local communities in marketing and selling local products, which are to be produced in accordance with GAPs, particularly shrimp and other agricultural products (e.g. fruits, onions, etc.);
- Enhance capacity of local authority officials and staff;
- Raise awareness among local authorities and communities towards sustainable management and utilisation of coastal resources.

The study asked local authority officials and staff how they perceived the role of local communities in terms of coastal resources. As shown in Table 10, nearly 70% of respondents indicated that the role of local villagers was both resource users and protectors. Only 8.6% indicated that the role of local villagers was limited to coastal resource exploiters and users, while 6.5% said local villagers were the managers and protectors of coastal resources. The study also found that 5.7% of respondents said that local villagers had no role in terms of local coastal resources, while the rest (nearly 10%) were unable to give any specific comments regarding the role of local villagers.

Table 10. Local authorities' perceptions of local communities' roles in terms of coastal resources.

Community's roles	Percent
Both resource users and protectors/managers	69.9
Only resource exploiters/users	8.6
Only resource managers/protectors	6.5
No role	5.4
No idea	9.7

In regards to identifying the stakeholders responsible for managing coastal resources in Soc Trang, the study asked local authority officials and staff to consider the following institutions: Department of Environment and Natural Resources (DoNRE) and its district divisions, Forest Protection Sub-Department

(FPSD) and its district divisions, Sub-Department of Capture Fisheries and Resource Protection (Sub-DECAFIREP), People's Committees at district and communal levels, aquaculture businesses and farmers, local social organisations (e.g. Youth Unions, Women's Unions, Veteran's Association), and local communities.

As shown in Table 11, almost all the respondents indicated that all of the above mentioned institutions should be responsible for coastal resource management, for which DoNRE (98.9%), the local People's Committees (95.7%), local social organisations (94.6%), DECAFIREP 92.6%), and FPSD (91.4%) were the key actors.. 16% of respondents did not agree that aquaculture businesses and/or farm owners were also responsible for managing the coastal resources they were utilising.

Table 11. Local authorities' perceptions of stakeholders in coastal resource management.

Institutions	Yes	No
DoNRE and its district divisions	98.9	1.1
District/Commune People's Committees	95.7	4.3
Aquaculture farming business/ owners	83.9	16.1
FPSD and its district divisions	91.4	8.6
Local communities	89.4	10.6
Marine Resource Protection Department/Station	92.6	7.4
Local social organisations (e.g. Youth, Women's Unions)	94.6	5.4

The study asked local authority officials and staff if they had ever attended any meetings or workshops related to the management, protection, use and development of coastal resources in their locations. Their responses, as shown in Table 12, indicated that about 60% of respondents had participated in such meetings, and more than 40% had not. During this interview, many young authority staff said that their managers were sometimes invited to district and communal meetings to discuss environmental issues, land use, aquaculture production, mangrove forests, etc., but young staff members usually were rarely nominated to attend such meetings. The study also observed that most of the respondents from local social organisations such as Youth Union, Women's Union, cultural and information divisions, and schools had never attended any meetings about coastal resource issues.

Table 12. Participation of local authority staff and officials in local "coastal resource" meetings (n=95).

Participation	Responses	Percent
Never have participated	39	40.4
Have participated	56	59.6

2.4 Provincial Officials' Awareness and Participation with Regard to Coastal Resource Management

2.4.1 Survey Sampling

A total of 15 provincial officials, the leaders and/or managers of different departments in Soc Trang, were interviewed. They were from the Provincial Communist Party Committee (1 person), Provincial People Council Office (1), Department of Natural Resources and Environment (2), Department of Agriculture and Rural Development (2), Department of Science and Technology (1), Provincial Centre for Aquaculture

Extension (1), Forest Protection Sub-Department (1), Environmental Police Division (2), Fisheries Association (1), Farmer's Association (1), Women's Union (1) and Youth Union (1). The study tried to approach the Soc Trang Provincial People's Committee but it was unsuccessful in arranging meetings with the proper key officials for the survey. This survey focused on investigating provincial officials' concerns over the management and use of coastal resources in Soc Trang, as well as their participation in discussion and consultation activities related to coastal resources. Findings from these investigations could help to identify their concerns and support in the management and development of coastal resources in the province.

2.4.2 Provincial Officials' Interest in Coastal Socio-economic Development and Resource Management

The study found that nearly 53% of provincial officials regularly received information related to coastal resource management and utilisation every week, which was higher than the 33% who sometimes received such information. The percentage of officials who rarely got such information was about 7%, while another 7% rarely received such information.

With regard to those officials who received weekly news and information about coastal resources, the vehicle was usually workshops or meetings, television, newspapers (commonly Nhan Dan, Soc Trang, Thanh Nien and Tuoi Tre newspapers), technical reports and informal conversation. The study found that nearly 50% of provincial officials were able to get such information from the internet, usually from online newspapers such as newspapers such as VietnamNet (www.vietnamnet.vn) or Vnexpress (www.vnexpress.net). Broadcast radio was actually not the main channels for these officials to receive information about coastal areas.

The study also asked provincial officials if they knew about the project "*Management of Natural Resources in the Coastal Zone of Soc Trang Province"* being implemented by GTZ and the Forest Protection Sub-Department. It found that 4 of the 15 respondents did not know about or had not been given any information about the project. These people were from the Environmental Police Division, Provincial Youth Union, and Department of Natural Resources and Environment. The other 11 respondents said that they had been invited to attend meetings, which were organised by the project, and/or obtained the project's news from the Soc Trang newspaper.

2.4.3 Provincial Officials' Perceptions of the Changes in the Local Environment and Coastal Natural Resources

Most of respondents assumed that the natural aquatic resources and the area of agricultural land in Soc Trang province had decreased over the last 10 years. The study found that 12 of the 15 provincial officials shared this view. Many people explained that the reduction in aquatic resources was caused by local over-exploitation, destructive fishing, lack of control and guidance to fishermen, water pollution due to waste water, and chemical substances used in agricultural production. They also explained that the decline in the area of agricultural land in Soc Trang's coastal zone was due to the expansion of aquaculture farming, settlement development and infrastructure construction.

All of the provincial officials predicted that the area of agricultural land in Soc Trang province would continue to shrink over the next 10 years due to increases in urbanisation and population, resulting in some cultivation land being converted for new settlement and industrial zone development, as oriented by the provincial socio-economic development plans for the year 2020. Some provincial officials believed that aquaculture farming would continue to be a key economic sector for Soc Trang province, thus causing the conversion of a portion of cultivated land into shrimp, crab and fish ponds.

Many provincial officials believed that the natural aquatic resources in Soc Trang would continue to decrease over the next 10 years, while coastal poverty would remain. Destructive fishing and over-exploitation of aquatic resources would be inevitable if the province's coastal poor do not had livelihood alternatives. They predicted that this situation would be aggravated as other problems such as the

discharge of waste water and run-off of pesticides/herbicides might not be appropriately solved in the near future.

All provincial officials confirmed that the area of mangrove forests and mud flats, as well as the quality of drinking water in Soc Trang had increased and/or improved over the last years. But no respondents could provide specific data or information to prove their conclusions. They raised the following issues as being of importance:

- The area of mangrove forests had been increased by recent plantation projects, but the risks of deforestation and conversion of forests into shrimp farming continued;
- The mud flats had naturally expanded, but local authorities had no monitoring system or data collection to verify the increase in mud flat area;
- The quality of drinking water had improved, but the risk of underground water being degraded was clearly seen due to the expansion of aquaculture farming; and
- More industrial zones will be established along the coastal zones of Soc Trang in the future, which increase the risk of water pollution for rivers, channels and underground waters.

2.4.4 Provincial Officials' Perceptions of Negative Influences on the Local Environment and Coastal Natural Resources

The study asked provincial officials to assess the harmfulness of negative factors that may affect Soc Trang's coastal environment and natural resources into three categories: high level of seriousness; serious; and not serious. A set of 10 negative factors was given to the provincial officials to rate, including: deforestation for aquaculture farming; intensive aquaculture; untreated waste water from aquaculture farming; abuse of pesticides and herbicides; destructive fishing; oil-spill pollution; waste discharge from plants; spreading of invasive alien species (e.g. mimosa, yellow snail); infrastructure construction; and sea level rise.

The study found that few responses were offered for this question, and no one filled in all of the answering/marking boxes. Some officials said that they could not give their own assessment of the harmfulness of these influences because they do not know and/or do not have adequate information about their impacts on the coastal environment and natural resources.

Four officials (from the Provincial People's Council Office, Department of Natural Resources and Environment, Youth Union, and Women's Union) assessed infrastructure development, spreading of invasive alien species, deforestation for aquaculture farming and destructive fishing, as not being seriously harmful to the local coastal environment and natural resources.

Eight officials selected rising sea levels as the factor that would be harmful at the "serious" level, but not at the "high level of seriousness" to the coastal environment and resources in Soc Trang.

The study asked provincial officials to assess the performance of different interventions that were locally implemented to ensure sustainable management and utilisation of coastal natural resources and the environment in Soc Trang. Many respondents assumed that the management, protection and development of mangrove forests had been well implemented in Soc Trang. They did not provide or point out any specific, relevant data in order to prove their conclusions. Respondents from the Provincial People's Council Office, Department of Agriculture and Rural Development, Department of Science and Technology, Centre for Aquaculture Extension, Forest Protection Sub-Department, and Fisheries Association stressed that interventions such as the World Bank-funded mangrove forest plantation project were an important contribution to maintaining and developing mangrove forests in Soc Trang.

The following activities were seen by many officials as "not-good performance": control and prevention of destructive fishing; disease control and prevention in aquaculture farming; treatment of polluted water from shrimp ponds; control of pesticide and herbicide abuse in crop cultivation; application of ecologically

friendly aquaculture farming; and equal sharing of benefits generated from good management of coastal resources.

2.4.5 Provincial Officials' Perceptions of Stakeholder Participation and Coastal Zone Development

The study asked provincial officials if they had participated in discussions and/or consultations on coastal resource management and coastal zone development planning in their province. It found that only 6 respondents from the provincial Communist Party Committee, Forest Protection Sub-Department, Department of Agriculture and Rural Development, Department of Science and Technology, Centre for Aquaculture Extension, and Fisheries Association, confirmed that they had ever attended at least one meeting and/or workshop to discuss coastal resource related issues. Some of them said that they were invited to a meeting, which was recently organised by the Forest Protection Sub-Department in regard to the project "*Management of Natural Resources in the Coastal Zone of Soc Trang Province"*. The other 9 respondents said that they had never been consulted and/or invited to any meeting or workshop related to such topics.

The study asked provincial officials to point out important departments/organisations in Soc Trang that should participate in discussions and consultations for the planning and management of coastal natural resources in the province. All of the officials gave comments on this request, and the departments/organisations proposed by many respondents were the Department of Agriculture and Rural Development (including FPSD, Sub-DECAFIREP), Department of Natural Resources and Environment, Department of Science and Technology, Department of Planning and Investment, Department of Industries and Trade, Environmental Police, People's Committees in the districts, Farmer's Association, Women's Association, Youth Union. Of these, DARD, DoNRE, DPI and social organisations were the most commonly selected. In particular, the respondent of the People's Council Office recommended that the Department of Justice and Lawyer's Association should be consulted for coastal resource issues in Soc Trang.

The study found that those departments/organisations which were less commonly recommended by provincial officials include the Department of Education and Training, Department of Health, Department of Culture, Sport and Tourism, and Department of Labour, Invalid and Social Affairs. No one mentioned the construction and transport departments, the Border Army Force, Police Department, local in-service soldiers or scientific research institutes, universities or financial institutions.

Each provincial official was required by the study to figure out economic, social and environmental priorities that need to be addressed in order to ensure the sustainable development of the coastal zone in Soc Trang. All of the officials responded to this requirement, in which the economic related priorities that were addressed by many respondents included:

- There should be overall and comprehensive planning for coastal zone development in Soc Trang with focus on planning for: aquaculture farming development; land use for rice growing to ensure food security; and investment for irrigation and coastal dyke construction;
- There should be rehabilitation and strengthening of economically effective management and utilisation of mangrove forests by encouraging vocational training, job creation and income generation for coastal poor villagers, through forest plantation, protection and exploitation of natural resources (e.g. clam, crab, *Keo* fish), and eco-tourism development; and
- There should be continued support for the poor and ethnic minority communities, with subsidiary livelihoods and agricultural product marketing.

With regard to social priorities, many officials recommended that the following points be focused on:

- There should be: strengthening of the education investment; improvement and enrichment of the spiritual lives of coastal communities; engagement with vocational training; job creation; and awareness raising for the sustainable management and use of coastal natural resources;

- There should be strengthening of law enforcement to control and mitigate social conflicts and violations related to natural resources (such as poisoning shrimp-ponds, land ownership, etc.); and
- There should be the promotion of effective participatory management and consultation between local authorities and local communities in regard to resource (i.e. land, water and aquatic) access and benefit sharing through accountable and transparent processes.

The environmental concerns that provincial officials recommended as priorities that should be addressed locally include:

- Rehabilitation and development of mangrove forest belts along the provincial coastal line;
- Effective treatment of polluted water discharged from intensive shrimp farming;
- Control and prevention of over-exploitation of coastal natural resources;
- Application of environmentally friendly aquaculture farming technologies;
- Promotion of equal resource access and benefit sharing for coastal communities;
- Strict strengthening of law enforcement for violations related to environmental laws;
- Strengthening of environmental awareness and education for local authorities and the public;
- Good management and treatment of domestic and production wastes and reduction of oil-spill risk; and
- Effective coordination and cooperation among local government departments and organisations to address local environmental and resource problems.

Of the suggestions listed above, the study found no response from any provincial officials addressing interventions for reducing the impact of climate change and/or rising sea levels in the coastal zone of Soc Trang Province. However, in the next question, when the interviewer asked if the issues of climate change should be considered in the planning of coastal zone development in Soc Trang, many of them stated that climate change was a global, national and provincial issue, so it should be integrated into planning related to the coastal zone development of the province.

2.5 Awareness and Attitudes of Local Aquaculture-related Business and Services Regarding Coastal Resource Management and Utilisation

During the survey in the Cu Lao Dung, Vinh Chau and Long Phu districts, the study team was unable to approach local aquaculture-related business and services for interviews as was intended. This was caused by:

- Many owners of aquaculture farms and seafood processing business and services refusing meetings and interviews;
- Many owners of such business and services were not local people and were not staying at the places when the study team came for interviews. Most of them stay in Soc Trang City or the provinces of Can Tho, Ca Mau, Bac Lieu and Vinh Long; and
- Those people the study team met, including farm managers, technicians, workers and hired labourers always refused to do interviews because, as they said, they could not represent their business bosses/directors.

Nonetheless, the study completed interviews with 15 people from shrimp farming companies and cooperatives, aquaculture farming services (e.g. food, juveniles, equipments, chemicals), and seafood processing plants in three districts. With this target group, the study focused on investigating their participation in the management and use of land, water, mangrove forests and natural aquatic resources in the area. It also tried to find out their willingness in regard to paying fees for resource use and possibilities for applying advanced environmentally friendly technologies in aquaculture production. The results of the survey are described below.

Most of the respondents agreed that their production activities relied on coastal resources - either water resources (salty, blackish, fresh waters), mud flats, wetlands or rice fields. They did not, however, accept that mangrove forests and natural aquatic resources were important for their farming operations. For those operating intensive aquaculture farming, they had to buy juveniles from “industrial” breeding stations instead of collecting them from the natural environment.

Many respondents did not know if local mangrove forests had changed over the past years. One respondent said this had remained unchanged. The study observed that those working in aquaculture farming usually stressed that their work does not relate to the destruction of mangrove forests in the areas, while those working for farming services and/or in seafood processing plants assumed that they did not had any involvement with that resource.

All of the respondents said that they were not informed by the local governments or other agencies about how local coastal natural resources, particularly mangrove forests or aquatic resources, had changed over the past years. Thus, they did not have clear and precise information or data about these changes. In general, most of the respondents said that they did not care much about the situation or changes in local coastal resources, except for water resources as water quality was vital for shrimp farming. They assumed that if local mangrove forests and/or natural aquatic resources were reduced, it was because poor local villagers had to over-exploit these resources to maintain their livelihoods.

Of 15 respondents asked if human interventions such as mangrove forest clearance or conversion of cultivation land and mud flats into shrimp farming had influenced the productivity and quality of shrimp products they raised, 6 indicated that they did not know 5 assumed that there had been no influence, while 4 confirmed that there had been an impact. Some respondents in the An Thanh Nam, Vinh Hai, Vinh Chau and Trung Binh communes said that local productivity and quality of local shrimp products has recently shown clear declines, proved by the fact that many shrimp farming owners experienced terrible losses due to shrimp disease spreading, water pollution, heavy raining and/or storms. Many other respondents could not explain the influence of human interventions, particularly mangrove forest destruction, on the aquaculture-based livelihoods in their areas.

Most of the respondents agreed that their livelihoods (e.g. aquaculture farming and fishing) were at risk from: natural disasters, especially flooding and storms; spread of disease; water pollution due to waste discharge from domestic and industrial activities; and abuse of pesticides and herbicides in the area. However, none mentioned other risks and problems that could affect their livelihoods such as erosion of the coastal zone and river banks and the depletion of natural aquatic resources (such as crab juveniles or mother shrimps).

Only 6 respondents (of 15) recognised that the operation of their companies/ businesses had caused pollution (to a greater or lesser extent) in the local environment by discharging solid waste and waste water or through the introduction of non-intentional disease. Most shrimp farm owners said that they were fully aware how to clean-up the environment in their farms through collecting solid wastes (e.g. plastic bags, bottles), using micro-biological products to clean up ponds (e.g. breeding algae), and establishing lakes or canals to contain and transport waste water for treatment. However, none expressed their support in regard to the models of raising shrimp or crab in mangrove forests or planting mangrove forests in shrimp-ponds. They explained that dead leaves and roots of mangrove would ruin their ponds, reducing oxygen volumes in water, leading to a decline in shrimp productivity.

All of the respondents said that their companies/businesses did not have to pay environmental taxes or fees to local authorities, but that they were willing to pay if it was legally required by the local government. However, many respondents said that every year their company/business had to make donations in cash to contribute towards a communal security fee, poor assistance fund, emergency aids, or charity services. They assumed that by making the donations, they had participated in poverty reduction and community development in the areas.

Several respondents explained that their companies and cooperatives were invited to attend training programs on sustainable aquaculture farming practices such as raising shrimp in mangrove forests, but no one was interested in applying for them at that time. They explained that they did not want to make a

trade-off by trying to protect the environment rather than raising the productivity and yield of farmed shrimp.

Some respondents in Vinh Chau and Long Phu said that they had been introduced and/or guided by the district's aquaculture extension workers in regard to the techniques of environmental management and treatment of waste water from shrimp-ponds, but they could not adopt these techniques systematically due to the high investment required. The study found that 9 of the 15 respondents said that they would be willing to adopt environmentally friendly technologies in aquaculture farming if the government provided them with financial and technical support and guaranteed their harvest's productivity. No respondents said that they had been informed, trained, or facilitated regarding environmental and land-use planning in aquaculture farming, or warned about the impacts of climate change on their livelihoods in the coastal areas.

The study also found that 6 out of 15 respondents did not known about Global Good Agriculture and Aquaculture Practices (Global GAP). Only 2 respondents said that they had been invited to the GAP training, so they clearly were aware of it. In addition, another 7 respondents said that they had heard about GAP, but did not clearly understand this standard. However, all respondents indicated that they would be willing to adopt GAP standards if they were properly trained and guided in practicing it, and were given secure non-diseased juvenile sources, compatible productivity, marketing assistance, and high selling prices. At the present, they were looking forward to receiving assistance from the local government in regard to aquaculture farming planning and how to design and construct water supply and discharge canals to avoid water pollution. This would ensure communal security and avoid land use conflicts between their companies/businesses and local villagers, and stop the stealing of shrimp or poisoning of ponds by aggressive people. They were also looking for assistance from the local government in regard to financial support via preferable credit programmes, and were seeking markets for their aquaculture products.

According to these respondents, local conflicts between their companies/businesses and local villagers arose due to conflicts over the use of land and water resources or the demand for local employment, which lead to aggressive behaviours such as stealing shrimp or poisoning ponds with pesticides. They explained that they could not or do not want to employ local villagers, because they lack an understanding of intensive shrimp-farming and farm management, and were not disciplined in meeting strict labour requirements. They prefer to recruit people from the Nam Dinh, Ca Mau, Long An and Can Tho provinces to work at their aquaculture farms. To avoid such conflicts, they suggest local authorities must be responsible for creating long-term jobs for villagers, as well as training them and ensuring their land capital for production.

2.6 Findings from Village-based Participatory Rapid Appraisals

Three village-based Participatory Rapid Appraisals (PRA) meetings were carried out in Vam Ho of An Thanh Nam Commune, Tan Nam of Vinh Tan Commune, and Au Tho B of Vinh Hai Commune. By facilitating these meetings, the study tried to investigate local communities' awareness of changes in local natural coastal resources based on their village's historical milestones since 1975, as well as their perceptions regarding the causes of such changes. Indicators relating to local coastal resources that were used for community brainstorming included: the area of mangrove forests; quantitative richness of (natural) fish, shrimp, crabs and oysters; the area of aquaculture/shrimp farming; the area of cultivated land (e.g. rice, subsidiary crops, sugarcane); and wildlife mangrove forests (where applicable). During the meeting, local villagers were asked to give scores indicating the richness of each kind of coastal resource in terms of local villagers' opinions at a given time identified as a milestone in their village's history.

Scores from 1 to 10 were given, with 1 representing the lowest level of richness and 10 the highest level of richness of local coastal resources in their areas. The trend of changes for each coastal resource was determined by scoring differences spanning these milestones. Common milestones were identified by

local villagers such as the year of the end of the American War[2] (1975), new cooperative formulation and/or new migration and resettlement (1980s), severe storms (1990s), development and expansion of shrimp farming (1990s), and the breakdown of shrimp-farming (early 2000s).

The following tables (13, 14 and 15) present the results of the three PRA meetings. These tables reflect that natural disaster occurrence (e.g. storms) and/or the expansion and breakdown of shrimp-farming, were locally considered as critical milestones in regard to clear changes in coastal resources in their areas. The key findings from PRA discussions are discussed below.

The area of mangrove forests has continuously declined over the last 30 years, particularly in the Au Tho B and Vam Ho villages. According to Au Tho B's villagers, from 1975 until 2008, an estimated 80% of local mangrove forests had been cleared, while villagers in Vam Ho estimated that more than 60% of mangrove forests in their area had also been lost. People from these villages also predicted that forest resources in their areas would continued to decrease over the coming years.

According to local villagers, the causes of mangrove forest reduction were quite different for each village. In Vam Ho, villagers said that since the early 1980s migrants came for the purposes of settlement and exploitation in the 30/4 Agricultural Farming Enterprise and cleared mass forests for housing, road and dyke construction so they could cultivate rice on the land. The remaining forest continued to be reduced locally by storms in the 1990s. They stressed that the expansion and development of aquaculture farming in Vam Ho was not the direct cause of forest loss, as most of the shrimp-ponds there were established on the rice fields or grass-wetlands where mangrove forests had been previously destroyed. Recently, the construction of the coastal dyke in An Thanh Nam Commune also led to some mangrove forest (about 2 hectares, local rangers said) being cut down.

Tan Nam's villagers blamed the development and expansion of shrimp-farming and/or storms for the loss of mangrove forests in their area. Villagers in Au Tho B, on the other hand, said that mangrove forests in their commune had increased in size since the late 1990s as new plantings and regeneration had taken place with the support of the Government's Programme 661 and the World Bank (e.g. the Coastal Wetland Protection and Development Project).

Table 13. Scoring the richness of local coastal resources by Vam Ho's villagers (2008).

Coastal resources	Milestones						
	1980 Settlement in Agri-farm 30/4	1990 Heavy storm	1996 Heavy storm No.5	2000 Coastal dyke construction	2002 Expansion of shrimp farming	2007 Agri-farm disintegration/ Land allocated to households	Next 5 years
Mangrove coverage	10	7	4	3	3	3	2
Clam	10	9	10	6	5	7	6
Fish, crab, shrimp	10	8	7	5	3	2	1
Land used for aquaculture	-	1	2	2	10	7	7
Land used for cultivation	1	10	10	2	2	1	1
Drinking water quality	1	2	4	8	9	10	10
Wild animals (bird, bat, monkey)	10	7	6	4	3	3	2

[2] This war is internationally called the Vietnam War.

Table 14. Scoring the richness of local coastal resources by Tan Nam's villagers (2008).

Coastal Resources	Milestones							
	1975 End of American war	1980 Cooperative establishment	1988 Introduction of shrimp farming	1990 Heavy storm	1994 Breakout shrimp farming	2004 Crab farming	2007	2015
Mangrove	0	0	6	6	4	2	2	Don't know
Clam	10	10	10	8	6	2	2	2
Keo fish	-	-	-	-	-	4	4	Don't know
Crab	10	10	10	10	10	6	4	Don't know
Ruoc	6	6	6	6	4	2	2	Don't know
Shrimp	2	2	2	2	2	2	2	Don't know
Fish	10	10	8	6	2	2	2	Don't know
Land for aquaculture	0	0	10	-	4	2	2	Don't know

Table 15. Scoring the richness of local coastal resources by Au Tho B's villagers (2008).

Coastal resources	Milestones						
	1975 End of American war	1985 Cooperative Disintegration	1995 Heavy storm	1997 Development of shrimp farming	2003 Breakdown of shrimp farming	2008 Current	2020
Fish	10	8	5	5	3	2	1
Shrimp	10	8	5	5	3	2	Don't know
Crab	10	8	5	5	3	2	Don't know
Clam	10	8	5	5	3	2	Don't know
Shell	10	8	5	5	3	2	Don't know
Mangrove	-	-	-	8	9	10	Don't know
Aquaculture land	Naturally extensive farming				6	10	Don't know
Cultivation land	Remaining unchanged much						Don't know

According to local villagers, all kinds of aquatic resources such as clams, crabs, fish and shrimp had gradually showed clear declines in both naturally brackish and fresh water bodies (e.g. rivers, canals and wetland fields). The major reduction of these resources seemed to occur in the 1990s and early 2000 in all three villages, especially for clams, crabs and shrimp. In particular, villagers in Vam Ho assumed that clam resources in An Thanh Nam Commune were currently increasing following the Cu Lao Dung Clam Cooperative being established to protect them. Explaining the trend towards declining resources, local villagers stressed over-exploitation, destructive fishing, and clearance of mangrove forests as the main causes. They criticised poverty and population growth, which they considered to be the key root-causes

for the decline in resources. Villagers in Tan Nam and Au Tho B could not predict trends for aquatic resources over the coming years.

Real stories offered by Vam Ho's villagers revealed that in the 1990s, the natural fish, shrimp and crab resources were abundant and diverse in An Thanh Nam Commune, and they could easily catch whenever they wanted. It was estimated at that time, by using fish-nets or light-traps, a person could catch from 10 to 15kg of different fish every night. Currently, few fish were found in brackish and fresh water bodies in their area. In one day of fishing, they now only catch up to 5kg of fish, but mainly small ones such as *Doi, Chot, Uc* fish and small shrimp. According to the villagers other resources such as oysters or crabs in An Thanh Nam, which have declined in past years, may increase again in coming years.

Villagers in Vam Ho also said that the populations of wild animals in mangrove forests in An Thanh Nam Commune such as civets, monkeys, bats and birds had almost disappeared. Prior to 1990, they could easily observe them in the wild, but forest clearing and hunting by migrant villagers had made them scarce.

Changes in the area of agricultural/cultivated land and aquaculture land were quite different across the three villages. In Vam Ho Village, according to local villagers, cultivated land was sharply reduced in late 1990s and early 2000s, while at the same time, land used for aquaculture farming increased. Villagers in Au Tho B assumed that cultivated land in their location had remained unchanged and that the land used for intensive shrimp-farming had just expanded over recent years. In Tan Nam, local villagers said that aquaculture farming land in their areas had been dramatically reduced over the last 15 years, particularly during the years from 2002 to 2005, because of the breakdown of shrimp-farming locally due to the spread of disease. In general, there had been a tendency to convert cultivated land into aquaculture farming land for the last decade in the surveyed communes. Table 16 was provided by local authorities and shows the land for aquaculture making up a significant proportion in comparison with other production livelihoods.

Table 16. Distribution of agricultural and aquaculture land (2007 and 2008).

Communes	Rice land (ha)	Sugarcane land (ha)	Subsidiary crop (onion, chilli, vegetables)	Fruit-tree (ha)	Aquaculture land (shrimp, crab, artemia, *Keo* fish)
An Thanh Nam	625	996	580	90	618
Vinh Tan	20	-	180	79	3669
Vinh Hai	752	250	3146	18	2755
Vinh Chau Town	100	-	415	35	480

Only the PRA meeting in Vam Ho Village conducted a brainstorming session regarding the quality of drinking water, and local villagers confirmed that it has clearly improved since the Clean Water Supply and Rural Sanitation Programmes were implemented in their commune. They said that the Government supported them in constructing and drilling wells, water supply stations, and the provisioning water tanks for poor households in order to ensure that local people could access clean drinking water. They also said, however, that many households in their village still maintained their traditional habits of using surface water from river canals for bathing and washing, regardless of its poor quality.

Local villagers in Vam Ho expressed their concerns about activities that polluted their water resources such as discharge of solid waste and waste water from: households and seafood processing plants (e.g. in Dai Ngai); sugar-cane processing plants; boat-repairing workshops etc. Local villagers in Vinh Hai were also particularly concerned about the discharging of polluted water from shrimp-ponds into rivers and canals, which could cause a major spread in shrimp-diseases and that no one could control its risk and damages.

2.7 Local Environmental and Coastal Natural Resource Management Issues

This section provides some discussions based on what the study groups had observed, investigated and examined during the survey in five communes. All the discussion issues below may be considered as existing problems and concerns relating to the management and use of coastal resources in Cu Lao Dung, Vinh Chau and Long Phu.

2.7.1 Villagers' Rights to Access and Use Coastal Natural Resources

There had been some clashes and conflicts among local villagers/inhabitants and between local villagers and the state (authorities, border army, forestry protection forces) regarding their rights to access and use coastal natural resources in the area. The concept of "rights" used here is not clearly, transparently and properly informed to local people, who have been living and maintaining their lives based on free/open exploitation of fishery, wetlands and mangrove resources for generations. Their rights to access these resources were now limited, prohibited or undefined, or they were not clearly informed about their rights, which affects local livelihood practices.

Most of the households in Vam Ho Village were formerly part of the 30/4 Agricultural Farming Enterprise, which pioneered the clearing of mangrove forests and renovation of land for rice growing, which has continued since the 1980s. Over the past years, they had been strictly forbidden to catch naturally occurring fish and shrimp in the farming areas, even though these resources were extremely abundant. This rule was adopted by Tran Ngoc Hoang, the former first-ever director of the enterprise from the 1980s to 2001. Many workers who violated these rules were strictly punished by farm guards set along rivers and canals. Though the enterprise has been closed for years, many people there still feel "scared" when reminded of the rule.

In recent years, several conflicts regarding clam exploitation had occurred in Cu Lao Dung and Vinh Chau among local inhabitants and between them and neighbouring fishermen from Tra Vinh and Bac Lieu provinces. To protect and control this exploitation, in late 2007 the Cu Lao Dung People's Committee motivated local people and organised the Cu Lao Dung Clam Cooperative with 100 household members to manage 800 hectares of coastal mud flats where clams live. The authorities hoped this response would help local villagers in An Thanh Nam and adjust communes to exercise their rights on the management and exploitation of clam resources. However, local people in Trung Binh (Long Phu) on the other side of the Hau River were complaining that they were not allowed to participate in the cooperative or exploit clams in the mud flats as they commonly did before.

The regulations protecting mangrove forest did not allow people to exploit crabs or red claw crabs (*Sesarma mederi*) in the forests at ebb tide if they did not have a permit from the District Forest Protection Division. Currently, 40 households in Vam Ho Village of An Thanh Nam Commune were permitted to exploit these resources. Many others in Trung Binh and Kinh Ba Commune of Long Phu District, however, said that they still came to the mud flat in the forest to catch crabs every day as it gave them a good daily income despite them not having permits. Additionally, some households in Vam Ho Village also participated in the protection of mangrove forests and were allowed to take *Nypa* leaves to sell (for roofing houses).

2.7.2 Mangrove Forest Management and Protection

The management and protection of mangrove forests by local rangers in three districts was likely less complicated and conflicted due to most local people being aware that they were prohibited from cutting mangroves or even taking firewood as they did before. It was observed that rangers patrol by motorboat every day, and sometimes border soldiers were also part of the patrolling teams. Few local villagers dare to practice deforestation. However, some forest areas were cleared to build sea dykes (e.g. in An Thanh Nam) or to allow private enterprises to build shrimp ponds.

In Cu Lao Dung, the Forestry Protection Sub-department has allocated forests to some local households to manage and protect, and they were allowed to harvest *Nypa* leaves, crabs and red claw crabs (*Sesarma mederi*). Meanwhile, in Long Phu, the Forestry Protection Sub-department allowed people to collect firewood. In Vinh Chau, people were suggesting the Forestry Protection Sub-department allow them to exploit firewood, *Nypa* leaves and mangroves to build houses.

2.7.3 Changes in Land-use Impacting Livelihoods and Causing Conflicts

Changes in land ownership and land use have created various critical socio-economic impacts for years in the areas, particularly in An Thanh Nam Commune. These have been referred to as a "vicious circle" in which the local poor were trying to find ways to maintain their livelihoods.

The cycle started in the mid 1990s with when local inhabitants were converting rice land into aquaculture farms. However, shrimp farming usually requires high investment and thus people had to borrow credit from the banks. Many the poor could not get these loans as they had nothing to deposit. Therefore, they had to sell, mortgage or pledge their (rice) land or give it to other shrimp-farming owners on hire. Large amounts of land area were required for shrimp-farming, so many shrimp-farm owners, mainly wealthy people from other places, bought or hired land from poor farmers, and/or cleared mangrove forests in order to enlarge their aquaculture fields. Up until 2000, high profits, encouraged the mass-movement towards intensive shrimp farming. As a consequence, many households utilised their (rice) land to make shrimp ponds.

Different incidents occurred in these areas over the period from 2000 to 2004, such as the spread of aquaculture diseases, storms, poor quality of aquaculture products, and the decline in shrimp prices on the world market since its peak in 2001 This led many shrimp farmers to become "bank debtors" and even now some are unable to pay back their loans. About 65% of the households in Vam Ho village, for example, are unable to repay their bank debts. Because of debt engagement and poverty, many households had to sell their shrimp ponds and go to work for hire under other non-indigenous shrimp-farmers in their areas. To maintain their livelihoods, some households converted their ponds into land for sugarcane cultivation, or continued farming shrimp in extensive manners with low productivity and lower income, or moved to the traditional exploitation of natural aquatic resources. This resulted in local villagers, who always had ownership rights to their cultivated land, becoming losers and/or unemployed on their land, which has subsequently created conflict between local villagers and new farm owners over efforts to take land back, ask for more payment, or occupy mud lands. Some others want to renovate unused shrimp ponds to grow rice, but it would take them about five years to desalt the land using irrigation.

The unplanned conversion of rice land into aquaculture also led to many conflicts and a failure in shrimp farming due to the spread of disease caused by the lack of canals and a water filtering system to supply ponds and/or discharge untreated wastewater. Besides, many aquaculture enterprises intentionally encroached upon mangrove forests and built dykes to prevent water from entering dry ground, causing the deaths of mangrove trees. In Vinh Chau, over 40 hectares of mangroves were destroyed in this way. This loss of mangroves might make local people lose opportunities to exploit aquatic resources from mangrove forests.

The study found that most aquaculture enterprises had no commitment or long-term responsibility/ mandate of benefit-sharing to manage and preserve local natural resources. The fact that shrimp-farming land is shifted by multi-exchanges among different owners via selling and/or hiring could lead the land to be exhausted due to pollutant accumulation and a loss of ecological resilience.

2.7.4 Influences of Markets and Biases of Policies and Planning

Market demand on exporting aquaculture products to Europe, Japan and the United States was considered the biggest motivation for the movement towards shrimp farming (i.e. "everyone does shrimp-farming, every household does shrimp-farming") over the last 15 years in these areas. A lack of proper

aquaculture planning and prioritising of shrimp-farming development by local authorities has caused terrible mass failures in local shrimp-farming, which has resulted in revenue loss for local state budgets and worsened local lives. As described in above, the collapse of the production and livelihood system in the study areas is probably due to local authorities who did not promptly catch up and effectively manage the change of land-use, which was freely facilitated by local people (and the market). Meanwhile, local people themselves were incapable of affording the technical and financial requirements or meeting the commitments to environmental protection for aquaculture-farming development. Unpredictable market demand, poor guidance and management from the state, and the attitude of “God-dependence” of local people were the root of significant factors involved in changing livelihoods and resources as mentioned above.

3. Study Conclusions and Recommendations

3.1 Local Communities

The study results proved that most local people basically understood the role and importance of mangrove forests and coastal resources as well as the situation and depleting trend of such resources in recent years. They recognised and appreciated the value of local aquatic resources and mangrove forests, especially in terms of natural disaster prevention. They had a good perception of relationships between environmental protection and livelihoods, and the negative impacts caused by environmental problems on their lives, particularly land erosion due to mangrove forest loss, water pollution and shrimp disease.

Most people were aware that deforesting or exploiting of aquatic resources in mangrove forests was illegal and prohibited. They assumed that the role and responsibility for managing and protecting mangrove forests and other coastal resources lies with local authorities, border soldiers, and forest rangers. The study recognised that inhabitants living near mangrove or coastal areas - being close to resources - and those associated with agriculture and aquaculture livelihoods, had higher levels of awareness than those people living in town areas or working in other fields.

However, the study results showed the following problems, which need to change:

- In general, local communities paid less attention to the fact that the environment and coastal resources in their areas were being degraded. Their ability to express their knowledge and concerns about local environment and coastal resources was very weak, even though they are close to these resources on a daily basis;
- Beside direct use values such as aquatic products, local villagers had little knowledge or interest in other values and roles of mangrove forests, mud flats and other coastal resources. According to their perceptions, the coastal region was just there for the purposes of exploitation and use;
- Few people actually participate in management, protection and sustainable exploitation of coastal resources. Cu Lao Dung Clam Cooperative was considered to be a good model; however, it had just started operating, so there was no evidence to demonstrate that it would be effective in the long-run;
- Local communities had not known or been aware that they could become important actors in coastal resource management in their areas. Few local villagers thought that local business and social organisations should take responsibility for managing land, water, forest and aquatic resources in their areas;
- The coastal ethnic minorities, mainly Khmer people, usually had lower awareness levels about the environment than Kinh people. Women usually had lower awareness levels and concern for environmental issues than men. Few ethnic people could express clearly and fully their understanding about the problems associated with local resources and the environment;
- Local communities had little information or knowledge of policies and planning of coastal resources from local authorities. No one can explain how the state's policies had resulted in mangrove deforestation, water and land resource degradation, and poverty in their areas;
- Few local villagers had information and an understanding of climate change and/or Global Agriculture and Aquaculture Practice (GAP); and
- Local villagers had not been well trained about how they could help to adjust their livelihood practices in response to environmental changes or resource degradation in order to maintain their lives.

3.2 Communal and District Authorities

In general, local commune and district authorities and social organizations were interested in the environment and coastal resource situation in the region. They followed information quite regularly, mainly through newspapers or television. Almost none supported developmental activities that caused environmental pollution or coastal resource degradation. Most local officers were aware of the situation,

threats and trends associated with environmental pollution, mangrove forest loss and coastal resource degradation (land, water, forest and aquatic) as well as the causes of such problems. Many officers were pessimistic about the future of the coastal environment and resources if the current problems were not solved completely. Nearly all officers were aware of rising sea levels and the threats due to climate change in the region. Local authorities appreciate and support models for managing and exploiting resources such as the Cu Lao Dung Clam Cooperative.

However, the study results showed the following problems, which need to change:

- Most district and commune officers did not have specific information or figures regarding environmental and coastal resource degradation in their regions. They also did not have information regarding the planning and use of coastal resources, especially those related to land and water sources for aquaculture farming;
- While they are concerned, district and commune officers did not have an obvious attitude condemning and warning about activities causing environmental pollution and resource degradation. They were not aware of the negative environmental impacts of developmental activities in the coastal region, such as building infrastructure or industrial zones;
- Although local officers were aware of the roles of the community and other stakeholders in managing coastal resources, they did not know the mechanism or specific solutions for efficient participation, or the responsibilities of every party, particularly aquaculture farming and processing manufactures in the region; and
- Many managers among the district and commune authorities had no concern or information regarding climate change or the threat of rising sea levels in the region.

3.3 Provincial Authorities and Department Officials

The study showed that one important point was that nearly 50% of provincial authorities did not usually follow information on coastal resource management and use in Soc Trang Province. Although most of them were aware of the situation and decreasing trend in terms of coastal resources, many officers did not agree that developmental or infrastructure building activities, even mangrove deforestation for shrimp farming, were dangerous threats to the environment. Apparently, since they were the highest provincial policy-making and consulting organisations, the standpoint of Soc Trang department officers prioritising economic development and disregarding the environment, present major challenges for sustainably protecting the environment and resources, and reducing local poverty.

This type of statement was obviously expressed when department officers had little opportunity to consult and contribute to the planning and managing of coastal resources in Soc Trang Province. Provincial officers also did not mention many important forces, offices or organisations, when talking about the roles of stakeholders in coastal resource management. In terms of guidelines and orientation however, most provincial officers were aware of the necessity of overall and comprehensive economic development planning of the coastal region, control of resource overexploitation, application of environmentally friendly techniques of aquaculture farming and law enforcement enhancement. While there are warnings of climate change and rising sea levels in Vietnam, it is regrettable that no provincial officers in Soc Trang Province mentioned these as important environmental issues.

3.4 Aquaculture Business Sector

The study results clearly reflected that the need to protect the environment and manage and use coastal resources sustainably was not a concern of the aquatic product farming/processing business or associated service providers. Representatives of such enterprises had little information about the status of mangrove forests, land and mud flats they were exploiting and using. As a result of this lack of concern, they were unaware of the relation and impacts of mangrove forests and other resources on their productive activities. Therefore, it is necessary to improve their knowledge level on the use and management of coastal resources, especially through the dissemination and application of the global

quality standard for exported agricultural and aquaculture products (GAP). Enterprises also need to be trained in reasonable land use planning, environmental treatment solutions in the productive process, adaptation to coastal climate change, and harmonious resolutions to conflicts with local people relating to resource use rights.

3.5 Orientation Towards Developing an Awareness Raising Programme

Based on the results of surveys of local community, business and authority awareness, a programme for raising awareness about the environment and Soc Trang coastal resource management should be comprehensively developed and include feasible and relevant solutions for each topic. The local conditions of poverty and the priority of economic development may be barriers to implementing an effective awareness programme. Calling for changes in behaviour by the community and other parties towards the environment and coastal resources over the short term is challenging.

Therefore, the awareness programme should focus on the following objectives:

- To raise awareness and increase knowledge of the coastal environment and resources, local environmental issues, and the causes and effects of such problems;
- To promote concern and support from the community, authorities and businesses to demand environmental protection and the sustainable management and use of coastal resources; and
- To create opportunities and encourage participation from the local community, authorities and businesses to implement solutions and activities to protect the environment, and manage and use coastal resources sustainably.

This awareness programme should include various components, with each component designed for a particular target group, such as:

- Component 1: Environmental communication and education programme on sustainable management and use of coastal resources for local communities;
- Component 2: Information and advocacy programme for provincial, district and communal authorities; and
- Component 3: Mobilisation programme to raise awareness and encourage aquatic businesses to participate in environmental protection and production quality improvement.

In each component, there should be specific activities such as: environmental communication campaigns; integration of environmental education; participatory development and use of awareness materials; journalists and environmental reporting; development of sustainable management; and use of coastal resource models with local communities and businesses.

4. Annexes

4.1 Annex 1: Lists of Provincial, District and Communal respondents

Provincial Respondents

No	Name	Position	Organisation
11	Vũ Xuân Bính	Deputy Director of Information Department	Provincial Committee of Communist Party
2	-	Secretary	Provincial People's Council Office
3	Vương Hổ	Director	Department of Science and Technology
4	Lý Định Lượng	Vice Director	Provincial Central for Agricultural Extension
5	Danh Thanh Hà	Environmental Management Officer	Department of Natural Resource and Environment
6	Trương Tấn Đạt	Environmental Management Officer	Department of Natural Resource and Environment
7	Trần Tuấn Phương	Agriculture Officer	Department of Agriculture and Rural Development
8	Trần Đức Ngọc	Forestry Officer	Department of Agriculture and Rural Development
9	Nguyễn Đoan Trinh	Technical Officer	Provincial Centre for Aquaculture Extension
10	Nguyễn Hoàng Vân	Head of Environmental Police	Provincial Police Department
11	Võ Thái Vinh	Environmental Inspector	Provincial Police Department
12	Trần Thị Quýt	Chairman	Provincial Farmer's Association
13	Trần Tấn Khôi	Chairman	Provincial Fishing Association
14	Kim Ngân	Vice Chairman	Provincial Women's Association

District Respondents:

No	Name	Position	Organisation
Long Phú			
1	Tráng Thanh Sơn	Phó Chủ tịch	Dist. People's Committee
2	Nguyễn Thị Tuyết Nhung	Cán bộ tổng hợp	Dist. People's Committee
3	Lâm Văn Panh	Chánh văn phòng	Dist. People's Council
4	Lê Thị Nhành	Trưởng phòng	Division of Education
5	Huỳnh Văn Chiến	Trưởng phòng	Division of Health Care
6	Cao Hữu Giang	Trưởng trạm	Division of Aqua. Extension
7	Lữ Thanh Sơn	Trưởng trạm	Division of Agri. Extension
8	Thạch Văn Miến	Phó Trưởng phòng	Division of Infor & Culture
9	Nguyễn Minh Chanh	Ủy viên thường vụ	Youth Union
10	Nguyễn Hoàng Ngỗi	Phó phòng	District DARD
11	Bùi Thị Thu Nga	Phó Chủ tịch	Women's Union
12	Nguyễn Anh Tài	Hạt trưởng	District FPSD
13	Huỳnh Văn Giám	Cán bộ kỹ thuật	District FPSD
Vĩnh Châu			
14	Lê Văn Phải	Phó trưởng ban	District Communist Party
15	Huỳnh Hoàng Nhựt	Chuyên viên	District PC
16	Trần Thanh Tuấn	Cán bộ	District PC

17	Hoàng Tân Tiến	Phó trưởng phòng	District DARD
18	Trương Ngọc Tuấn	Cán bộ	District DoNRE
19	Lý Thúy Oanh	Cán bộ	District DoNRE
20	Trần Minh Trí	Trạm trưởng	Division of Aqua. Extension
21	Trịnh Phước	Cán bộ	Division of Education
22	Nguyễn Văn Vũ	Hạt trưởng	District FPSD
23	Đào Công Chương	Trạm trưởng	Division of Agri. Extension
24	Trần Hòa	Chủ tịch	Farmer's Association
25	Thạch Pết	Phó Bí thư	Youth Union
Cù Lao Dung			
26	Mai Văn Vân	Phó Bí thư	District Communist Party
27	Nguyễn Tiến Lên	Phó Chánh VP	District Communist Party
28	Đặng Minh Nhựt	Phó Văn phòng	District PC
29	Mã Xuân Nhôn	Cán bộ	District Communist Party
30	Lê Vũ Phương	Cán bộ địa chính	District DoNRE
31	Hồ Thanh Kiệt	Phó trưởng phòng	Division of Economics
32	Dương Quốc Toàn	Cán bộ	District DARD
33	Trương Thị Bích Ngọc	Cán bộ	District DARD
34	Nguyễn Long Tăng	Phó Chủ tịch	Dist. Fatherland Front
35	Trịnh Minh Thành	Cán bộ	Division of Justice
36	Dương Thái Hùng	Phó trưởng công an	District Police
37	Đặng Hữu Khánh	Cán bộ	District DoNRE
38	Làm Thị Chúc Linh	Cán bộ	Division of Infor & Culture
39	Lương Thanh Sang	Cán bộ	Division of Education
40	Bùi Huy Hạnh	Phó trưởng phòng	-
41	-	Trưởng phòng	Division of Health Care
42	Trương thị Thu Mộng	Phó Chủ tịch	Women's Union
43	Trần Quang Khải	Phó Chủ tịch	Farmer's Association
44	Trần Văn Đương	Phó Bí thư	Youth Union
45	Trần Hoàng Kha	Ủy viên	Youth Union
46	-	Cán bộ kỹ thuật	Fishermen Association

Communal Respondents:

No	Name	Position/Organisation
Vĩnh Tân		
1	Hồ Thanh Tùng	Communal Party Secretary
2	Phan Văn Đê	Vice-chairman of Communal People's Committee
3	Trần Văn Sốn	Vice-chairman of Communal People's Committee
4	Nguyễn Việt Cường	Staff of Communal People's Committee
5	Võ Văn Hào	Legal staff of Communal People's Committee
6	Lê Thị Cẩm Đương	Communist Party Office's staff
7	Lưu Quốc Huy	Chairman of Farmer's Association
8	Lưu Văn Hậu	Land-use Management staff
9	Đỗ Văn Thứa	Communist Party Office's staff
10	Tăng Thược	Head of Vinh Tan 2 Secondary School
11	Lâm Thị Vân	Head of Women's Union
12	Lê Thành Nghiệp	Cultural staff
13	Phan Quốc Hương	Vice-chairman of Veteran's Association
14	Bùi Văn Ngữn	Youth Union Secretary
15	Phan Thanh Nhã	Transport & Irrigation staff

Vĩnh Hải		
16	Dương Suối	Head of Farmer's Association
17	Châu Thị Ngọc Linh	CPC staff
18	Nguyễn Văn Cường	Communal police
19	Hồ Vũ Trang	Head of Youth Union
20	Lê Văn Thảo	Land-use Management staff
21	Trần Thanh Phương	Head of Red Cross
22	Nguyễn Thanh Toàn	Legal staff
23	Bùi Lê Tuyết	Head of Women's Union
Vĩnh Châu town		
24	Nguyễn Quốc Thắng	Vice-head of Communal Communist Party
25	Hàn Văn Hóa	CPC Vice-chairman
26	Vưu Thanh Bạch	CPC Vice-chairman
27	Trịnh Văn Thanh	Population & Family Planning staff
28	Su Diệp Panh	Vice head of Farmer's Association
29	Huỳnh Văn Sen	Head of Veteran's Association
30	Lữ Tấn Tài	Agricultural staff
31	Lưu Văn Dũng	Staff
32	Quản Ngọc Bình	Land-use Management staff
33	Đoàn Trọng Hưởng	Head of Fatherland Front
Trung Bình		
34	Lâm Văn Bé	CPP Secretary
35	Võ Phước Toàn	Cultural staff
36	Nguyễn Huy Tùng	Vice-chairman of Fatherland Front
37	Nguyễn Thanh An	Land-use Management staff
38	Trần Thu Hương	Head of Women's Union
39	Nguyễn Thanh Phong	CPC staff
40	Nguyễn Thành Đồng	Head of Farmer's Association
41	PhanVăn Diện	Head of Trung Binh A Secondary School
42	Quách Thanh Huy	Head of Trung Binh Primary School
An Thạnh Nam		
43	Lê Minh Sớm	Land-use Management staff
44	Trương Hồng Vinh	Economic staff
45	Dương Công Điện	Vice-head of CPP
46	Nguyễn Thanh Tùng	Communal Police
47	Trương Hồng Vinh	Head of Economic Division
48	Anh Lâm	Vice-head of CPC
49	-	Agricultural staff

4.2 Annex 2: Lists of Questionnaire Forms

HOUSEHOLD QUESTIONNAIRE FORM

"Assessing local community awareness on the environment & sustainable management and use of coastal natural resources in Soc Trang province"

I. INTERVIEWEE'S INFORMATION

1. Name of interviewee/household representative (optional): .....
2. Age:

☐ Under 16 years old ☐ From 16 to 40 years old

☐ From 41 to 60 years old ☐ Over 60 years old

3. Gender: ☐ Male ☐ Female
4. Educational level:

☐ Illiteracy ☐ High school

☐ Primary ☐ Higher education

☐ Secondary

5. Use of Vietnamese language:

☐ Fluent / Good ☐ Fair ☐ Don't know

6. Ethnic:

☐ Kinh ☐ Hoa

☐ Khmer ☐ Other.....

7. Occupation (or main sources of household income):

☐ Agriculture and livestock raising
☐ Aquaculture farming
☐ Fishing / fish catching
☐ Mixed forestry-aquaculture (plantation, charcoal extraction, fishery,..)
☐ Commercial services
☐ Labour on hire
☐ Full time employee with salary
☐ Others.....

8. Household's economic ranking (in accordance with the state category)

☐ Wealthy ☐ Moderate ☐ Poor

II. VALUES OF COASTAL NATURAL RESOURCES AND MANGROVE

9. Are coastal natural resources and mangrove forests important to your family and village?

☐ Yes ☐ No ☐ No idea

10. What kind of natural resources is your family relying on for livelihoods?

☐ Lands (rice fields, mud grounds, tidal mud flats)
☐ Water resources (rivers, lakes, swamps, canals,...)
☐ Mangrove and other wetland habitats (charcoal extraction, shrimp farming,..)
☐ Fishery sources (fishes, shrimps from rice field, canals, rivers, sea)
☐ other(s):.....

What are the values/importance of coastal zone in your areas?

Values of coastal zone	Yes	No	No idea
1. Natural fishery sources	☐	☐	☐
2. Relevant for aquaculture farming	☐	☐	☐
3. Relevant for agricultural production - rice, cereal, fruits and other plants	☐	☐	☐
4. Relevant for development of tourism, entertainment, recreation services	☐	☐	☐
5. Providing materials for handicraft development	☐	☐	☐
6. Relevant for industrial development	☐	☐	☐
7. Preventing from flood-tiding and sea level raising	☐	☐	☐

11. What are the values/importance of mangrove forests in estuaries and coastal zones?

Values of mangrove	Yes	No	No idea
Prevention of waves, wind, storm, flood-tide and tsunami	☐	☐	☐
Stability of shoreline and prevention of erosion	☐	☐	☐
Prevention of invasion of sea water into inland	☐	☐	☐
Protection of water resources for domestic and irrigation	☐	☐	☐
Fishery sources for food and income-generation	☐	☐	☐
Providing natural breed fishery sources	☐	☐	☐
Opportunity for ecotourism development	☐	☐	☐
Providing forestry products - fuelwood, charcoal, birds, snakes, bee honey	☐	☐	☐
Restoring of natural heritage for future generations	☐	☐	☐

III. CHANGES OF ENVIRONMENT AND NATURAL RESOURCES IN COASTAL ZONE

12. How have fishery sources in your commune been changed in last 10 years? How do you think they would be changing in next 10 years?

(a) Changed in last 10 years (or compared to that status 10 years ago):
☐ Increased ☐ Decreased ☐ Remained unchanged ☐ Don't know / No idea

What are the reasons and evidences for that changes? .....

(b) your assumption in next 10 years:
☐ Will increase ☐ Will decrease ☐ Will remain

Why will it be changed in that way? .....

13. How have the area of mangroves and other habitats (Melaleuca forest, wetlands,...) in your commune been changed in last 10 years? How do you think it would be changing in next 10 years?

(a) Changed in last 10 years (or compared to that status 10 years ago):
☐ Increased ☐ Decreased ☐ Remained unchanged ☐ Don't know / No idea

What are the reasons and evidences for that changes? .....

(b) your assumption in next 10 years:
☐ Will increased ☐ Will decrease ☐ Will be remain

Why will it be changed in that way? .....

14. How has the area of agriculture land (rice field, farming area, fruit tree area) in your commune been changed in last 10 years? How do you think it would be changing in next 10 years?

(a) Changed in last 10 years (or compared to that status 10 years ago):
☐ Increased ☐ Decreased ☐ Remained unchanged ☐ Don't know / No idea

What are the reasons and evidences for that changes? .....

(b) your assumption in next 10 years:
☐ Will increase ☐ Will decrease ☐ Will remain

Why will it be changed in that way? .....

15. How has the area of aquaculture farming land (incl. intensive and extensive production) in your commune been changed in last 10 years? How do you think it would be changing in next 10 years?

(a) Changed in last 10 years (or compared to that status 10 years ago):
☐ Increased ☐ Decreased ☐ Remained unchanged ☐ Don't know / No idea

What are the reasons and evidences for that changes? .....

(b) your assumption in next 10 years:
☐ Will increase ☐ Will decrease ☐ Will remain

Why will it be changed in that way? .....

16. How has the area of land for industrial production in your commune been changed in last 10 years? How do you think they would be changing in next 10 years?

(a) Changed in last 10 years (or compared to that status 10 years ago):
☐ Increased ☐ Decreased ☐ Remained unchanged ☐ Don't know / No idea

What are the reasons and evidences for that changes? .....

(b) your assumption in next 10 years:
☐ Will increase ☐ Will decrease ☐ Will remain

Why will it be changed in that way? .....

17. How has the area of mud grounds, tidal mud flat in your commune been changed in last 10 years? How do you think they would be changing in next 10 years?

(a) Changed in last 10 years (or compared to that status 10 years ago):
☐ Increased ☐ Decreased ☐ Remained unchanged ☐ Don't know / No idea

What are the reasons and evidences for that changes? .....

(b) your assumption in next 10 years:
☐ Will increase ☐ Will decrease ☐ Will remain

Why will it be changed in that way? .....

18. How has the quality of fresh water resources in your commune/village been changed in last 10 years? How do you think it would e changing in next 10 years?

(a) Changed in last 10 years (or compared to that status 10 years ago):
☐ Better ☐ Worse ☐ Remain unchanged ☐ Don't know / No idea

What are the reasons and evidences for that changes? .....

(b) your assumption in next 10 years:
☐ Will be better ☐ Will be worse ☐ Will be remained

Why will it be changed in that way? .....

19. What has the productivity of aquaculture farming in your village been changed in recent years?
☐ Increased ☐ Decreased ☐ Remain

If decreased, why is has decreased? .....

20. Do you think the environment and natural resources in your area have been degrading?
☐ Yes ☐ No ☐ Don't know / No idea

If YES (having been degraded), please tell us three major causes of those degradation:

☐ Clearing mangrove for aquaculture and agricultural development
☐ Soil and water polluted by pesticide abuse, sewage from factories/shrimp farming
☐ Clearing forest for construction of factories, industrial zones and resettlement
☐ Destructive fishing by electricity, explosion,...
☐ Poverty, no alternative livelihoods for locals instead of extraction of natural resources
☐ Poor development policies and plans by local authorities
☐ Poor management and control of natural resources by authorities
☐ Other(s) .....

21. What are the consequences if all local mangrove forest cleared off?
☐ No impact
☐ Invasion of salty water to rice fields, shrimp farming, soil erosion, tide-rising,..
☐ Freshwater with salty invasion
☐ Source of breeding shrimp, fish collapsed; loss of firewood and bee honey
☐ Loss of forest with beautiful sceneries; future generation will have no chance to see these.
☐ (Other impacts).....

IV. AWARENESS AND PARTICIPATION OF LOCAL COMMUNITIES TO PROTECT LOCAL NATURAL RESOURCES

22. Is it necessary to maintain and protect the remaining mangrove area in your commune/village?

☐ Yes ☐ No ☐ Don't know

23. Should we continue encouraging and allowing local people and firms to exploit/shift natural landscapes, mangrove forests, and agricultural land into aquaculture farming?

☐ Yes ☐ No ☐ Don't know

24. Who do you think should have major responsibility for managing and planning the utilisation and control of coastal natural resources in your communes?

☐ Ranger forces / forest protection department
☐ Provincial, district and communal authorities
☐ Environment and natural resources agencies
☐ Firms who are exploiting natural resources (aquaculture, fishery,..)
☐ Local communities / households
☐ (Others).....

25. What is the role of local people/communities in management and use of coastal natural resources?

☐ Exploiters, users ☐ Not only exploiters, users but also managers, protectors
☐ Managers, protectors ☐ None

26. Have you ever participated in any meeting and activity relating to protection, management and sustainable use of coastal resources and mangrove in your commune/village?

☐ Yes ☐ No

If yes, what following activity have you been participated:

Activity	Yes	No
Meeting on management and protection of natural resources	☐	☐
Planting mangrove	☐	☐
Patrolling in mangrove and coastal line with village, communal authorities	☐	☐
Training on aquaculture development in sustainable ways	☐	☐
Informed and collaborated to authorities preventing illegal activities in mangroves	☐	☐
Guiding, providing tourists information of local landscapes and customs	☐	☐
Carried out aquaculture development in accordance to planning of local authorities	☐	☐
(Others)....	☐	☐

27. How have the changes of natural resources been effecting to your family?

☐ Better ☐ Worse /poorer ☐ Remain unchanged ☐ Unknown/No idea

28. Have you ever heard about climate changes? If YES, could you please tell how climate change would affect coastal zones in your areas?

QUESTIONAIRE FOR COMMUNE AND DISTRICT AUTHORITY STAFF
"Information, consultation and participation of commune and district authority staff in management of coastal resources in Soc Trang province"

1. Name of interviewee: .....
2. Position:.....
3. Ethnicity: .....
4. Sex: ☐ Male ☐ Female
5. Are you native to this area? ☐ Yes ☐ No
6. Level of education background:
   ☐ Secondary ☐ High school/college ☐ University graduate/post- graduate
7. Years of working experience:
   ☐ Under 5 years ☐ 5 – 15 years ☐ Over 15 years

8. Do you often update or follow up information related to management, protection, exploitation, and use of coastal resources and mangrove forests?
   ☐ Very often (every week)
   ☐ Regularly (every month)
   ☐ Occasionally (over every two month)
   ☐ Almost no

If you often update information on these issues, please indicate the sources?
   ☐ From regular field monitoring and checking
   ☐ From meetings, workshops, conferences
   ☐ From technical reports and references
   ☐ From regular talks and discussion
   ☐ From local radio and television channels
   ☐ From local print media
   ☐ From national television channels and media
   ☐ From online media and the Internet

9. In your opinion, how fishery resources in your area have changed over the last 10 years? Your perspectives of changes for the next 10 years?

(a) Changes over last 10 years:
☐ Increasing ☐ Decreasing ☐ No change ☐ Don't know /No opinion
Please list the causes of changes and evidence: .....

(b) Perspectives of changes over the next 10 years:
☐ Will increase ☐ Will decrease ☐ No change
Please state why you predict that trend of changes: .....

10. How the area of mangrove forests and other natural ecosystems in your area has changed over the last 10 years? Your prediction of changes of these natural resources in next 10 years:

(a) Changes over the last 10 years:
☐ Increasing ☐ Decreasing ☐ No change ☐ Don't know /No opinion
Please list the causes of changes and evidence: .....

(b) Perspectives of changes over the next 10 years:
☐ Will increase ☐ Will decrease ☐ No change
Please state why you predict that trend of changes: .....

11. How the area of farming land (rice field, subsidy crop land, fruit gardens) in your area has changed over the past 10 years? Your prediction of changes of farming land in the next 10 years?

(a) Changes over the last 10 years:

☐ Increasing ☐ Decreasing ☐ No change ☐ Don't know /No opinion

Please list the causes of changes and evidence: .....

b) Perspectives of changes over the next 10 years:

☐ Will increase ☐ Will decrease ☐ No change

Please state why you predict that trend of changes: .....

12. How the area of shrimp farms and other fishery farms in your area has changed over the past 10 years? Your prediction of changes in the next 10 years?

(a) Changes over the last 10 years:

☐ Increasing ☐ Decreasing ☐ No change ☐ Don't know /No opinion

Please list the causes of changes and evidence: .....

b) Perspectives of changes over the next 10 years:

☐ Will increase ☐ Will decrease ☐ No change

Please state why you predict that trend of changes: .....

13. How the area of industrial zones, agro-forestry and fishery production and processing factories in your area has changed over the past 10 years? Your prediction of changes for the next 10 years?

(a) Changes over the last 10 years:

☐ Increasing ☐ Decreasing ☐ No change ☐ Don't know /No opinion

Please list the causes of changes and evidence: .....

b) Perspectives of changes over the next 10 years:

☐ Will increase ☐ Will decrease ☐ No change

Please state why you predict that trend of changes: .....

14. How the area of estuary and tidy mudflats in your area has changed over the past 10 years? Your prediction of changes in the next 10 years?

(a) Changes over the last 10 years:

☐ Increasing ☐ Decreasing ☐ No change ☐ Don't know /No opinion

Please list the causes of changes and evidence: .....

b) Perspectives of changes over the next 10 years:

☐ Will increase ☐ Will decrease ☐ No change

Please state why you predict that trend of changes: .....

15. How the drinking water quality and production water in your area has changed over the past 10 years? Your prediction of changes of this resource in next 10 years?

(a) Changes over the last 10 years:

☐ Better ☐ No change

☐ Worse ☐ Don't know /No opinion

Please list the causes of changes and evidence: .....

b) Perspectives of changes over the next 10 years:

☐ Will be better ☐ Will be worse ☐ No change

Please state why you predict that trend of changes: .....

16. How do you assess the level of impacts on natural resources in your area by following activities:

Activities	Very serious	Serious	Not serious
Clearing mangrove forests for shrimp and fishery farms	☐	☐	☐
Intensive fishery farming with industrial foodstuff	☐	☐	☐
Unplanned and uncontrolled fishery farming	☐	☐	☐
Untreated waste and sewage water from ponds and farms released into rivers and the sea	☐	☐	☐
Overuse of pesticides in farming	☐	☐	☐
Destructive fishing by local people (electric fishing, dynamite)	☐	☐	☐
Pollution by oil spill and oil leak from boats engines	☐	☐	☐
Waste and sewage water from factories	☐	☐	☐
Invasive species (Golden Apple Snail, Marsh Mimosa)	☐	☐	☐
Infrastructure development (roads, residential areas, factories, ports)	☐	☐	☐
Climate change and rising sea level	☐	☐	☐

17. Which agencies below are mainly responsible for management of coastal resources in your area?

Government agencies	Yes	No
Provincial and district DoNREs	☐	☐
District and commune government (PCs)	☐	☐
Fishery farming establishments, shrimp farm owners	☐	☐
Provincial and district FPDs	☐	☐
Provincial and district DARDs, Department of Fishery	☐	☐
Local communities	☐	☐
Fish Protection Department	☐	☐
Mass organizations (Youth Union, Women Union, Veteran Union ...)	☐	☐
Others	☐	☐

18. How do you assess the role of local people in management and conservation of coastal resources in your area?

☐ Merely exploiters and users ☐ Exploiters, managers, protectors

☐ Managers and protectors ☐ No role

19. How do you rate the implementation of below activities in your area?

	Good	Average	Not good
Management, protection, and development of mangrove forests and coastal wetlands	☐	☐	☐
Planning of fishery farming and farming land	☐	☐	☐
Control and prevent destructive fishing methods	☐	☐	☐
Control and prevent diseases in fishery farming	☐	☐	☐

Control of waste and sewage water in fishery farming	☐	☐	☐
Limit use of pesticides and chemicals in farming	☐	☐	☐
Monitor activities of fishery production and processing companies	☐	☐	☐
Control and clear invasive species (Golden Apple Snail, Mimosa)	☐	☐	☐
Apply environmental-friendly techniques in fishery farming	☐	☐	☐
Promote participation of local people in sustainable management, exploitation, and use of natural resources	☐	☐	☐

20. Have you ever joined any meeting or activity related to sustainable management and use of coastal resources?

☐ Never ☐ Yes

If yes, please state the details of the activity and hosting agency? .....

21. Please state main difficulties and challenges in sustainable management, protection, exploitation, and use of coastal resources in your area?

- Policy and orientations: .....
- Laws and regulations: .....
- Institutional, organizational, and implementation capacity: .....
- Local people and communities: .....
- Other factors (markets, technical and technological requirements, product quality) .....

22. Do you think it is necessary to maintain mangrove forests and coastal wetlands in your area?

☐ Yes ☐ No ☐ Don't know

23. Do you think it is necessary to encourage or allow local people and business establishments to continue exploiting coastal natural ecosystems and mangrove forests, and conversing farming lands for expanding the fishery farms?

☐ Yes, it is ☐ No ☐ Don't know

24. Do you know how climate change will affect the coastal areas of your area, Soc Trang province, and the Western South of Vietnam? If yes, please state your opinion on this issue.

.....

25. What should the local government do to manage and exploit coastal resources in a more sustainable and reasonable manner.

QUESTIONNAIRE FORM for PROVINCIAL AUTHORITY STAFF
Information and Consultation for environmental management and utilisation of coastal natural resources in Soc Trang Province

Interviewee: ……..……...
Position:
……
Department / Organisation: ……..……
How long has you been at your current position: …… year(s)

1. How often do you receive information of social economic development activities relating to coastal zones of Vietnam in general and of your province in particularly?
   - ☐ Often (weekly)
   - ☐ Sometimes (monthly)
   - ☐ Very little (over 2 months)
   - ☐ Rarely

   If often, where do you get these information most?
   - ☐ From directly field activities of management, inspection and monitor in coastal zones
   - ☐ From meetings, workshops and conferences in the field
   - ☐ From regularly professional reports, references
   - ☐ From informal conversations with other people
   - ☐ From local radio, television and newspapers
   - ☐ From national television and newspapers
   - ☐ From e-newspapers, internet

2. How have natural aquatic resources in your province been changed over the last 10 years? How will they be changing within the next ten years?

   (a) Changes over last 10 years (or comparison to their status in 10 years ago):
   ☐ Increased ☐ Decreased ☐ Remain unchanged ☐ Don't know / No idea

   What were the reasons and evidences of that changes? .....

   (b) Your assumption of their changes within next 10 years:
   ☐ Will increase ☐ Will decrease ☐ Will remain

   Why will they be changed in that way? .....

3. How has the area of mangrove and others (Melaleuca, grass-wetlands) in your province been changed over last 10 years? How will they be changing within next 10 years?

   (a) Changes over last 10 years (or comparison to their status in 10 years ago):
   ☐ Increased ☐ Decreased ☐ Remain unchanged ☐ Don't know / No idea

   What were the reasons and evidences of that changes? .....

   (b) Your assumption of their changes within next 10 years:
   ☐ Will increase ☐ Will decrease ☐ Will remain

   Why will they be changed in that way? .....

4. How has the area of agricultural land (rice fields, other cereals, fruit gardens) in your province been changed over last 10 years? How will they be changing within next 10 years?

(a) Changes over last 10 years (or comparison to their status in 10 years ago):
☐ Increased ☐ Decreased ☐ Remain unchanged ☐ Don't know / No idea

What were the reasons and evidences of that changes? .....

(b) Your assumption of their changes within next 10 years:
☐ Will increase ☐ Will decrease ☐ Will remain

Why will they be changed in that way? .....

5. How has the area of shrimp farming and aquaculture land (incl. intensive and extensive farming) been changed over last 10 years? How will they be changing within next 10 years?

(a) Changes over last 10 years (or comparison to their status in 10 years ago):
☐ Increased ☐ Decreased ☐ Remain unchanged ☐ Don't know / No idea

What were the reasons and evidences of that changes? .....

(b) Your assumption of their changes within next 10 years:
☐ Will increase ☐ Will decrease ☐ Will remain

Why will they be changed in that way? .....

6. How has the area of industrial plants for aquaculture processing and production in your province been changed over last 10 years? How will they be changing within next 10 years?

(a) Changes over last 10 years (or comparison to their status in 10 years ago):
☐ Increased ☐ Decreased ☐ Remain unchanged ☐ Don't know / No idea

What were the reasons and evidences of that changes? .....

(b) Your assumption of their changes within next 10 years:
☐ Will increase ☐ Will decrease ☐ Will remain

Why will they be changed in that way? .....

7. How have the areas of mud grounds, tidal mud flat in your province been changed over last 10 years? How will they be changing within next 10 years?

(b) Changes over last 10 years (or comparison to their status in 10 years ago):
☐ Increased ☐ Decreased ☐ Remain unchanged ☐ Don't know / No idea

What were the reasons and evidences of that changes? .....

(b) Your assumption of their changes within next 10 years:
☐ Will increase ☐ Will decrease ☐ Will remain

Why will they be changed in that way? .....

8. How has the quality of fresh water resources (for domestic uses) in your province been changed over last 10 years? How will they be changing within next 10 years?

(c) Changes over last 10 years (or comparison to their status in 10 years ago):

☐ Better ☐ Remain unchanged

☐ Worse ☐ Don't know / No idea

What were the reasons and evidences of that changes? .....

(b) Your assumption of their changes within next 10 years:

☐ Will be better ☐ Will be worse ☐ Will be remained

Why will they be changed in that way? .....

9. How has the productivity of fishing/exploitation in your province been changed over last 10 years? How will they be changing within next 10 years?

(a) Changes over last 10 years (or comparison to their status in 10 years ago):

☐ Increased ☐ Decreased ☐ Remain unchanged ☐ Don't know / No idea

What were the reasons and evidences of that changes? .....

(b) Your assumption of their changes within next 10 years:

☐ Will increase ☐ Will decrease ☐ Will remain

Why will they be changed in that way? .....

10. In your opinion, which priorities need to be solved in order to ensure sustainable development in coastal zones in your province?
(a) For economic aspects (please list 03 prior issues) .....
(b) For social and governance/management aspect (please list 03 prior issues) .....
(c) For environmental aspect (please list 03 prior issues) .....

11. How are negative impacts of the following activities may cause to coastal resources in your province?

Activities	Very bad	bad	Not bad
Clearing mangrove for aquaculture farming development	☐	☐	☐
Intensive aquaculture faming with industrial food	☐	☐	☐
Unplanned development of aquaculture farming	☐	☐	☐
Untreated wastes from aquaculture farming to rivers/sea	☐	☐	☐
Abuse of pesticides and herbicide in rice fields	☐	☐	☐
Destructive fishing by electricity, poisons, explosion)	☐	☐	☐
Oil pollution spilling out from boats and ships	☐	☐	☐
Wastes and sewages from local factories	☐	☐	☐
Invasion of alien species	☐	☐	☐
Infrastructure development (roads, ports, plants)	☐	☐	☐
Climate changes and sea-level rising	☐	☐	☐

12. How do you evaluate the following activities in your province recent years?

	Good	Fair	Not good
Management, protection and development of mangrove and wetlands in coastal zones	☐	☐	☐
Agricultural and aquaculture land use planning	☐	☐	☐
Controlling and preventing destructive fishing (electricity, poison, explosion...)	☐	☐	☐
Controlling and preventing aquaculture diseases	☐	☐	☐
Controlling aquaculture wastes and sewages	☐	☐	☐
Reduction of abuse of pesticide and herbicide in	☐	☐	☐

agricultural production			
Monitoring operation of aquaculture processing and production companies	☐	☐	☐
Controlling and killing of alien invasive species	☐	☐	☐
Promoting application of environmentally friendly aquaculture technologies	☐	☐	☐
Promoting community participation in natural resource management & use	☐	☐	☐
Coordination and cooperation of local stakeholders for management and sustainable use of coastal resources	☐	☐	☐

13. Do you know about the Soc Trang province's coastal natural resources management project being implemented by GTZ and provincial authorities?

☐ Yes ☐ No

If yes, where did you get information? .....

14. In your opinion, which local agencies /organizations should be involved to consult for planning of management of coastal natural resources in Soc Trang province?

.....

15. Have you ever been participated in and/or consulted for planning development and management of coastal natural resources in Soc Trang?

☐ Yes ☐ No

If yes, what events did you participate? (e.g.: name and date of meeting/workshop)

.....

16. In your opinion, should climate change issues be integrated into strategies and plans for coastal zone development of Soc Trang province? And WHY?

.....

QUETSIONNAIRE FORM for AQUACULTURE COMPANIES AND FARMINGS
Awareness, concerns and participation towards sustainable management and utilisation of coastal natural resources in Soc Trang province

1. Name of interviewee (optional): .....
2. Position: .....
3. Ethnic: ....
4. Gender: ☐ Male ☐ Female
5. Are you local people? ☐ Yes ☐ No

6. How long has your company/farming/cooperative been in operation here:
☐ Less than 5 years ☐ 5 – 15 years ☐ More than 15 years

7. Operational form of your company / farming/ cooperative:
☐ Aquaculture nursery farming
☐ Aquaculture farming for export and domestic consumption
☐ Fishing and exploitation from marine, rivers, streams
☐ Aquaculture / seafood processing and production
☐ Providing materials and services for aquaculture farming (food, disease prevention,...)

8. Which natural resources your company/cooperative is mainly relying on for operation:
☐ Naturally young aquaculture creatures (fish, shrimp, crab)
☐ Mangrove forests and other floral wetlands habitats
☐ Fresh and brackish water resources
☐ Coastal mud grounds, swamp along sea line, rivers, streams
☐ Rice plain fields

9. How does the operation of your company lead to the following changes of local natural resources:
(a) The area of natural mangrove forest:
☐ Increase ☐ Decrease ☐ Remained (no change) ☐ Don't know
(b) The area of new plantation of mangrove:
☐ Increase ☐ Decrease ☐ Remained (no change) ☐ Don't know
(c) The area of coastal mud ground and swamps:
☐ Increase ☐ Decrease ☐ Remained (no change) ☐ Don't know
(d) The area of rice fields and fruit gardens:
☐ Increase ☐ Decrease ☐ Remained (no change) ☐ Don't know
(e) Resources of natural young aquaculture creatures in rice fields, rivers, streams,..
☐ Increase ☐ Decrease ☐ Remained (no change) ☐ Don't know
(f) Yield of fish/shrimp harvested from rivers, rice fields, streams:
☐ Increase ☐ Decrease ☐ Remained (no change) ☐ Don't know
(g) Quality of surface water resource in rice fields, rivers, streams:
☐ Better ☐ Worse ☐ Remained (no change) ☐ Don't know

10. How about the yield of aquaculture farming of your company in comparison to previous years?
☐ Increased ☐ Decreased ☐ Remained

11. Do the mass destruction of mangrove forest and the extensive conversion of natural swamp, mud ground and rice fields for aquaculture farming affect the productivity and quality of aquaculture farming?

☐ Yes, they do ☐ No, they don't ☐ Don't know / No idea

If yes, please explain WHY .....

12. What are the risks that your company/cooperative usually has to deal with?
(a) Natural disasters (storm, tsunami, tidal rising): ☐ Yes ☐ No

(b) Soil erosion along rivers, streams, sea lines: ☐ Yes ☐ No
(c) Pollution of water resources from rice fields, plants: ☐ Yes ☐ No
(d) Aquaculture diseases: ☐ Yes ☐ No
(e) Shortage of fresh water in dry seasons: ☐ Yes ☐ No
(f) Natural young aquaculture creatures exhausted: ☐ Yes ☐ No

13. Does your company/cooperative cause pollution for local environment?
(a) Solid wastes, disease: ☐ Yes ☐ No ☐ Don't know
(b) Surface/underground water pollution: ☐ Yes ☐ No ☐ Don't know
(c) Air pollution (smell, smoke): ☐ Yes ☐ No ☐ Don't know

14. If your company/cooperative is a pollutant cause, what are you doing to solve the problem?
(a) Collecting wastes to fire, dump or remove to sites: ☐ Yes ☐ No
(b) Applying waste water treatment system: ☐ Yes ☐ No
(c) Using micro-organism to disintegrate organic wastes: ☐ Yes ☐ No
(d) Using bio-organism to clean up ponds: ☐ Yes ☐ No
(e) Planting mangrove to filter water pollutants: ☐ Yes ☐ No

15. How the expansion of aquaculture farming areas will affect local environment/resources:
(a) No more mangrove remained: ☐ Yes ☐ No ☐ Don't know
(b) Heavier water pollution: ☐ Yes ☐ No ☐ Don't know
(c) Salty water encroached, salty rice land: ☐ Yes ☐ No ☐ Don't know
(d) More air pollution: ☐ Yes ☐ No ☐ Don't know
(e) Heavier soil erosion along streams, rivers, sea lines: ☐ Yes ☐ No ☐ Don't know
(f) Rice land reduced, food insecurity: ☐ Yes ☐ No ☐ Don't know
(g) Natural young aquaculture creature exhausted: ☐ Yes ☐ No ☐ Don't know

16. Which the following fees/taxes/donation has your company/cooperative contribute?

Fees/Taxes/Donation	Yes	No
Environmental tax / Resource tax	☐	☐
Fees for environmental protection (e.g. fees for waste water)	☐	☐
Fee for local hygiene	☐	☐
Fees for social security	☐	☐
Donation to help local poor	☐	☐
Support to social movements (education, sports,...)	☐	☐
Contribution for other common benefits (health care, charity, disaster rescuers,...)	☐	☐

17. Which the following information/training did you provide?
(a) Techniques for farming based environmental management: ☐ Yes ☐ No
(b) Technology for ecologically sustainable farming: ☐ Yes ☐ No
(c) Technology shrimp farming in mangrove forest: ☐ Yes ☐ No
(d) Techniques for farming based waste treatment: ☐ Yes ☐ No
(e) Aquaculture farming and land-use planning: ☐ Yes ☐ No
(f) Coastal impacts by climate changes: ☐ Yes ☐ No

18. Are you willing to adopt an aquaculture farming technology that providing a sustainable yield at average level without causing environmental pollution?
☐ Willing to adopt ☐ Will not adopt ☐ Need more considerations
Explain your choice (WHY): ....

20. What do you want to suggest local authority in order to facilitator your company/cooperative with more effective operation?

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