

**MANAGEMENT GUIDELINES FOR COASTAL EROSION,
A CASE STUDY OF CHAO LAO AND LAEM SADET
BEACHES, CHANTHABURI PROVINCE, THAILAND**

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CHANTHABURI PROVINCE, THAILAND**

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ABSTRACT

Coastal erosion is one of the important problems that has been increasing and is adversely affecting coastal ecosystems, socio-economic systems and overall quality of life. This study aims to (1) study the conditions and previous management of coastal erosion in Chao Lao and Laem Sadet Beaches, Chanthaburi Province, Thailand (2) study problems, obstacles, considerations and suggestions of stakeholders on coastal erosion problems and (3) propose management guidelines for coastal erosion problems.

This study is divided into two parts; quantitative and qualitative analysis. There were 400 suggestions made by tourists used for the quantitative analysis, while 25 in-depth interviews and 95 focus groups were used for the qualitative analysis. In addition, SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis was another tool used for developing management guidelines for coastal erosion in this study.

The results illustrated the lack of a coastal and marine resources database, poor knowledge and ignorance of stakeholders on coastal erosions, low participation of stakeholders in conservation projects, weaknesses of community leaders, and lastly non - continuation of government and local authorities' work plans were the main constraints to the management of coastal erosion. Therefore, the management guidelines for coastal erosion in this study are proposed as follows: supporting coastal and marine resources database, building knowledge and awareness for better understanding of coastal erosion, promoting increased stakeholder participation, increasing effectiveness on law enforcement, and providing appropriate funding.

KEY WORDS: GUIDELINES/ MANAGEMENT/ COASTAL EROSION

159 pages

แนวทางการจัดการปัญหาการกัดเซาะชายฝั่งทะเล กรณีศึกษา หาดเจ้าหลาวและหาดแหลมเสด็จ จ.จันทบุรี
MANAGEMENT GUIDELINES FOR COASTAL EROSION, A CASE STUDY OF CHAO LAO
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บทคัดย่อ

ปัญหาการกัดเซาะชายฝั่งทะเลในปัจจุบันเริ่มทวีความรุนแรงเพิ่มมากขึ้น ส่งผลกระทบต่อทั้งทางด้านระบบนิเวศทางทะเลและชายฝั่ง เศรษฐกิจ สังคม และคุณภาพชีวิต/สภาพจิตใจ จึงกลายเป็นปัญหาที่ทุกคนต้องหันมาให้ความสำคัญกันอย่างจริงจัง โดยงานวิจัยในครั้งนี้มีวัตถุประสงค์เพื่อ 1) เพื่อศึกษาถึงสถานภาพ การจัดการปัญหาการกัดเซาะชายฝั่งทะเล บริเวณหาดเจ้าหลาวและหาดแหลมเสด็จ จ.จันทบุรี 2) เพื่อศึกษา ปัญหา อุปสรรค ความคิดเห็น รวมถึงข้อเสนอแนะต่างๆ ของผู้มีส่วนเกี่ยวข้องกับการจัดการปัญหาการกัดเซาะชายฝั่งทะเล และ 3) เพื่อเสนอแนวทางการในการจัดการปัญหาการกัดเซาะชายฝั่งทะเล กรณีศึกษา หาดเจ้าหลาวและหาดแหลมเสด็จ จ.จันทบุรี ซึ่งการวิจัยในครั้งนี้แบ่งเป็น 2 ส่วน คือ การวิจัยเชิงปริมาณ โดยใช้แบบสอบถามความคิดเห็นสำหรับนักท่องเที่ยว จำนวน 400 ราย และการวิจัยเชิงคุณภาพ โดยวิธีการสัมภาษณ์เชิงลึก จำนวน 25 ราย และการสนทนากลุ่มย่อย จำนวน 95 ราย จากนั้นนำข้อมูลที่ได้จากการวิจัยทั้ง 2 ส่วน มาทำการวิเคราะห์สภาวะแวดล้อม โดยวิเคราะห์จุดอ่อน จุดแข็ง โอกาส และอุปสรรค เพื่อเสนอเป็นแนวทางในการจัดการปัญหาการกัดเซาะชายฝั่งทะเลต่อไป

ผลการวิจัย พบว่า ปัญหา อุปสรรค ที่พบในการจัดการปัญหาการกัดเซาะชายฝั่งทะเล คือ การขาดข้อมูลทรัพยากรพื้นฐานทางทะเลและชายฝั่งในพื้นที่ ผู้มีส่วนเกี่ยวข้องขาดความรู้ความเข้าใจ ความตระหนักในปัญหาการกัดเซาะชายฝั่งทะเล กิจกรรมการมีส่วนร่วมในโครงการด้านการอนุรักษ์สิ่งแวดล้อมยังมีน้อย ผู้นำขาดความเข้มแข็ง อีกทั้งการปฏิบัติงานของหน่วยงานที่รับผิดชอบขาดความจริงจังและต่อเนื่อง ดังนั้น แนวทางการจัดการปัญหาการกัดเซาะชายฝั่งทะเล จึงควรมีการจัดการระบบฐานข้อมูลทรัพยากรที่ดี การปลูกจิตสำนึก สร้างความรู้ความเข้าใจเกี่ยวกับปัญหาการกัดเซาะชายฝั่งทะเล การส่งเสริมการมีส่วนร่วมให้มากขึ้น การบังคับใช้กฎหมาย และการจัดสรรงบประมาณที่เหมาะสม

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CHAPTER I

INTRODUCTION

1.1 Background and Statement of Problem

In Thailand, There are 2,815 kilometers of coastline located in 23 provinces along the Gulf of Thailand and Andaman Sea. They are essential sources of local people's daily living, careers, traditions, economic and social development, and essentially of the natural ecosystem. Due to the changes of waves, wind and sea tide, especially as a result of human-induced land using activities, inappropriate land development by local people. All of these virtually cause coastal erosion both in the area of the Gulf of Thailand and that of the Andaman Sea. Specifically, coastal erosion in the Gulf of Thailand coastline is about 376.16 kilometers, accounting for 22.11% of total shoreline of Thailand. In addition, coastal erosion in the Andaman Sea coastline is about 111.4 kilometers, accounting for 11.77% of total shoreline of Thailand. (Department of Marine and Coastal Resources, 2007) costing individual properties, the land, public infrastructures and buildings. Not only does Coastal erosion cause damage to the wider coastal environment, including beaches, sand dunes, mangrove forests, and beach forests but it also affect the region's social and economic development to the extent that the coastal ecosystem and marine resources are destructed.

Chanthaburi is one of the provinces affected by the above problems. Popular for tourism, it was situated in the east of the Gulf of Thailand. Annually, during April to November, tourists are there to enjoy the beauty of the province's natural abundance, bringing in a great amount of income, especially on the beaches of Chao Lao and Laem Sadet. 90% of the tourists usually visit the beaches during local festivities (Regional Environment Office, n.d.). These days the beaches have become Chanthaburi main tourist attractions. Due to the province's geographical features, consisting mainly of plateaus and seaside areas close to the Gulf of Thailand, and being regarded as the only coastal province in Thailand where coral reefs are found, it is good place for tourism and recreational activities. During the last 4-5 years, there

was policy aimed at promoting local tourism. As a result, commercial places, such as hotels, resorts, and other businesses, are increasingly seen.

Recently, the beaches of Chao Lao and Laem Sadet are at erosion in the moderate or approximately 1-5 kilometers a year (Sin Sinsakul *et al*, 2002) and the problem seems to grow more severe because of the state policy promoting local tourism, as mentioned above. Furthermore; coastal erosion also affects local residents. According to long-time collected information on this problem, it indicated that there was a failure in the construction of a coast-protecting structure against the erosion. For instance, parts of the structure came tumbling down. And in the case of Chao Lao beach, a complete form of management, irrespective of the other one used at neighboring Laem Sadet beach, resulted in accelerating the rate of erosion. However, there was no report of public participation on this issue. Instead, what had been done was the top-down state management, disrespecting community involvement and the people whose lives are at stake (Orathai Ardam, 1997).

As a preventive measure against ruthless land use with no regard to the area's carrying capacity, resulting in coastal erosion, it is important that well-grounded research be completed to find the most management guidelines and restoration of coastal areas, in the short and long term, to reverse the rapid, uncontrollable coastal development and to bring it back to a new balance with which negative effects happening these days and in the future are possibly monitored. The researcher is interested in studying coastal erosion management adaptive to the locale, not only bringing together academic disciplines and complete understanding about coastal erosion and restoration gained from the responsible government sector but it also needs co-operation from stakeholders who are residents in the area, affectionate towards their birthplace, both in individual and collective levels.

In accordance to the above information, the researcher is interested in examining problems, obstacles, opinions and suggestions from stakeholders in participatory coastal erosion management in the beaches of Chao Lao and Laem Sadet in Chanthaburi province in order to cope with the problems in the most management guidelines.

1.2 Objectives of the study

1.2.1 To study the previous status for coastal erosion management in the beaches of Chao Lao and Laem Sadet in Chanthaburi province.

1.2.2 To study understanding problems, obstacles, opinions and suggestions from stakeholders for coastal erosion management in the beaches of Chao Lao and Laem Sadet in Chanthaburi province.

1.2.3 To develop management guidelines for coastal erosion the beaches of Chao Lao and Laem Sadet in Chanthaburi province.

1.3 Conceptual framework of the study

This study aims at examining the previous state coastal erosion management in the area, relevant issues, obstacles and suggestions to cope with coastal erosion by the collection and analysis of data, along with co-operation by those in charge (in the forms of realizing the problem, sharing ideas, participating in decision making, making donation, co-planning the project, co-operating and co-evaluating the project) to find out possible solutions, taking different factors into account, e.g. population-related, social and external factors. Ultimately, its goal is to find the most effective means of participatory coastal erosion management for the area.

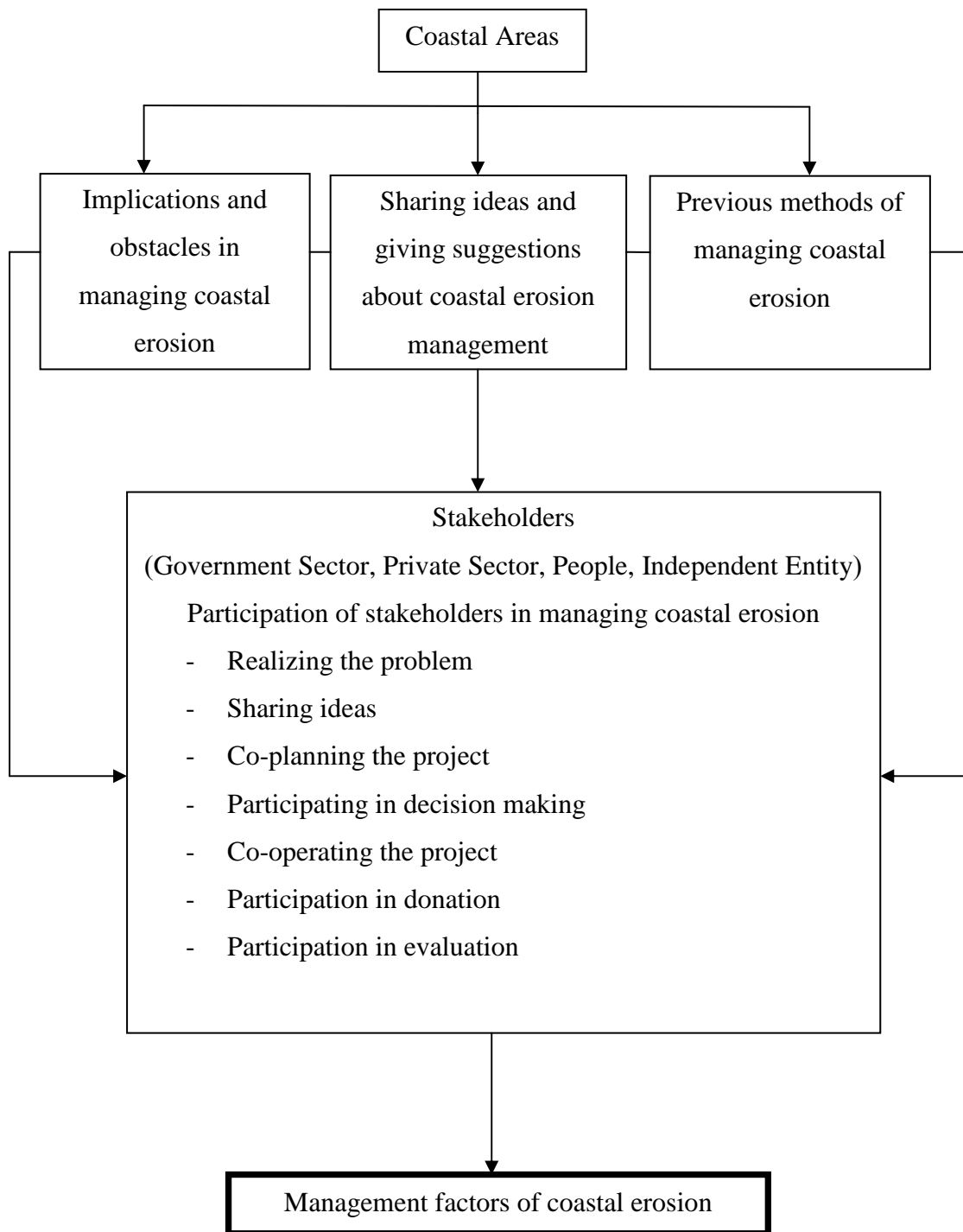


Figure 1-1 Framework of study

1.4 Scope of the Study

1.4.1 Sample populations

In this study, sampled populations, regarded as stakeholders, are classified into 4 main groups;

- 1) Government sector, including Khlong-Kood subdistrict Administrative Organization and other relevant agencies; such as the Marine Office 6 in Chanthaburi and Kung Krabaen Bay Development Study Center, Department of Marine and Coastal Resources, etc.
- 2) Private sector, including owners of hotel and resort
- 3) Non-governmental organization (NGO), including the Chao Lao Conservancy Association.
- 4) General people, including community leaders, villagers and tourists.

1.4.2 The scope of the Study Area

1.4.2.1 In this study, communities in Khlong-Kood subdistrict along the beaches of Chao Lao and Laem Sadet were chosen because of their location. The scope of the study covers the active shoreline.

1.4.2.2 Local government sectors were chosen based on their responsibilities with coastal erosion in the area.

1.4.3 Scope of the Study

1.4.3.1 To study the state of participatory coastal erosion management in the area; comparing the previous and present situations of erosion and examining how the problem had been managed.

1.4.3.2 To study problems, obstacles, opinions and suggestions done by stakeholders in participatory coastal erosion management in the area.

1.4.3.3 To suggestion management guidelines for coastal erosion Chao Lao and Laem Sadet beaches in Chanthaburi province, based on the quantitative and qualitative research.

1.5 Definitions

Coastal erosion is a geological process, natural and man-made. It is the wearing away or the removal of beach and surrounding land, troubling local people and damaging their properties.

Management is the process of planning and controlling effectiveness of coastal area usage, in a means of making living and in business. Coastal resources are to be shared and responsible by those involved, under the capacity of the ecosystem. The process includes the restoration of coastal Ecosystem, maximizing its resources, with the use of multidisciplinary knowledge. Participation, mainly from stakeholders, state officers in charge of coastal management, and other relevant entities, requires the understanding, realization and acceptance of the issue in relation to local aspects, social, cultural, conditions and the structure of local government and policy.

Participation is a certain act done by a local community or other stakeholders in managing the area's coastal erosion, in harmony with the ecosystem and local people. It encourages all of those involved to realize the problem, share ideas, co-operate in decision-making, donation and evaluation of coastal management.

Bar is forms where the waves are breaking, because the breaking waves set up a shoreward current with a compensating counter-current along the bottom. Also known as a trough bar. Sand carried by the offshore moving bottom current is deposited where the current reaches the wave break.

1.6 Expected Outcome of the study

Output

1.6.1 Understanding the previous status for coastal erosion management in the beaches of Chao Lao and Laem Sadet in Chanthaburi province.

1.6.2 Understanding problems, obstacles opinions and suggestions from stakeholders for coastal erosion management in the beaches of Chao Lao and Laem Sadet in Chanthaburi province.

Outcome

1.6.3 Bringing the result from this research to planning or providing regulations for natural resource and community environmental management

1.6.4 Bringing benefits to all of the entities involved, including interested individuals whose interest is of studying participatory coastal erosion management.

CHAPTER II

LITERATURE REVIEW

From the studied manage problems scour the coast by have a part in between Chao Lao Beach area and Laem Sadet beach, Chanthaburi province. The researcher had necessity to require the combination of ideas in the participatory management to consist of analyzing in order to be able to discover the issue as required according to objectives by the concept, theory and research that related as follows.

- Coastal change
- Concepts about coastal erosion.
- The impacts of problems erosion the coast line.
- Methods and format in a prevention of erosion problems coast
- Changing in coastal areas due to erosion the coastline of the Gulf of Thailand.
- Coastal erosion in the study area.
- Concepts and theories relevant to participation.
- Research relevant.

2.1 Coastal change

The coast of Thailand has had a long geological evolution changing the environment in several formats. Until about 6,000 years ago, when sea water got highest raised and flooded the low river basin area of country cause the sediment accumulation from sea water. Later when sea levels continuously downgrade till at present level cause Thailand has made coastal areas occur in the Gulf of Thailand and Andaman Sea; representing a combined distance of approximately 2,815 km. Currently the coastal areas of Thailand have changed both in the Gulf of Thailand and the Andaman Sea occurs more. In particular, the changing caused by human activities,

the development conflicts with the coastal environment when combined with changes that occur naturally, which it continuously increasing in intensity which makes the coastal areas confront a problem of coast changing more regularly.

Coastal changing is a change of physical form of the coastal area. Or change of look of a coastal area that was previously appears to be other formats which are different. The changes are based on several geologic processes, coastal areas of Thailand may be divided according to the nature of change are 3 characteristics (Sin Sinsakul *et al.*, 2002).

1) Stable coast

Coastal conditions are still common characteristics of the Thai coast as a coastal which has a fine balance of natural seasonal conditions that is around one year has a erosion in one season and then have accumulated in a another season in an equal rate or nearly equal, consequently causing the coast is in balance in the state.

2) Dispositonal coast

The accumulation is a geology process that the sediments drift from one place to the pile or over lay in another place. By mean of waves and tides are the main reasons that led the sediments to the accumulation of these sediments. One part occurs from own erosion coastal. Then drift to the accumulation in another or may come from the sea during the storm winds blow landward sediment. Another part come from waters on the land, all whole waters that are watercourse flows into the sea, the water flow down the steepest of the area. The coastline which has the accumulated, mostly occur in the plains area reach to hide tide more than seashore area by the suspended sediments in the water and waves blow the accumulated sediment near the coast.

3) Coastal erosion

The erosion is the one of geological processes that can occur in the stone and sedimentary those have not yet become stiff as a stone and happened in a variety of topographies. The main significant are waves, winds, water, stream of high tide and low tide and creature, both animals and humans. When that happens then it will change those things or those areas and have different format from the original model.

Erosion coast causing the coastal line change or take place by shoreline retreat into the earth cause damage to coastal areas significantly.

Characteristics of the erosion coast can be subdivided as 2 along the rate of erosion per year are

1. The coastline which has severe erosion: Rate of erosion occurred more than 5 meters per year.

2. The coastline which has moderate erosion: Rate of erosion from 1 - 5 meters per year.

The erosion rate is identified as a sensitive area to coastal processes such as waves, winds that move into the affected coast. There are also many variables that are considered sensitive components of coastal areas such as relief of coastal areas, types of stone and sediment, geologic characteristics shape and characteristics of coastal hydrographic.

2.2 Coastal erosion

The erosion is the one of geological processes that can occur in the stone and sedimentary those have not yet become stiff as a stone and happened in a variety of topographies. The main significant are waves, winds, water, stream of high tide and low tide and creature, both animals and humans. When that happens then it will change those things or those areas and have different format from the original model. Erosion coast causing the coastal line change or take place by shoreline retreat into the earth cause damage to coastal areas significantly. (Sin Sinsakul *et al.*, 2002)

The erosion coast, there is a process that results from a net attrition of sediment which means that the sediment is taken from one area rather than to belittle each other. To erosion the coast has two main reasons are natural phenomena and human activities which have details as follows.

2.2.1 Caused by natural phenomena

Waves, winds and stream: waves, wind and stream are natural mechanisms that cause erosion the coast. The movement of wind and stream can blow

the sand from areas that not protected. The erosion coast in this model has been influenced by seasonal monsoon, typhoon and the change of other weathers.

Sea level rise: have the relationship not whichever way or either way with the subsidence of the earth and the changing of climate or a combination of both by increasing the sea level resulting in waves and stream more widespread.

2.2.2 Caused by human activities

Usage of underground water and land subsidence: Subsidence of the land succeed at the land level that continuously slope down cause the erosion that occurs by naturally get more widespread due to the fact that the stream be able to flow to the area below. The improper using land, such as raising fish or shrimp pond all are to accelerate the process of erosion to occur faster, in order that the main reasons of the subsidence of land caused by human action which is to pump groundwater overuse.

Developed coastal areas: Developed coastal areas without suitable planning and law enforcement are another factor that acceleration to erosion the coast goes on even faster. So that the activity that bring damage such as draining sand, the changes of ridge and construction of buildings in the sea such as breakwater, sea ports including drill ships channel. All these things make the direction of flow of stream and sediment supply is not go on as a natural.

The degradation of coral reef and loss of Mangrove forest: Mangrove forest include coral reef and sea grass resources are protect the erosion quite well because they reduces the height of the waves that blow onto the coast and also hold or trap the sediments as well.

Depletion of sediment influx: Dams and Development Project in some agricultural projects been built to obstruct the water way, restrict the natural flow of sediment. Resulting in an amount of sediment to the estuary has less. In consequence, the volume control sediment flow to appropriate, it is necessary to maintain the stability of the coastline. (Worldbank, 2006.)

2.3 The impacts of coastal erosion

2.3.1 marine ecosystem impact

The important coastal ecosystems such as beach ecosystem, mangrove forest, sea grass ecosystem and coral reefs will be affected by erosion both directly whole structural and role of the ecosystem. Affect the abundance of marine animals and biodiversity including food chain, so the coastal areas that face with the problems of erosion coastal that has deteriorated of ecosystem.

2.3.2 Economic impact

The coastal areas that face with problems of erosion coast change the physical environment including losing of coastal areas and natural beauty. Affected investment in the developing countries both industry and services sectors, especially tourism. And problems of erosion coast impact to economic in household level because people have lost agricultural areas and cannot have the same career, make a lower income and at the same time have to pay more for expenses to make lifestyle be in normal.

In addition to state sector of central and local still have to loss the great amount budget of country to solve the problems in the area that the erosion coast occur by the construction of engineering structures such as build breakwater, pending sand trap and other structures which these structures are not able to resolve successfully to erosion the coast and are likely to use a budget for solving the erosion coastline problem in endless way.

2.3.3 Social impact

The communities that settle in coastal areas, in several areas had face with problems of erosion coastal cannot live in the same area must have to gradually immigrate to other areas. Result in losing life style of the community and including cultural tradition.

2.3.4 Quality of life/ psychological conditions impact

The violence of erosion coastal cause the community loss land, work place and residence make people have to change the way of life style from the original as well as feel insecurity of their land proprietary right and lack of confidence in the way of life which caused distress besides the migration to escape the problem of erosion coastal also resulted in the relationship between the family and neighbors are alienated including have to change to another earn a living that themselves are not good at it.

2.4 Coastal erosion prevention in Thailand

Nawarat (2001) have discussed about popular methods for the prevention of and solutions of coastal erosion which have 4 methods are; the first method is to create stability of coastal by using the structure (Hard stabilization) such as sea walls, groins and detached breakwaters, etc. The second method is to create the coastal stability without structure (Soft stabilization) such as beach replenishment and groundwater level control around beach area, etc. The third method is moving buildings or the construction of risk situation to the new location where is a safety zone (Relocation) or retreat.

Majority is emigration, moving, pulling down buildings or structures that are located on the coast line to construct in the nearby areas, and allowing more stable earth and deeper foundations into the land creating less exposure to from natural circumstances such as rising sea levels; Also the ability to maintain the behavior of nature without humans causing negative effects.

Even if emigration way to move to new areas will help to maintain the beach at one level and for saving the budget that will have to pay for build stability to the beach in various formats. But in practice may have political problems. If the area where expose to risk to erosion is the area of isolated development is not a large group or is the property of organizations or local agencies Say that the ways of emigration dislocate is the best usable method. And the last method is chose not to manage anything (No Action) which is the contemplation of choosing not to manage anything, mostly because of the value of property and land will be protected have a limited value or low value, compared with the investment for prevention or solution the problem or

in case that not have development of activity in each area as above. Choosing not to take any actions and to preserve the beauty of the beach in its natural form, it will be the suitable method in economical. In theory, this approach will be compatible with the areas where buffers left have enough to support situation of erosion in short term and long term for many years so in this case will occur good results because the decision to take any action be able to slow down for a period time until the buffer zone will erosion till less than the level of protect erosion by safely.

These four methods as above have advantages and disadvantages in themselves, for example to create stability of the coastal areas by the use of structures, this may be the best form of prevention construction of buildings or barriers; however, by moving buildings or construction that is located in hazardous locations to other areas is the best way to maintain the beach.

The methods and formats for preventing any problems and all the information involved, consideration and analysis completed and thoroughly combined with suitability and possibility by engineering, economic, social and environmental which will different according to location and time.

2.5 Changing in coastal areas due to erosion on the coast line of the Gulf of Thailand (Department of Mineral Resources, 2002)

2.5.1 The provincial coastal areas affected by erosion

2.5.1.1 Upper Gulf of Thailand coast

Consist of coastal of Samut Songkram, Samut Sakhon, Bangkok, Samut Prakan and Chachoengsao provinces, approximately 121 km long, have the area where erosion is approximately 82 kilometers long, or approximately 67.48 percent of the total area. The erosion coastal areas are mostly found near Samut Sakhon Province and Samut Prakan Province.

2.5.1.2 The eastern Gulf of Thailand coast

Consist of the coastal of Chonburi province, Rayong province, Chantaburi province and Trat province. The length of approximately 485 km, the area eroded was approximately 62.5 kilometers long or approximately 12.88 percent of the total areas, the erosion areas are mostly found near Rayong province and Chanthaburi province.

2.5.1.3 Western Gulf of Thailand coast

Consist of the coastal of Phetchaburi province, Prachuap Khiri Khan Province and Chumphon province. The length of approximately 450 km, the area eroded was approximately 75.46 km long or approximately 16.76 percent of the total areas. The erosion coastal areas are mostly found near Phetchaburi province and Prachuap Khiri Khan Province.

2.5.1.4 Coastal Southern Upper Gulf of Thailand

Consist of the coastal of Surat Thani province, Nakhon Si Thammarat province and Songkhla province. Approximately 475 km long, the area eroded was approximately 159.18 kilometers or approximately 33.51 percent of the total areas. The erosion coastal areas are mostly found near Songkhla province and Nakhon Si Thammarat province.

2.5.1.5 Coastal Southern Lower Gulf of Thailand

Consist of coastal of Pattani province and Narathiwat province. The length of approximately 170 km, the area eroded was approximately 78.5 kilometers long or approximately 46.17 percent of the total areas. The erosion coastal areas are mostly found near Pattani province.

From the study erosion coastal area in the Gulf of Thailand over the provincial (**Figure 2-1**) found that the study areas in this research such as Chanthaburi Province which arrange in coastal areas of eastern Gulf of Thailand. By mean of the Chanthaburi province has severe erosion in Laem Sing district and a moderate rate of erosion in Thamai district. From this research will be detailed in the section of the Thamai district only due to the face that is the study area by have the details in the next section.

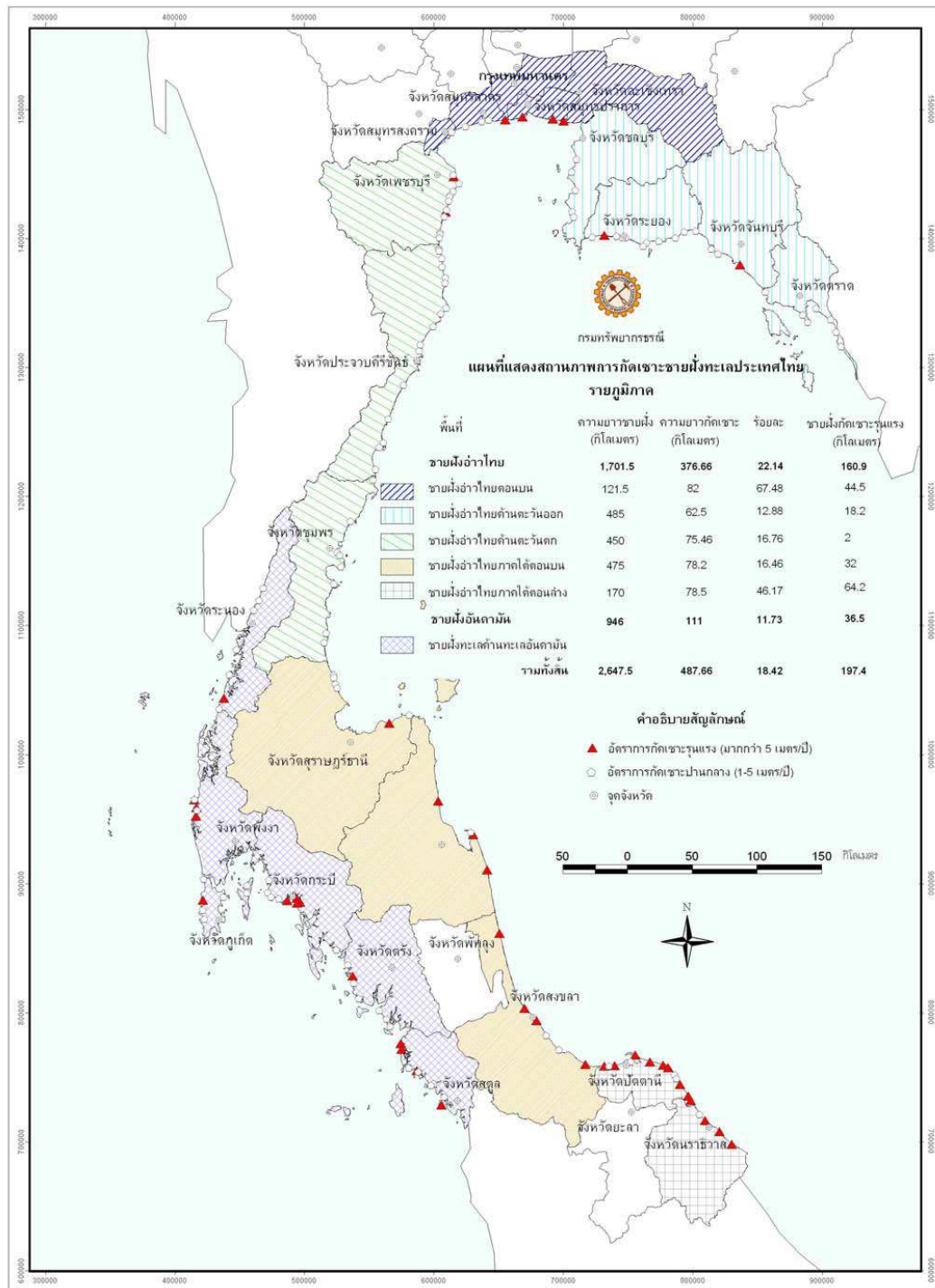


Figure 2-1 Coastal erosion of Thailand

Source: (Department of Mineral Resources, 2002)

2.6 The erosion the coast line in the study area

Study area around the coastline from Chao Lao beach until the end of Laem Sadet beach, located between the coordinates at N12° 31' 48.9" E101° 56' 48.8" to N 12° 34' 14.7" E 101° 53' 43.0" which the coastline near the Chao Lao beach to the end of Laem Sadet beach have different changing formats by the mass movement of sand, influenced by forces created from monsoon weather changing accumulations. Majority of cumulative are found in the period from August to September continuing until March the following year again combined with the influence of sea level that increases and structure of engineered in all kinds.

The rate of coastal erosion near Chao Lao beach to Laem Sadet beach during the year 2534-2549 showed that the eroded area was 5.50 square meters (Pattiyapon Phasuk, 2006) by means of the rate of medium eroded (As the **figure 2-2**, which from the study will talk about the details of each beach as the following.

Laem Sadet Beach is a sand bar that connects the islands that occurs from sand sediment that waves and littoral current long shore currents blow into the accumulated to become beaches that proliferate long away from Din Dang mountain continued to Kung Krabaen mountain.

Heavy erosion occurs on front of sand beaches that currently is a sand beach in the east of Kung Krabaen Mountain showing erosion that is approximately 1 km long, with an erosion rate of approximately 2-3 meters per year. A sea wall barrier had been constructed here but erosion still occurs. The erosion is caused by natural elements from waves in monsoon season moving to crash the coast in this area directly; but because Kung Krabaen mountain obstruct in the west caused the coastal currents rotate back and crash with the coastal cause the erosion.

Chao Lao Beach The erosion occurs on beaches at present. Approximately 2 km long from Ai Lao Cape to east till Chao Lao Mountain that the cape extend into the sea. Ai Lao Cape is a triangular sandbar (Cuspate Spit) caused by coastal currents blow the sand from two-way to convergence to be cuspate spit.

The beaches contain fine-grain sand mixed with clay soil that one part been blown through the Ai Lao canal which flows from the land pass to beach and into

the sea. Another part comes from sediment that has eroded molder of sandstone and siltstone of Chao Lao Mountain. From the face that sand beaches combine with fine-grain sand not capture the same tense cause the erosion occurred easily when it been hit by the power waves in the period of South west monsoon, the erosion in this area had rate of approximately 2-3 meters per consecutive years. All the time that the Department of Mineral Resources has studied (1997 -2000), the owner of the this land area are creating protection using personal resources by themselves that why the construction is not a same format and cause the coastal lack of balance and the erosion still happens (Sin Sinsakhun *et al*, 2002).

According to the above mention information found that the erosion coast in the study area is due to the nature of sand that does not capture the same tense which is a coastal ecological that put together with the mainly of natural change such as waves, seasonal monsoon, the increasing of sea level. However, due to the Year 2005, Mr. Phayakaphan Phokaew, the sheriff of Thamai said Chanthaburi Province has promoted tourism and specify to Laem Sadet, Chao Lao beaches are the tourism location of the province. According to the strategy of the province and policy of government that will make the overall economy will get better and be able to make tourist from around the world has known tourist attractions in this place. Resulted in the current this location has been interest from tourist at least 300,000 visitors per year, which could result in investors both domestic and international visibility of the benefits that they can have and bring investment into the development of coastal areas in this area more. For this reason cause the study area have a risk of problems of the erosion coastal more and in the future the reason of erosion coastal problems might occurs caused by human action as a catalyst process the problems of erosion coast faster go together with the natural processes that change through time.

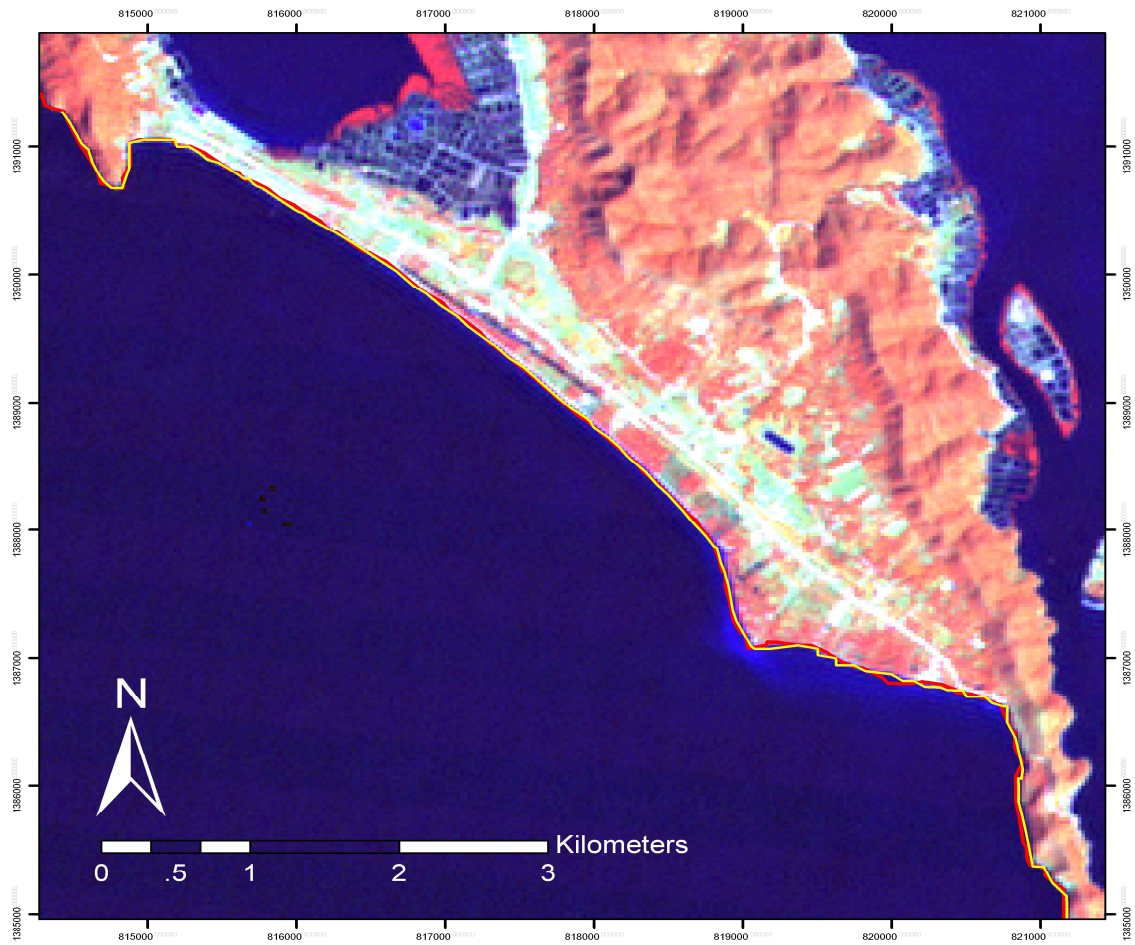


Figure 2-2 Coastal erosion of Chao Lao and Laem Sadet beaches in 1991 compare to 2006

Source: Candidate, 2009

2.7 The concept, theory about the participation

2.7.1 Definition of participation

From the study's researchers found that many technical specialist give the various meaning of participation although similar meaning and different meaning. The details are as follows.

Sanya Sanyarat (1996) said that participation of the people means opportunity for people who are the targets of development to join development projects since the operation program, estimate the project till finish the project by have the objective to offer the villager be able to learn what to do and how to work together, have shared responsibility in resource management to benefit the making a living of economy and society. As a member of society this equation will make people develop themselves instead of being as the beneficiary only one side (Thaweethong Hongwiwat, 1984). As Reeder (1974) gave the meaning of the participation of the people that the participation means the participation in socialize confrontation including participation of the individual and participation of groups which consistent with Pairat Taecharin (1984) who said that The participation is a process that promotes by government, leading and create opportunities for people in the community all the individaul, group, private club, associations, foundations and organizations of volunteer in various format o become involved in operations on something.

In addition to Aorapin Sobchokchai (1995) gave the meaning of participation that means participation of the member who have gain and lost in the community or people that get it and have a part in operational activities of the community in steps and Nirun Jongwutivej (1984) said that participation means Mental and Emotion Involvement of a person in group situations which the result as above cause the exciting to contribution to reach the goals of the group also cause the feelings to share responsibility with a group as above as well.

From the above definition: The participation means collaboration in action to do something that from accompany of person, group or who interest of solving, shared responsibility to develop and issue guidelines for efficient and successful as possible.

2.7.2 The concept of participation

The concepts of participation take place from 3 important concepts which are (Pritsana Korasut, 1991)

1. Interests and shared concerns. Occurs from shared personal interests and concerns, unexpected to be identical became interested and the common concern of public.

2. The trouble and unsatisfactory situation together with the circumstances that exist. Push forwards to straightly association of plan and start to do together.

3. To decide together to change the group or community in the desired direction, joint decision which severe enough to cause the initiation that response the resolution of most people who are involved in that activity, as Pirat Taecharin (1984) has proposed principles and guidelines to developed that cause the participation as follow.

- Stick on the principles of needs and problems of the people that is the beginning of the activity if that activity will bring to people it is a new thing so have take time to motivation, push the interest to offer knowledge, understanding until people agree the necessity and benefit in the those activities.

- The activities must be done in the group style. To build the shared responsibility, to build mutual relationships between group members, educate opinion and behaviors that think of public, work's sacrifice for common interest than personal.

- The guideline of development in activities in the community have to consider ability of people who get to resume work without reliance on outside, especially in the initial period to focus on not to devote in completely giving for nothing, have to make people feel consciousness own activities and to be able to continue by their own to when the support from external ends. The self-help and self-reliant is the important thing that need to start from the beginning.

- The activity development leading into the community have to comply with the environment, the community ready to receive which include the using communities' resources have to comply with tradition, traditions and culture of communities.

- To start activities have to require community leadership which means the natural leading that villagers respect, religious leaders, the leader has been elected or appointed by the official in order to be pioneer and persuader to the villagers afterward. Generally, community leaders will be able to adjust opinion and accept new things faster and be the persons whom villagers already have believe in. Starting from the leader, it can go faster and recognized than the general people.

- Process operations have make people get in to have a part in from the initial that is joint to search information, join in to search for cause of the problem, co-counsel for solve the problem, joint decision, joint to planning, Co-operation, joint tracking performance up to participation in long-term maintenance in further.

2.7.3 Step of participation

Many technical specialists such as (Lodermilk and Laitos1980, Pairat Taecharin, 1984 and Jermsak Pinthong, 1983) have proposed ideas about the process of participating in a similar manner, arranged into 4 steps as follow.

Step one: The participation in the search for problems and cause of problems of the community and reorganizing the significance of these difficulties.

Step two: Participate to consider, create formats, define solutions and methods of development to improve and decrease the problems of community to create new opportunities that will be beneficial to the community or satisfy the needs of the community.

Step three: Follow the project by participating and doing all kinds of activities, make use of people's abilities such as decisions for sharing, share to arrange or improve the administration work develop system to be effective, share to invest, share to follow the policy, plans, projects and the activities to achieve the stated objectives, and so on.

And the last step: Project evaluation and consideration, review the projects to complete the process perfectly.

2.7.4 The form of participation

United Nations, Department of International Economic and Social Affairs (1989) has collected the form of participation into 3 types are

1. Spontaneous Participation, help received from volunteers or informal gatherings to solve their own problems that action that did not receive assistance from outside which this format is targeted.

2. Induced Participation as is joined by demand approval or supports by the government, as forms which generality of the developing countries.

3. Conceived Participation, to be participants under operation according to policy of government, under management by government officials or by direct force. This is a form of action that was effective immediately but will not be efficient in the long-term and eventually will have bad result that will not be supported by the community. As Chapin (1979) studied the pattern of participation and classified into 4 types as attendance at meeting, Financial contribution, Membership on committees and Position of leadership.

In addition, Pretty J. (1995) also proposed the form of participation is as follows (**Table 2-1**)

Table 2-1 Form of participation (Source: Pretty J., 1995)

1. Manipulative Participation	People participation, by giving information from research results. Answers produced from researchers by using questionnaires or other similar techniques. The people not involved in checking the accuracy of the information.
2. Passive Participation	People participate by being told what is going to happen or what has already happened. This tends to be a unilateral announcement and people's responses are not taken into account.
3. Participation by Consultation	People participate by being consulted, and external agents listen to views. External agents define both problems and solutions, and may modify these in the light of people's responses. People do not share in decision making as their views may or may not be taken on board.
4. Participation for material incentives	People participate by providing resources (e.g., labor in return for food or cash). Such people are not involved in the experimentation and have no stake in maintaining activities when incentives end.
5. Functional Participation	People participate by forming groups to meet predetermined objectives related to the project. Their participation tends to occur at later stages of a project after major decisions have been made. They may become self-dependent but are initially dependent on external facilitators.
6. Interactive Participation	People participate in joint analysis, which leads to action plans and the formation of new local groups or the strengthening of existing ones. Groups take control over local decisions; thus, people have a stake in maintaining structures or practices.
7. Self-Mobilization	People participate by taking initiatives independent of external institutions to change systems. They may or may not challenge existing inequitable distribution of wealth and power.

From review literature on participation including forms and processes, the researcher concluded the meaning as the own concept of researcher. This can be concluded the meaning as above that the participation means practices or actions of one or the other of community or stakeholders that related with management problems coastal erosion in order to have management which is consistent with the area condition and benefit to the community by people in the community and stakeholders will be the co-perception problems, joint comments, joint planning, joint decision, joint perform, joint donation and joint to track evaluation.

2.7.5 The factors and participation conditions of the people

Numbers of participants have more or less depending on each location or each country is having many factors that will enable participant's progress or go back ward. All those factors are likely to be external factors such as political system, the local culture and reliability of the local communities. Sakhun Spongpan (2003) has divided these obstacles into 3 main topics which are politically related problems, managerial problems and social problems. As for the United Nations has said about the factors that affect participation, for example the fact that government supporting for the fundamental organizations of people who be a group representative groups in the expression of participation. In a mean while Reeder (Reeder, 1974) had summary of factors that affecting to community participation 11 reasons as following.

1. Behavior to get along with fundamental belief that is person and individual group will choose the format and practices that consistent and similar with basic beliefs.
2. Standard value, individuals and individual groups will follow in accordance with their standard values.
3. Target individuals and group individuals will have to conduct their own protection and maintain goals.
4. Experience common disorders, person or groups of individuals. Sometimes the behavior is caused by unusual natural experience.
5. The person and group individual expectations will have behavior according to their expectations that should be shown in such situations. Also like to treat others people in the way that they expect from others.

6. Looking only your own, individual and groups individual often do things that oneself thought should do it.

7. The stricture, person and individual group often do the entire things in forced situation.

8. The habits and traditions, Individuals and groups of people usually do all things by preferred habit or correspond with tradition when in those situations.

9. Opportunity, people and groups of people usually come to have participation in the form of social practice through the number of opportunities types which structures of social are provide.

10. Ability, people and groups of people often to participate in some certain activities that people think they can do what they want to do in situations like that.

11. To support, individuals and groups of people they get good support for the action in activities.

From information as above can see that mostly the participation will effectively depend on personal factors whether it's sex, age or beliefs on issues. Motivation from external factors such as law, supporting from external institute also be based on convenience and willingness of each person or group of people.

Theoretical concepts that have been said, will notice that there are many technical specialist who study about the concept, theory, model, process including factors, conditions that relating to participation which have a character of format that look similar or different. However, most studies that all lead to the same purpose, whether helping people accept the project because this project is suit with the problem and the needs of people. People have a feeling bound and feeling more to own the project. The processing of project is seamless because receives good cooperation from the people, helping develop the capabilities of people, benefit to the people and have resources mobilization for the operation more. For this reason, cause many institute turn to place importance on the participation of people in coastal resource management more.

2.8 The use of SWOT analysis and prospective management

2.8.1 Definition of SWOT

SWOT is abbreviated of Strengths, Weaknesses, Opportunities, and Threats. It has been used to analysis the condition of organizations or sectors; searching strengths, weaknesses or issues that could be affecting the future work.

Strengths: The work capacity and positive circumstances that the organizations can use to run the work smoothly to the goals or good conductions of the organizations.

Weaknesses: The low-work capacity and negative circumstances that the organizations cannot use to run the work smoothly to the goals or poor conductions of the organizations.

Opportunities: The factors or external conditions that influence the works and can run it easily to the goals.

Threats: The factors or external conditions that obstruct the work process and affect achievement of the aims.

The principle of SWOT is analysis both two sides of the survey which are internal and external circumstances. It is could be described as “The Situation Analysis” which is normally use to analysis strengths, weaknesses, conditions, opportunities, and threats of organizations

2.8.2 The Useful of SWOT Analysis

The SWOT analysis is a strategic planning method used to evaluate the Strengths, Weaknesses, Opportunities, and Threats involved in a project or in a business venture. It involves specifying the objective of the business venture or project and identifying the internal and external factors that are favorable and unfavorable to achieving that objective. These could be advantage to all executives, trends and the potential changes would be predicting. Therefore, visions, strategies and suitable plans would be creating for each organization or sector.

2.8.3 The advantages and disadvantages of SWOT analysis

The advantages are that it is simple and only costs time to do, able to apply to any situation for example making decision when it has too many changes, arranging the importance of conditions, managing the changes of business venture, analyzing and solving problems, generating new projects and increasing work capacities. Furthermore, it can help generate new ideas as to how a company can use a particular strength to defend against threats in the market. If a company is aware of the potential threats then it can have responses and plans ready to counteract them when they happen.

The disadvantages are usually simple and not critically presented. The SWOT analysis is could have a potential of mistake form quality of data that need to be often check for up to date data. Moreover, Skills and experiences of analysts are other issues that need to be concerning.

2.9 Research Relevant

A study from many researchers who study about factors that have an effect on problem of coastal resources management by study in quantitatively such as studying of Wararat Trethanawat (2001) have studied the potential together with participation of people in solving the coastal erosion problems from Petchaburi River, Phetchaburi Province to Pranburi River, Prachuap Khiri Khan Province found that the people who have gender, age, position in the community, the distance between homes with the coastal and receiving different information which have an effect to the participation of citizens in the solving coastal erosion problems in different way. By the male participants than female, people who have aged 41-50 years and up to 60 years get involved than people who have aged 20-30 years the person who take a position as a leader in community get involve than people in other groups and people who have homes near the coast are involved in solving the coastal erosion problems more than people who have homes far away from the coast and the studying in qualitative research such as the research of Srisompop Jitpiromsri *et al.* (2002) said that beliefs about resources in the sea, knowledge of local fishermen, ideology power and community rights have an effect to aquatic resources management of local

fishermen. The case of study, Ban Tanhyong Pao, Moo 4, Tambon Tha Kamchan, Nongjik District in Pattani Province.

But due to fact that in this study focused on primarily qualitative studies by studied about problem, obstacles in management problems of coastal erosion participatory then divided the related research which is a qualitative study as the following.

In the years 1992, Supornchai Mungmeesit had studied about participation of villagers in community forest management projects of NGOs: The case of study is Community Forest Project that initiated by Rural Development Center Village, Ban Pai District, Khon Kaen Province found that the villagers need to rely on supporting from outside organizations including institute of government and private institute. Especially, the NGOs, many organizations which have a role of entering to reinforce the strength to the villagers, has involved to support and promote to community to maintain the source of forest or planted forest, to solve the problem of shortage of usable tumbles and maintain food resources of community. As Bumpen Keawwan (2007) who studying the participation of villagers in the rehabilitation of coastal resources of NGOs in the case of Andaman project, found that the NGOs are the external factors that affect to the resource management which mean the NGOs will strengthen the power to the villager organizations and networks, to enhance the process of learning by have the process and method of working in participation in every steps. After Supornchai Mungmeesit's research in years 2535, still have other researches that study about problems, obstacles, opinion, and suggestion including to guidelines to management the following problems that related to coastal resources, as follow.

The problems of information recognition

Somrak Kingrunpet (1998) had studied the participation of people in Samut Songkhram to conservation Mae Klong River. Found that awareness messages is the factors that affecting to the conservation of Mae Klong River by the communication of the sample groups, most of them had received information about the conservation of Mae Klong River which the way to recognition by the radio, voice call and the broadcast tower are communications that give the information to influence

people have participation in conservation Mae Klong river most and the newspapers is a communication to persuade people to participate in the conservation Mae Klong River least. And Lunjakorn Sakoong (2005) had studied the role and participation of local government organization leaders about Natural Resources Conservation and Environment in Chachoengsao Province; found that the leader of organizations local has knowledge in natural resources and environmental conservation in very good level which received the information from newspapers, radio, television, also found that the leaders of organizations local who recognition the news about the conservation of natural resources and environment in different ways will have the different roles and participation in conservation activities of natural resource conservation and environmental as well.

The commitment duty's problems of government institute

Darunee Suppawan and team (2548) had studied about the development projects of Kham Pha Oung Sub district Administrative Organization in participatory natural resource management found that the committees are lack of clarity in their roles and missions, have not been meeting the operating plan that in each sector will work together in which format so when have operating work will help together in the natural style, lack of a system cause working of local institute have not ready enough to assist communities in solving many problems. With the potential of the Tambon Administration Organization also lack the office, budget, personnel, knowledge, skill in coastal erosion; this is because the work performance of public officials is not enough by mean of working in each time is only working as carelessly, lack of consistency and practicality. The numbers of personnel in the operation are not sufficient number with the work load assignments

Pattrawan Sanunthai (2005) had studied the participation of local fishermen in the conservation of coastal resources: At Bangpakong River area found that problems and obstacles to the participation of local fishermen in the conservation of coastal resources is public authority lack of project public relations seriously with many reasons then cause the problem of sea coastal erosion in Chao Lao Beach and Laem Sa Det beach, almost not have any projects or guidelines in any management,

have only one project that occurred at the present is to solve the problem of sea coastal erosion, around Ao Kung Kra Ban which has a Department of Water Transport and Commercial Maritime is the responsible for the project.

Problem of shortage of leaders who are strong

Ekkachai Kaisang (1992) found that the problems, obstacles in the mangrove forest conservation of people in Trang Province is the one of factors which is the leader not really give much the advices, including not see the importance, not interested in compliance mangrove forest protection plan. People are suggestions to government officials training the community leaders to be the leader of people in process of activities and promote the careers which have stability to people.

The suggestion guideline of coastal resource management problems

Paweena Dansakhun (2001) had studied about integrated management of coastal areas in the western Gulf of Thailand. She proposed an approach in management by the demarcation set focused on control measures of the growth of the city, the adoption of Economics go together with law enforcement in management the wastewater, promoting the conservation and restoration of mangrove forest and aquatic resources in order to using natural resources to go on permanently. And Taungporn Jankaew (2007) found that management guidelines for coastal resources Muang Narathiwat district, Narathiwat Province, is appropriate must be to promote knowledge and awareness about coastal resources conservation, coastal resources rehabilitation, promoting professional support, encourage about the laws and policies in coastal resource management and promoting to association in the community.

In addition, still have another research that is necessary which is a research study on the participation of communities in coastal resource management. This is an important process that affecting the success and effectiveness in managing coastal resources such as the study of Ruengchai Tonsakhun et al. (2002) had studied coastal resource management by have participation of local communities, in the Gulf of Ta-Chana, SuratThani Province found that to establish community for participation in conservation and management of coastal resources happened from the fact that the community will be faced with the problems and important internal factors such as

mainstay of the community, awareness of community problems and the influence of external factors for example NGOs, government policies, state agency, mass media and technical specialist.

Chalernporn Choosri (2000) had studied about participation of local fishermen in the Coast Resources Conservation, Gulf of Pattani, Pattani Province found that most of local fishermen have a part in the conservation of coastal resources in the low level and levels of education, status of family are the factors that have an effect on participation. Also found the area occupied by capitalist is obstacle to participation in the conservation of coastal resources in that area.

And the studying about the case that fishing community, Dato Village, Pattani Province: collaborative problem degeneration of mangrove forest and aquatic resources of the Gulf Coast in Pattani had analyzes the development of cooperation that happened from the pressures on the environment which affects the economy of fishing communities cause the communities be awakened to solved problem of resources. And integration firmly of people is a community organization in working to strengthen the process of community to solve the problems effectively. Apart from working of local people organizations, the community must be coordinated with external organizations and interact with social context, local politics, economic and also the cultures (Wattana Sukanseen, 1996) and Sareerat legislation Taecharat (2003) had studied about the participation of people in coastal resource management, Wee Ru River area, Chanthaburi Province and Trat Provinces found that the level of people participation in coastal resource management still have a low level including planning, Co-operation, Co-benefits and joint evaluation. And suggestions that should have leadership development and supporting group of people organization, creating conscious of using the benefits of coastal resources, lay down measures management of coastal resource in the Weruu River area including law enforcement to efficiencies.

From review of research mentioned above found that in Thailand has a study of coastal resource management in participatory which mostly focused on fishery resource management and mangrove resources. About the study of coastal erosion problems and management in varying participation styles, still have relatively

education and focus on the areas where have a case of crisis by studying on the management problems of coastal erosion in participation style, sometimes it is just a graduated from the responsible institute such as study of World Bank work together with local institute in order to arrange the stage of associate in 3 locations. Such as Samut Prakan, Rayong, and River basin of Songkhla Lake found that the information that got from the meeting, creating willingness to work together, having a strong leader combination with technical knowledge, participation of local institute and supporting from central institute, including the communication and continuously coordination that will be the guide line to managing coastal erosion problems effectively. This makes education of research in Thailand is not enough and for this reason the researcher has had study the research from abroad to combine with this study in this time. To be a way to learning more and be able to adapt with the studying in the further which have the detailed as follow.

Pomeroy (1997) studied the goal of the research is to determine factors influencing the success and sustainability of community-base coastal resource management project of the Central Visayas Regional Project (CVRP -1) located in Cebu and Negros Oriental, Philippines. This studied was found early and continuous participation of beneficiaries in the project is related to positive evaluation of success, positive cultural attitudes toward collective action were related to perception of positive change and in 2004 Pomeroy *et al.* studied to factors of fisheries and coastal resource co-management in the Carribbean region. It presents to shared problem recognition, effective communication, support from external agents and enforceable rules to the factors that affect to success of coastal resource management. In addition, several conditions were also identified which are constraining the implementation of co-management such as management approaches of government for coastal resources management are not flexible and responsive to changing circumstances, lack of effective leadership, limited trust and mutual respect between government and fishers and, in some case, between fishers for each other and organizational capacity of fishers is weak.

Clark (1997) said to coastal zone management for the new century; stakeholder participation as the best way to gain support for ICZM and that Environmental Assessment (EA) is the best tool for controlling coastal development.

In Addition, Clark investigated to US Agency for International Development: USAID test program for Integrated Coastal Zone Management (ICZM) countries in Asia and Latin America for more than ten years. The following are the strategies which have lead to success in this program.

1. Work with all levels of government (central and local).
2. Focus on a limited set of issues.
3. Emphasize public education early in the program.
4. Gain strong participation of resource user group.
5. Utilize scientific information and monitor the program.
6. Emphasize training of coastal manager (present and future).
7. Move quickly from planning to management with sub-projects.
8. Encourage flexibility and adaptability.
9. Use an incremental approach (implement program in steps).

Solomon & Forbes (1999) had studied analyzing the impact of geological nature and the oceanography that caused by cyclone storm in islands of the South Pacific area said that having understanding and knowledge in the natural processes of the coastal is the important factor which cause finding the ways to manage including the ways to protect in the correct way and have a permanently development in the area of the South Pacific islands.

Afterward in the year 2001, Arriaga & Villalobos investigated to the coast of Mexico: approaches for its management to the main that face with the problems of coastal land used activities for economic development which is too much above the North Pacific area, Mar de Cortes, South Pacific, Gulf of Mexico and Caribbean Lake and had pollution problems. In this study found that the management guidelines should be developing a legal framework, designating a coordinating institution, developing management plans and implementing management strategies and activities including to search more another activities in order to campaigning to make people see the importance of the problems.

Tran (2006) talked about the participation of local communities of Holbox Island, Mexico that effected by coastal water pollution and coastal erosion by set up the participation development of management project by training as workshops such as to practice keeping the instant water, including analyzing the quality of water, basic education of beach structure, etc., which have participation of communities in a high level. The results of projects found that the communities have more awareness and also Tran said, the coastal management will be successful it have to create a conscious of community, knowing enough news and must have the policies, rules, regulations are essential to regulate development activities at lower levels. And in the same year, Phillips and Jones (2006) said ICZM is justified as a tool for managing coastal resources and reduce the impact of coastal erosion problems which caused by the developing of tourism industry in the United States which ICZM should be under the participation of stakeholders and policy organizer. In the analyzing problems, planning, management tools including monitoring evaluation, it will lead to successful and sustainable management.

Baine *et al.* (2007) has studied coastal and marine resource management in the Galapagos Islands and the Archipelago of San Andres, Colombia which had the problems associated with the health of fishery resources, the environment and their dependant industries. This studies have setting the scene for an examination of a more participatory and effective role for local stakeholders in the management of their island resources. Local stakeholders have been involved in guiding plans on future management of both islands' resources including Biosphere Reserve designation of the San Andres Archipelago and the development of special law for Galapagos which their participation is deemed essential to progress in marine resource management and zoning initiatives within the islands.

Cai *et al.* (2009) investigated to coastal erosion in China under the condition of global climate change and measures for its prevention. by means of China have to face with the problems of coastal erosion because of sea level rise, strom, tides and the influence of global climate change. From the study found that a summary of the main protection measures is presented in **figure 2-3**

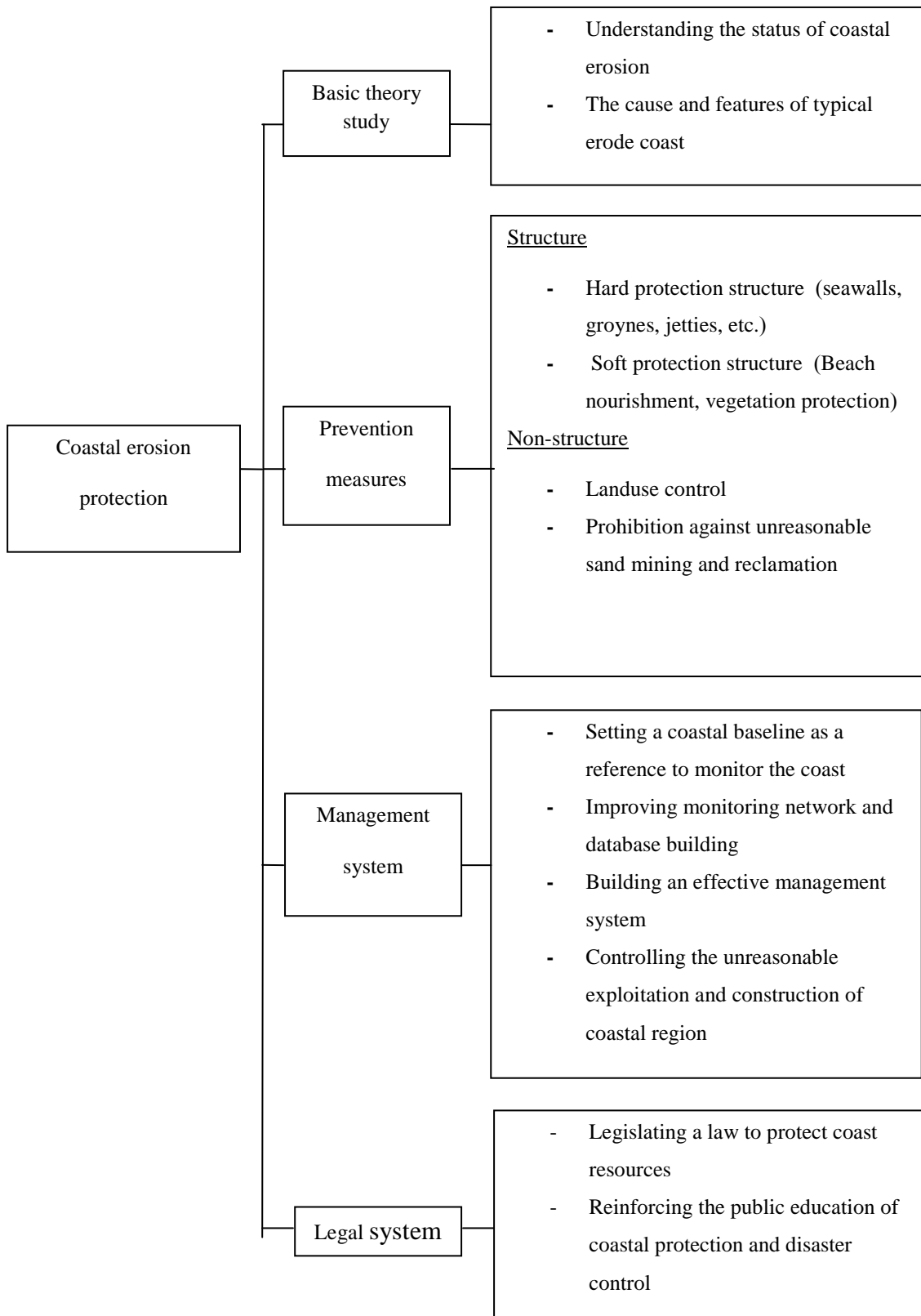


Figure 2-3 Sketch map of the prevention measures against the coastal erosion in China.

From the review document, related research mentioned above said that most of coastal resource problems caused by the actions of human and natural system that changes all the time cause effects that are often associated with the basic needs of human and other living things mainly so these affect are the pressures condition that makes human find the ways to effectively manage coastal resources and it is consistent with the area condition that cause the review of researches that a researcher had been studied can be summarized as that the coastal resource management effectiveness will be the participation of stakeholders from all sectors which is important and also depends on another 3 factors are.

1. The factors of the population such as gender, age, level of education and the period of time that living in those local
2. The factors of social, economic such as occupation, social status.
3. The external factors such as knowledge base, opinion, receiving the information, all kind of policies and receive the supporting from organizations and so on.

From the factors mentioned above will be seen that the study of coastal resources problem will be studied in quantitative data and quality oriented. By the study of quantitative data will be a study of the negative numbers to a conclusion and to be a reference that the things that happened is not about an accidentally. About the study of quality oriented is a study that focused on understanding the phenomenon occurs and for this reason, the researcher selected to studies in quantitative and quality oriented by mainly focus on the study of qualitative due to face that the researcher have a goals to study about the actual problems which occurred in the area to have most completely of the content such as comments, problems, obstructs and the suggestions of stakeholders in order to bring the information are acquired to be as the guidelines of management in the future.

CHAPTER III

MATERIALS AND METHOD

3.1 The study areas

Chanthaburi province has located in the east of Thailand. The borders have connected to Battambang and Pailin of Cambodia and the shore to the Gulf of Thailand. It is cover 6,338 square meters or approximately 3,961,250 rais (1 rai equals 1600 square meters). The province has mountains and high lands bordering the Gulf on the North and the East.

The weather has influence of the southwest monsoon and sea humidity with highly precipitation all year. There are 3 seasons; summer begins in the middle of February until the middle of April; rainy season, driven by the southwest monsoon, in the middle of April until the middle of September and winter in September until February of the following year. Under the northeast moon, cold win usually strikes the hardest in December. However, the temperature is not too cold in winter due to the location of the province on the southeastern part.

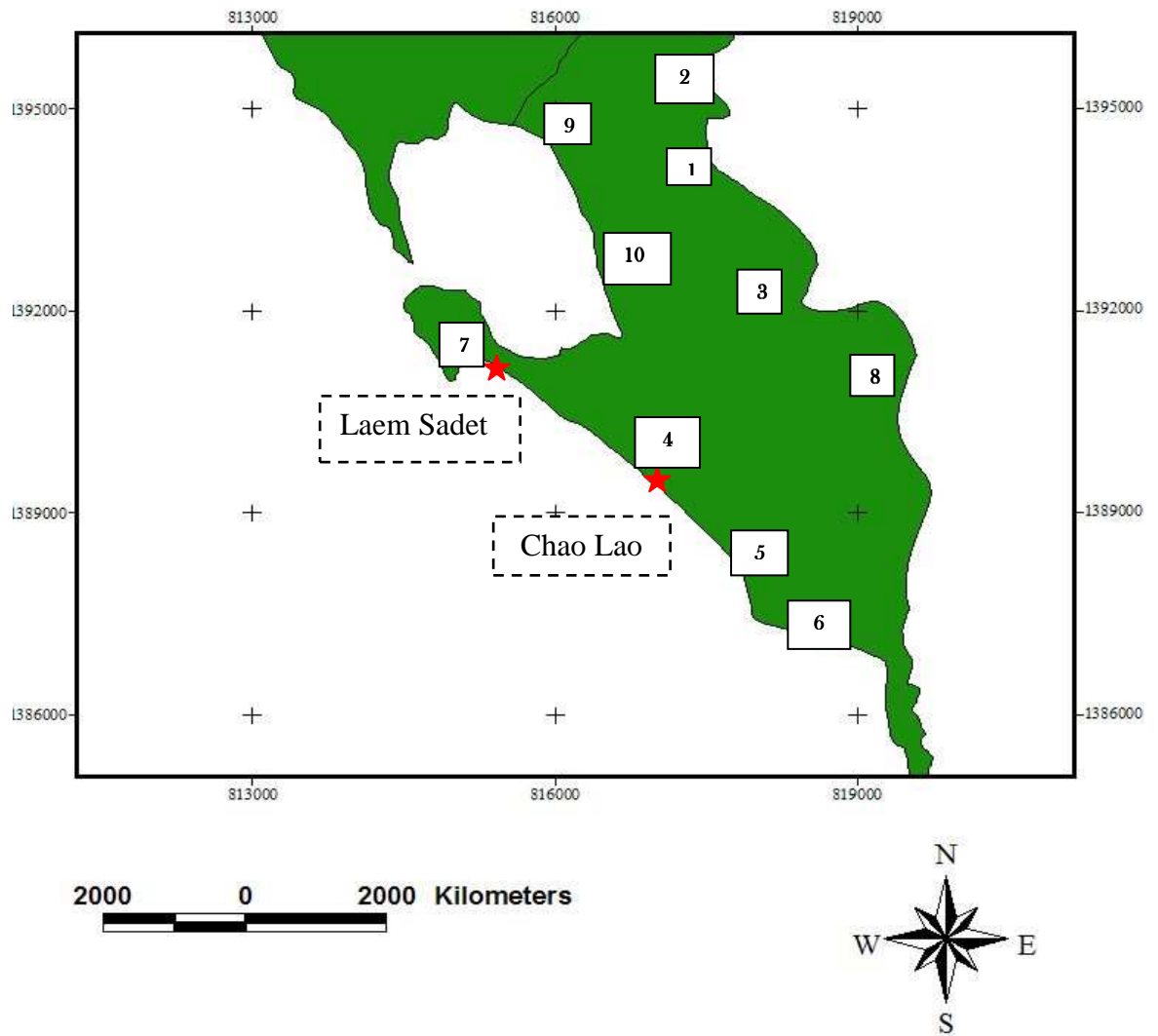
Klung, Laem Sing, Na Yai Arm, Tha Mai are the districts that bordering the Gulf of Thailand, these significant in terms of tourism and abundant natural resources, including corals, mangrove forests and fisher especially in Thamai district.

Furthermore, there are significant tourist attractions, Chao Lao and Laem Sadet beaches, located in Khlong- Kood subdistrict in Thamai district. It has under coastal erosion in the middle level (1-5 meters per year). This has to be taken seriously to find preventive measures and effective solutions. In the areas, there are independent conservation organizations campaigning on local natural resources and strong fishing communities with Buddhist monks as leaders. Because of the information mentioned above, the researcher is interested in the areas in which the beaches cover and details about why they were chosen are also provided.

The study areas were Chao Lao and Laem Sadet beaches (**Figure 3-1**) in Khlong-Kood subdistrict, Thamai district, Chanthaburi province, including 10 villages; namely,

1. Sattaboot (N12° 59' 07.7" E101° 92' 89.5")
2. Norkkhao (N12° 60' 87.8" E101° 91' 98.6")
3. Nernpradoo (N12° 58' 44.3" E101° 91' 50.5")
4. Moodood (N12° 56' 24.7" E101° 91' 26.5")
5. Chao Lao (N12° 54' 56.7" E101° 93' 16.9")
6. Chao Lao Hua Laem (N12° 31' 48.9" E101° 56' 48.8")
7. Kung Krabaen (N12° 54' 18.9" E101° 93' 36.6")
8. Amphawa (N12° 57' 92.8" E101° 93' 47.8")
9. Khlong- Kood (Moo 9) (N12° 60' 96.4" E101° 90' 89.6")
10. Khlong- Kood (Moo 10) (N12° 59' 29.2" E101° 91' 78.0")

According to the information above, there are 4 villages, located by the coast, the villages of Moodood (Moo 1), Chao Lao (Moo 5), Chao Lao Hua Laem (Moo 6), and Kung Krabaen (Moo 7), which are under direct erosion. Out of these villages, only four were chosen as samples (Regional Administration Organization) while the rest of the villages with a small number of members benefiting from the beach



- | | | |
|-------|----------------|-----------------------|
| When; | 1 - Sattaboot | 6 – Chao Lao Hua Laem |
| | 2 – Norkkhao | 7 – Kung Krabaen |
| | 3 - Nernpradoo | 8 – Amphawa |
| | 4 - Moodood | 9 – Khlong-Kood |
| | 5 – Chao Lao | 10 - Khlong-Kood |

Figure 3-1 Map of the villages in the study area

This study is based on integrating qualitative and quantitative research methods, indicated in the following steps.

3.2 Quantitative Research

3.2.1 Selection of Population and Sample Group

3.2.1.1 Population

The study required tourists who were visiting Chao Lao and Laem Sadet annually, with the total number of 300,000 of them per year. (Rambhai Barni Rajabhat University and Chanthaburi Highway District, 2006)

3.3.1.2 Sample size

Tourists who were visiting Chao Lao and Laem Sadet beaches were chosen as sample group, using Yamane's calculation principle (1973) for the confidence rate of 95%, with 400 individuals, indicated in detail in the following formula.

$$n = \frac{N}{1+N(e)^2}$$

When;

n	=	sample size
N	=	population size
e	=	sampling error (= 0.05)

From the formula;

$$n = \frac{300,000}{1 + (300,000 \times 0.05^2)}$$

The sample size = 399.47 individuals

Conclusion: At least 400 tourists have to be taken in the study.

This study had different steps in choosing the sample groups without using the Non Probability Sampling method as it was found that a sample group obtained by the method are not able to find exact probability rate in the group (Kallaya Wanichbancha, 2003).

3.2.2 Instruments

The questionnaire was employed as a tool in which the researcher began considering the framework and theories, as well as comparative study of previous questionnaires used in other related research projects, following the 3 points below.

Point 1: Questions are to address opinions regarding activities on coastal erosion issues.

Part 1: Activities in the area, done by government agencies

Part 2: Activities, specially organized for tourists

Part 3: Other activities, generally organized in the area

Point 2: Opinions and suggestions concerning coastal erosion management, as well as other issues, that need development and improvement

In Point 1, from the points 1-3, questions are designed multiple choices for choosing the degree of satisfaction, ranging from 5 to 1 as shown in the following detail.

Degree of Opinion	Rate
Highly agree	5
Agree	4
Uncertain	3
Disagree	2
Highly Disagree	1

3.2.3 Steps in making the research tool

1. Studying relevant books, documents, theories and research projects to scope the framework to cover all issues concerned.
2. Studying how to make a questionnaire from documents to make sure that details in the questionnaires are clear in accordance to the purpose of the project.
3. Bringing collected information to make a questionnaire.
4. Presenting a draft to the advisor for suggestions, corrections and revision.
5. Distributing sampled questionnaires as a pre-test experiment to 30 individuals, (February, 2009) chosen as target groups, before modifying and presenting them to specialists to ensure that they could be an effective research tool
Distributing questionnaires to sample group (April-May, 2009)

3.2.4 Analysis of Data

In this process, prepared questionnaires were examined thoroughly. Code book production with computer data processing was to be done and statistics used as Descriptive Statistic.

3.3 Qualitative Study

In-depth interviews and focus group discussions were conducted in order to cover as many aspects as possible concerning coastal erosion, the present state of the problem and participatory management of the erosion as well as suggestions for solutions.

In-depth interviews and focus group discussions being employed, sample individuals were divided into 2 main groups as seen in **table 3-1**.

Table 3-1 Classifying stakeholders

Stakeholder	Criteria	Target
Major stakeholder	1) Those directly affected by coastal erosion 2) Authorities in local administration and local influential individuals	1) Affected villagers in Moo 4, 5, 6, and 7, who are owners of the following businesses, <ul style="list-style-type: none"> - Food stall owners - Hotel owners - Resort owners - Fish market business owners - Ferry owners <u>Main organizations</u> <ol style="list-style-type: none"> 1) Khlong Kood Tambon Administration Organization 2) Community leaders, including village headmen 3) Kung Kraben Development Study Center (under the Royal Initiation) <u>Groups/ Local Forums</u> <ol style="list-style-type: none"> 4) Chao Lao Beach Conservation Society 5) Chao Lao Beach Local Fishing Group
Minor stakeholder	1) Those living in the area unaffected by coastal erosion, being prone to the problem in the future 2) Provincial government officers	<ol style="list-style-type: none"> 1) Villagers from Moo 1, 2, 3, 8, 9 and 10 (because of the habitat for distance from coastal area) who are shrimp farmers 2) Tourists 3) Provincial Department Natural Resource and Environment 4) Provincial Department of Public Works and Town & Country Planning 5) Provincial Department

Notice: Regarding data collection among tourists, questionnaires were used as research tool.

3.2.1 In-depth Interview

This method was done through careful interviewing, triggering responses from interviewees in terms of opinions, beliefs and attitudes difficult to explain. It is a special way of obtaining information that is rare and possibly unexpected. An in-depth interview usually takes a time, perhaps 2 hours or more in each session. Data collection, as a result, is difficult. The best way to conduct this kind of method is to specify sample group by their characteristics, namely gender, age, social status and their way of living, etc. Positively, in-depth interview provides a lot of details about a particular topic, sometimes previously unknown to the researcher. Negatively, as mentioned before, it takes much time to complete, costing a large amount of money and being unsuccessful in selecting the right sample population.

Sample Population

Purposive sampling was employed in this research by the choosing of interviewees determined by either their relevant knowledge or authoritative power in which this study is based.

11	Seniors/ Community Leaders
3	Conservation Group Leaders
6	Government Officers
2	Local Administration Officers
3	Other related individuals

3.3.2 Focus Group

This is an effective methodology for collecting specific data by the selection of criteria proposed by interested individuals. It is based on an assumption that the selected informants have relevant knowledge in the topic of study. They are also expected to know as best related details as possible. In sum, group discussions were organized among researchers and key informants whose background knowledge are not much different from one another (Yothin Sawaengdee, 2002).

Population Group

Population groups were chosen by the Purposive Sampling method during group discussions. Those who got selected were from members of small discussion groups, who are

- 1) Local residents, knowing the issues of study well and being ready to work voluntarily.
- 2) Stakeholders, benefiting from the Beaches directly and indirectly, living by the Beaches and realizing their changes for a long period of time, according to the list below.

7	Sattaboot villagers	(Moo 1)
7	Norkkhao villagers	(Moo 2)
8	Nernpradoo villager	(Moo 3)
12	Moodood villagers	(Moo 4)
12	Chao Lao villagers	(Moo 5)
12	Chaolaohualaem villagers	(Moo 6)
12	Kung Krabaen villagers	(Moo 7)
8	Amphawa villagers	(Moo 8)
10	Khlong- Kood villagers	(Moo 9)
7	Khlong- Kood villagers	(Moo 10)

It took 1-2 hours for each focus group.

3.3.3 Tool for Qualitative Research

In-depth interview has been used as a major tool, in focus group, featuring questions regarding on the following issues.

Issues for in-depth interview

1. Natural resource abundance in Chao Lao and Laem Sadet beaches
2. Knowledge of coastal erosion, its causes, preventive measures and solutions
3. Problems and obstacles in tackling coastal erosion

4. Community participation in coastal erosion management (including brainstorming, planning, decision-making, cooperating, donating resources and doing an evaluation)
5. Collective management of coastal erosion
6. Knowledge with regard to information concerning coastal erosion
7. Management of coastal erosion by relevant national and local agencies
8. Management guidelines for coastal erosion

Issues for focus group

Participants' opinions regarding coastal erosion in their area of residence, how it affects their lives, which issue should be urgently tackled

1. Individually, what each of the participants perceive as the best possible way to find solutions to it
2. From the effects, how do you solve the problem?

3.3.4 Experiment on Efficiency of the Tool

In qualitative research, there are ways to test if the research tool is efficient.

3.2.4.1 In finding accuracy of the tool, the researcher included interview topics divided into parts and then presented the work to the advisor and other thesis committee for corrections and suggestions

3.2.4.2 Checking language appropriation, relevance of questions before the use of the tool is important. In this process of testing, it was to be tested on 10 sample groups, all of which were not local residents (February, 2009). Analysis of the test results would confirm its possibility as research tool.

3.3.5 Tool for Qualitative Research

In-depth Interview

1) Issuing of official letter, approved by The Faculty of Environment and Natural Resource Studies, Mahidol University, requesting participants for an interview and for other data collection

2) Making of an appointment, indicating the date, time and place of interview (February-April, 2010 and June-July, 2010)

3) Participating in local community activities

4) Doing research in relevant documents for further information

Focus Group

For convenience in collecting data, well-connected individuals in the area were contacted in order to serve as a medium between the researcher and interviewees during the course of in-depth interviews.

3.3.6 Analysis of qualitative data

This study employed in-depth interview, small group discussion, and participatory observation done by the researcher. These qualitative methods were then taken for analysis and processing. The presentation was to be done in the form of Descriptive Approach Analysis on interview issues to find solutions to coastal erosion and the best management suitable for the area.

3.4 Environmental process analysis

The researcher conducted environmental analysis which had the processes as following (Picture 3-2)

Process 1 Arrange the participants for in-depth interview and focus group discussion No.1

Process 2 Arrange the participants for in-depth interview and focus group discussion No.2

Process 3 Survey the tourists' attitudes and recommendations

Process 4 Analyze the internal factor (weakness and strength) and external factor (opportunities and threats) of process 1-3

Process 5 Present the coastal erosion management at Chao Lao beach and Laem Sadet beach, Chanthaburi province

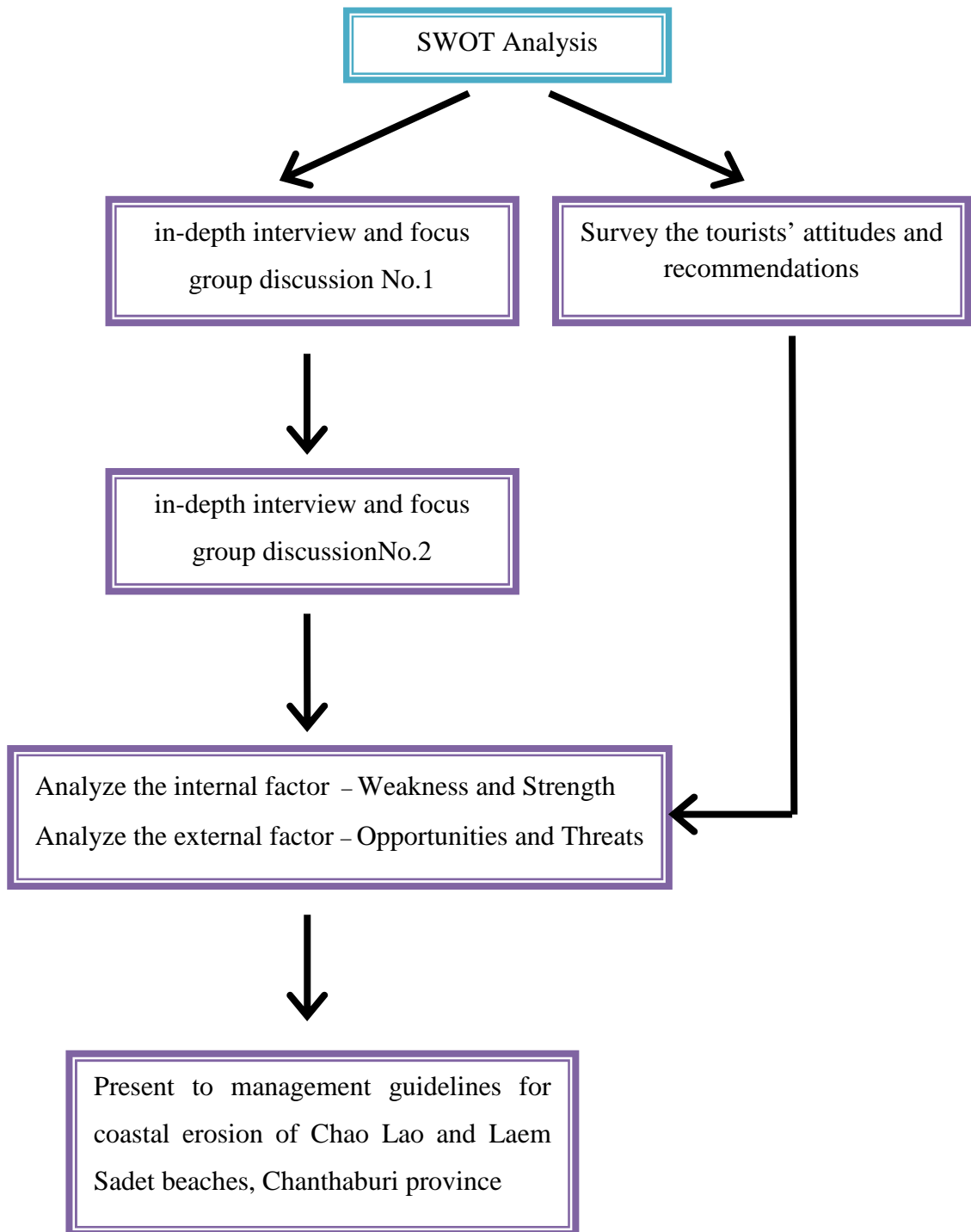


Figure 3-2 SWOT Analysis

CHAPTER IV RESULT

The study of coastal erosion management at Chao Lao Beach and Laem Sadet Beach, Chanthaburi province was presented as figure 4-1:

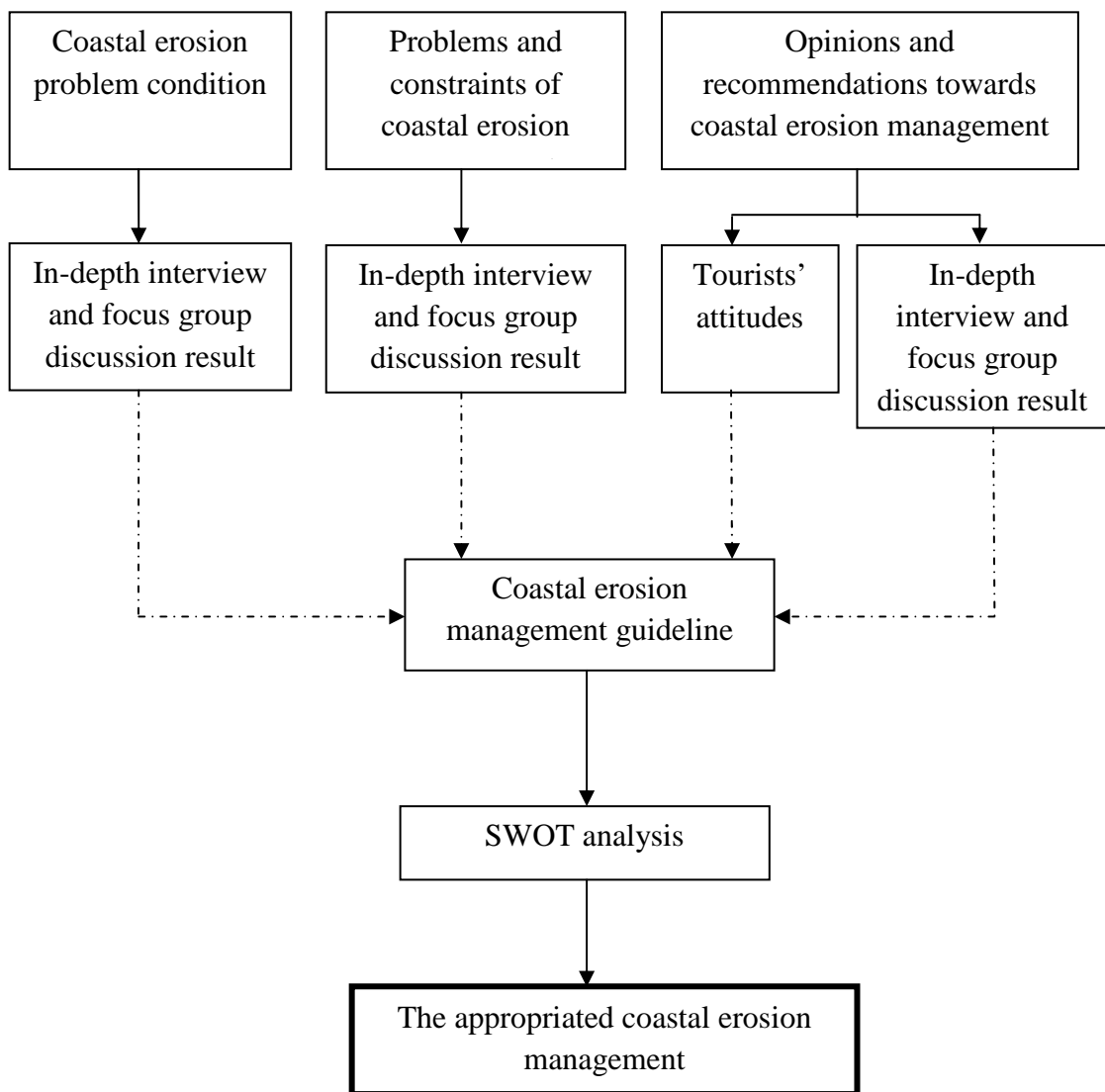


Figure 4-1 Coastal erosion management guideline

The coastal erosion management guideline at Chao Lao Beach and Laem Sadet Beach, Chanthaburi province was classified the data collection and recommendation into 3 main facets as following:

4.1 The result of quantitative research

The researcher collected the attitudes and the recommendations in relation to coastal erosion problem at the tourism areas at Chao Lao Beach and Laem Sadet Beach in form of questionnaire 400 people: male were 212 people (53%) and female were 188 people (47%) as table 4-1.

Table 4-1 Result of the attitudes and the recommendations from tourist

กิจกรรม	ระดับความคิดเห็น				
	highly agreed (%)	moderately agreed (%)	uncertain (%)	disagreed (%)	highly disagreed (%)
Part I activities of organizations					
coconut or pine plantation along the coastal zone	51.5	45.0	2.5	0.8	0.3
building construction to prevent waves if the local organizations cooperated with the central organizations	23.8	38.0	22.8	11.5	4.0
Part II Activities for tourists service					
taking boat to see coral	42.3	46.8	7.8	2.3	1.0
taking speed boat to see coral	31.3	39.8	15.8	10.8	2.5
water sport	39.5	39.8	13.8	5.3	1.8
Part III The others activities					
building rock barrier to prevent wave	15.5	10.5	32.3	40.0	1.8
using ground water	7.0	28.8	29.5	25.8	9.0
hotel and resort expansion along the coastal zone	12.0	20.8	21.5	32.3	13.5
restaurant expansion	14.5	28.0	25.0	22.3	10.3

Table 4-1; it summarized that the majority of tourists highly agreed with coconut or pine plantation along the coastal zone (51.5%) and moderately agreed with building construction to prevent waves if the local organizations cooperated with the central organizations (38%). In terms of tourists recreations, most of tourists moderately agreed and highly agreed with taking boat to see coral (42.35% and 46.8% respectively) as well as they moderately agreed and highly agreed with taking speed boat to see coral (39.8% and 31.3% respectively) including they moderately agreed and highly agreed with water sport (39.8% and 39.5% respectively). Lastly, they were uncertain whether using ground water causing the coastal erosion problem or not (29.5%) and they disagreed with building rock barrier to prevent wave (40%) and accommodation, hotel and resort expansion along the coastal zone (32.3%); at the same time, they agreed the store and restaurant expansion (28%) and some were uncertain (25%).

4.2 The qualitative research (In-depth interview and focus group discussion)

The in-depth interview was applied in the qualitative research in order to interview key informants and stakeholders altogether 25 populations (Appendix B) namely village head men, local administration, related government agencies, restaurant operators, hotels and resorts. Of these 95 stakeholders did focus group discussion (Appendix B). The descriptive analysis was employed for data analysis as followed:

4.2.1 The pristine condition of Chao Lao Beach and Laem Sadet Beach

To study the pristine condition of Chao Lao beach and Laem Sadet Beach, the researcher selected mangrove forest, coral condition and seagrass due to the fact that this information linked with the coastal erosion problem through in-depth interview the stakeholders 25 people and focus group discussion 95 people as following:

The pristine of mangrove forest area

The mangrove forest area at Tambon Khlong Kood was a part of “Kung Krabaen Bay Royal Development Study Center” which was the Royal Initiative for area development by applying new technology that had the closed pond system of giant tiger prawn and plenty of red mangroves which were suitable for people who were interesting to nature and mangrove ecosystem. Furthermore, the total area of Kung Krabaen Bay Mangrove forest, opposite Laem Sadet Beach (figure 4-6), was 1200 rai. A part of it was considered as Kung Krabaen and Ao Kham Nu National Reserved Forest. The mangrove forest area, in the past, was degraded; then, it was restored for maintain the big trees. As in-depth interview, this research found that there were 4 people, namely the village headman of Kung Krabaen village, the village headman of Mu Dud village and the village headman of Khlong Kood village and the staff of Kung Krabaen Bay Royal Development Study Center, mentioned that Kung Krabaen, in the past, was natural forest. The local people likely logged in order to make charcoal for household consumption and selling. The Kung Krabaen Bay Royal Development Study Center was established in 1982 and it was declared as forest reserved area which had many activities related to conservation; thus, the forest areas gradually increased.

The researcher, moreover, conducted focus group discussion with local people who lives around mangrove forest and found that there was only Kung Krabaen village that was able to share attitude in terms of pristine mangrove forest. In other words, the mangrove forest, at the moment, was in good condition and they provided the reason of this successful practice

1. The staffs strictly followed the law enforcement and inspected at mangrove forest area. The local people from Kung Krabaen village said that he used to log one chump for making oar but he was fined 10,000 Baht and had to go to the court.”

2. The Kung Krabaen Bay Royal Development Study Center continuously publicized. In the past, the some local people broke the law so the center explained the positive and negative together with the importance of mangrove forest conservation.

3. The local people greatly participated in the environmental conservation activities or mangrove replantation including protecting and invigilating their resources.

The pristine condition of coral

The coastal characteristic of Chanthaburi province was the beach sand and mangrove forest which was located at the estuary and canal as Pak Nam Kaem Nu and Kung Krabaen Bay at Tha Mai district or Pak Nam Laem Singha at Laem Singha district where were not appropriated for coral reef development. There was no the coral reef along the coastal zone excepting Chao Lao Beach, Tha Mai district and small islands nearby the coastal zone were closed to the estuary. The water low transparency and the area characteristic was mud so the coral reef was not found as well (Ronnawan Bunprakob and Piyachok Sinarnun, n.d).

Chao Lao Beach and Laem Sadet Beach at Tha Mai district were regarded as tourist areas that were very famous in Chanthaburi province. Besides, there were local fishermen scattered along the coastal zone. The coral reef at Chao Lao beach was developed from poling until became coral reef parallel with the coastal zone. The coral reef was far from the coastal zone from 300 – 1,300 m. and its width was from 50-500 m. and the depth was not over 5m. The area of coral reef at Chao Lao beach was 0.526 sq.km. The coral reef characteristic was divided into 2 groups:

The first group was situated at fishing pier. The coral reef was far from the coast around 400 m. and the coral width was about 500 m. together with the edge side connecting to the coast was patch reef. The coral reef in the shallow water 1-2 m was the small mountain coral (*Polites lutea*) scattering on the sand that was in moderate condition and still alive 20%. The outer of coral reef was deteriorated condition to moderate condition; in addition, there were the living coral around 20-40% and mountain coral (*Polites lutea*), double star coral (*Diploastrea heliopora*) or long valley coral in Mussidai family at the prone zone as **figure 4-2 and figure 4-3**

Some area had patchable lobed leather coral (*Lobophytum* sp.) and there was zoanthid cover the death coral at the reef flat.

The second group of coral reef was far from the coast around 1 km. whose width was around 50-100 m. and its depth was 2-3 m. The coral reef was in moderate

condition. The living coral at prone zone was 30-50%; in addition, the outstanding coral was mountain coral (*Polites lutea*), favild ring (*Favia sp.*) and cauliflower coral (*Pocillopora damicornis*).



Figure 4-2 Brain coral that found in the study area



Figure 4-3 Brain coral that found in the study area

The survey of government organizations as marine and coastal resources and mangrove forest research and development conducted the survey around the coral reef through applying Manta tow technique at Chao Lao Beach (around Hin Ai Lao Nai, Hin Ai Lao Klang and Hin Ai Lao Nok) and Laem Sadet Beach, in 2006, found that the coral reef, in general, was in the moderate condition (Nipon Pongsuwan, 2009) as well as the Department of Marine and Coastal Resources surveyed the coral reef around Chao Lao beach and Laem Sadet Beach in 1997 and 2007 presented that the coral reef was in the moderate level (Environmental situation at Chanthaburi province report, 2009).

As from interviewed the local people around Chao Lao beach in relation to staff of Eastern Marine Fishery Research and Development in terms of the coral reef utilization in the past found that collecting coral in the past 10 years ago gradually increased in order to make lime but this problem already disappeared. Therefore, it could be assumed that the coral reef used to be pristine and abundant. The current problem of coral reef of Chao Lao beach was the deterioration because of coastal community development and tourism due to the fact that the coral around Chao Lao beach greatly used for tourism. However, there was the cooperation between private sectors and the institutes around the areas for conserving the environment and coral

reef which could reduce coral reef degradation. Nevertheless, bleaching of coral in 1998 (as from interviewed, 2009) caused the deterioration around Chao Lao beach corresponding with the in-depth interview about the pristine of coral, the researcher interviewed 3 people as the oldest person in the community, and 2 leaders of Chao Lao conservation group said that the coral at the present time reduced and degraded from the past because the local people, 20 years ago, did not know what was coral and even the word coral, they understood as “rock flower”; moreover, they understood that this flower could grow very fast in the sea so they sold 4 Baht/coral for fish tank decoration. At the same time, the local people during that time vastly did shrimp farm so the lime highly demanded for reducing acid in shrimp farm. Therefore, many private sectors established lime factories including local people’ communities altogether 100 factories. The entrepreneurs mostly understood that the lime from coral was better than burning shell; consequently, converting coral to lime affected on the number of coral degradation. Of these 95 people from focus group discussion could not explain the pristine condition of coral because the coral conservation in the area decreased so that the local people did not have knowledge about this and lacked of transferring experience to the next generation; in addition, some local people did not stay around coastal zone so they did not care of coral resources.

The pristine condition of seagrass

The seagrass at Chanthaburi province greatly found at Kung Krabeen Bay namely tropical eelgrass (*Enhalus acoroides*; Ea), (*Halodule pinnifolia*; Hp), veinless spoon – grass (*Halophila decipiens*; Hd) and Forsskal (*Halodule uninervis*; Hu) (Jittima Aryutaka *et al*, 1992). There were 2 outstanding sea grasses: *Enhalus acoroides* (Ea) (figure 4-4) and *Halodule pinnifolia* (Hp) (figure 4-5) generally scattering both shallow and deep water (Sureeporn Thanmikphon, 2005); accordingly, the interviewing local people found that there were 2 remarkable sea grasses at Kung Krabaen Bay namely tropical eelgrass (*Enhalus acoroide*) that local people called Wan Ram Pan or Wan Nam and *Halodule pinnifolia*; Hp that was called Ya Pom Nang. Normally, local people did not directly use the seagrass benefit but the seagrass was the shelter of the aquatic animal which were not direct food of human being.

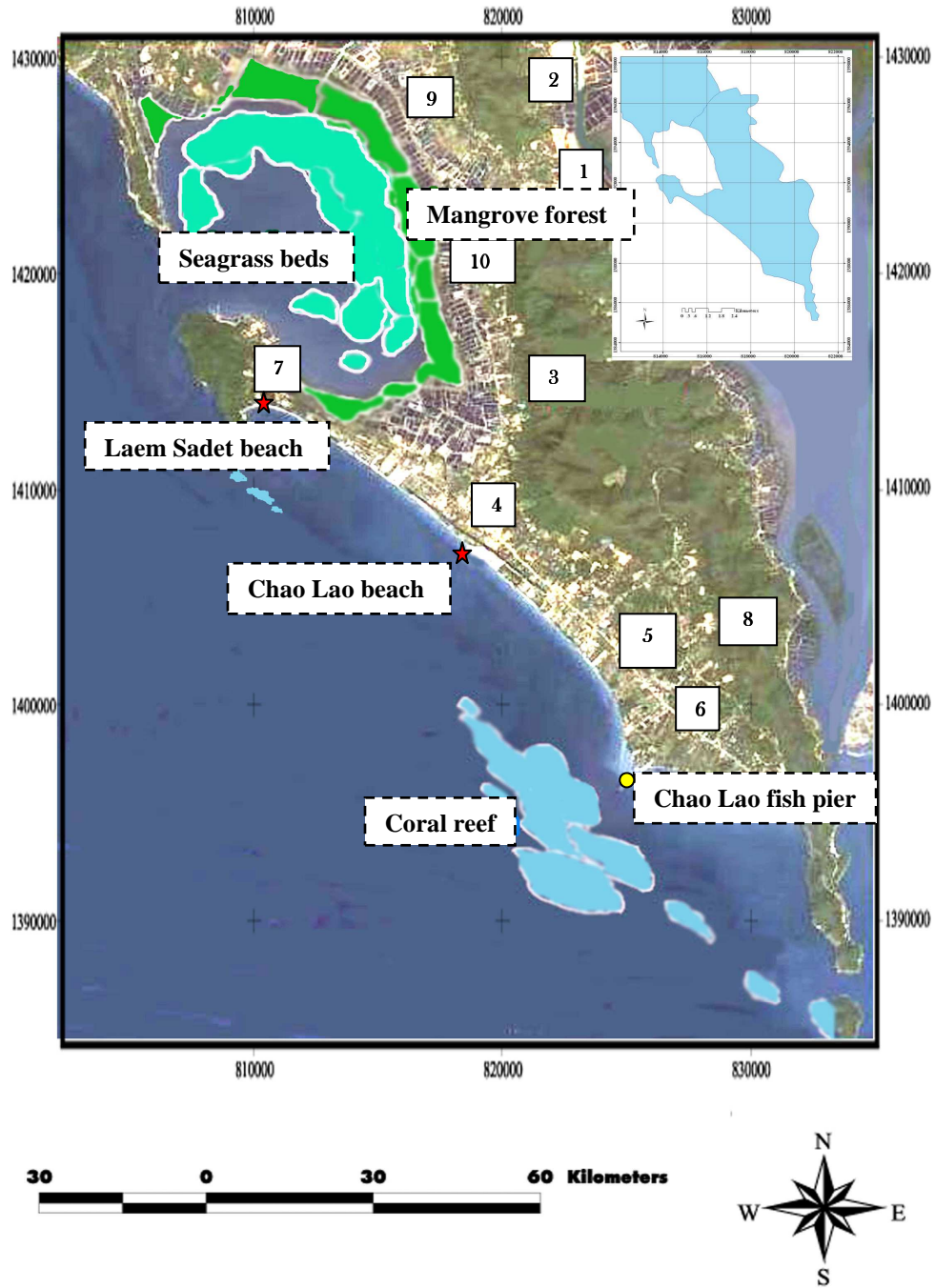
Therefore, the local people used the seagrass area for fishing and the fishing equipment was hook, floating seine, and fishnet.



Figure 4-4 *Enhalus acoroides*



Figure 4-5 *Halodule pinifolia*



When; 1 - Sattaboot	6 - Chao Lao Hua Laem
2 - Norkkhao	7 - Kung Krabaen
3 - Nernpradoo	8 - Amphawa
4 - Moodood	9 - Khlong-Kood
5 - Chao Lao	10 - Khlong-Kood

Figure 4- 6 Mangrove forest, seagrass and coral reef in the study area

4.2.2. Knowledge based of coastal erosion problem (cause of coastal erosion problem at the study area including the previous management)

The report of changed coastal area at the Gulf of Thailand by Sin Sinsakul *et al.* (2002) reported that the Chao Lao beach and Laem Sadet beach was eroded in moderate level (1-5 m./year). The eroded distance of Chao Lao beach was approximately 2 km. and Laem Sadet was about 1 km. so the ratio of coastal erosion was around 2-3 m./year. This erosion naturally happened. As conducted in-depth interview staffs from Marine Department, this research found that the caused coastal erosion was analyzed for finding guideline or solution. To understand marine engineering was importance for instance constructing bank protection of Kung Krabaen Bay Royal Development Study Center, at the present time, did not accorded to the principles due to the fact that the bank protection was low and the waves could battle and cross the bank protection as well as the sand at the back of bank protection was brought back to the sea during monsoon season (figure 4-7 and figure 4-8); besides, Kung Krabaen Bay Royal Development Study Center already repaired.



Figure 4-7 The seawall is damaged



Figure 4-8 The seawall is damaged



Figure 4-9 The seawall has to repair



Figure 4-10 The seawall has to repair

Therefore, the wave characteristic (height, direction, sea area characteristic, tide level and coastal sediment direction including the change of coast from the past until now) should study. The staff of Department of Harbor explained the reason of coastal change from the past until now was the southwest monsoon affected on the areas more than northeast monsoon. The wind direction of Chao Lao beach and Laem Sadet beach always happened that was from the north inclining to the east, southwest and south respectively. The beach drift mostly moved to the northwest direction. The mean higher high water (MHHW) was higher than mean sea level. Besides, to study the geography condition and oceanography condition and to interview the local people about the coastal erosion could summarize that the coastal erosion problem around the south beach of Laem Sadet was from the beach drift in form of cross shore transport and it was not from the beach drift in form of long shore transport due to the fact that the length of coastal erosion was around 5 km. between hard ridge in the north being Laem Sadet and the coral reef around Baan Had Hua Laem that caused the coastal balance characteristic from sediment movement along coastal zone in the areas between hard ridge and coral reef. To consider the height and the wave direction battered the beach, it could be seen that the wave in the deep water moved to the coastal zone while the mean higher high water battered coast, its height would be lower than the wave in the deep water. The storm surge battered the coast which could sweep the sand beach until it became sand dune under the water outside the beach. The survey of the depth of water at the south of Laem Sadet monastery found that sea characteristic was the horizontal width more than other areas. The piling sand gradually was blown into the coast during out of monsoon; the beach was back to

original condition. However, some sediment was blown by the coastal current to other areas so the coastal zone was increasingly eroded every year due to the fact that there was no barrier. The detail of coastal erosion and regeneration area around Chao Lao beach and Laem Sadet beach were demonstrated as figure 4-11.

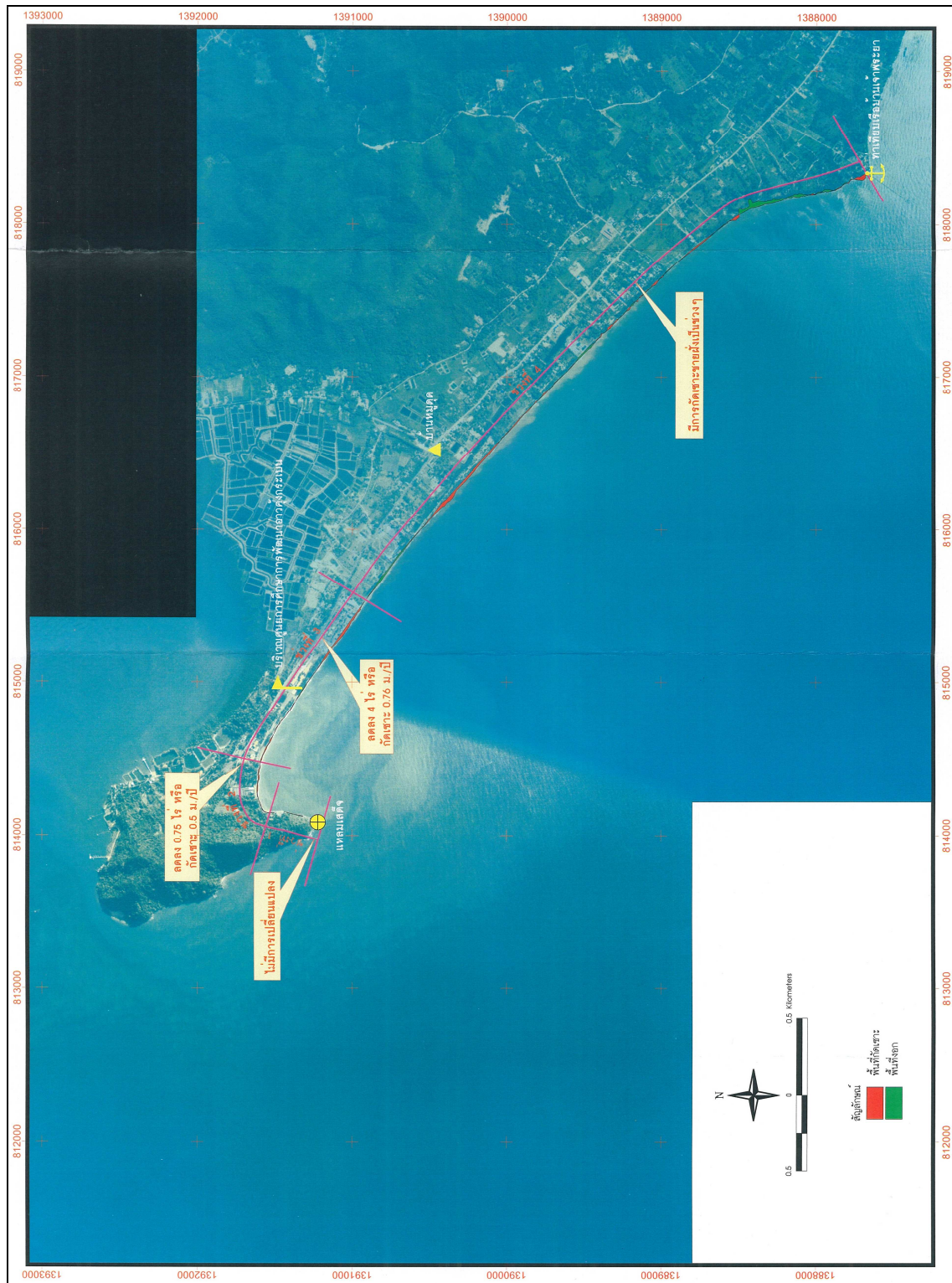


Figure 4-11 Coastal change of Chao Lao and Laem Sadet beaches

Source: Marine Department (2005)

The focus group found that the ratio of coastal erosion in the past corresponded with the report as mentioned above that was the ratio of coastal erosion was in moderate level around 2-3 m./ year but it violently increased at the present time during these 5 years. Mr. Maitree Jongjaijit (the village headman of Chao Lao village) mentioned that this beach was called Hat Sai Kae that the sea water had never sprung up but Hat Sai Kae was, at the present time, disappeared because of flood tide. The local people said that the coconut trees were planted along the beach together with the pine trees were planted around 3 lines but there were no more the pine trees and coconut trees at the present time.

Local people and the entrepreneurs were affected by coastal erosion in many aspects such as land loss for residences and workplaces and loss budget for solving this problem. Nonetheless, the troubleshooting approach in the past and the at the present time was not different by using sandbag, rock wall or construction in various forms as figure 4-12 and figure 4-13.



Figure 4-12 Status for coastal erosion in the present



Figure 4-13 Management for coastal erosion problem by owners of hotel and resort

The answer from in-depth interview and focus group discussion was similar related to the coastal erosion problem at Chao Lao beach and Laem Sadet beach which came from 2 main causes: natural phenomena and human activities; for instance, building fishing pier which had detail as followed:

1. Natural phenomena

1. Influenced wind condition

Chao Lao beach and Laem Sadet were located at open sea which was influenced by the southwest monsoon that often occurred between June and September of every year particularly the wind, during these 4-5 years, extremely increased because of global warming that affected on raising sea levels and the waves increasingly were higher and severer. Furthermore, Thailand was effected by typhoon Linda on 3-4 November 1997 that greatly impacted on Chao Lao beach and Laem Sadet beach especially the wave barrier could not be durable the surge storm

2. The decreased shoal beach

Chao Lao beach and Laem Sadet beach were eroded during the monsoon season. The coast was blown the sediment out to the sea and the piled sediments were brought back to the coast after the monsoon season and left only the sand dune. Although the sand dune at the study areas was decreased so the sand dune was not able to reduce the waves but these waves disappeared at the coast; hence, the coast was severely eroded.

2. Building fish pier

Many people said that the fish pier at Chao Lao beach was one of the causes that changed the current flow direction due to the fact that the sand characteristic obviously changed. Additionally, the sand at the moment was not as white as before (excepting monsoon season) and the sand at the left side of fish pier was shallow which was different from the past (figure 4-14).



Figure 4-14 Characteristic of beach at Chao Lao beach with fish pier

4.2.3 Problem and obstacle of solving coastal erosion

A. Lack of knowledge and understanding of communities and entrepreneurs in terms of coastal erosion management

As from the in-depth interview and focus group discussion, the communities mostly did not have knowledge about the coastal erosion and its causes as well as the solution. The minority, such as the communities' leaders or entrepreneurs who were affected by this problem, acknowledged; thus, un-receiving information from the related organizations led to individual solving coastal erosion problem. Moreover, the structural protection was different form and riskily broke the law for example unintentional building wave protection encroached sea.

In addition, lacking of knowledge and understanding in terms of coastal erosion caused conflict. The local people' opinions did not concern the theories and positive-negative but mainly focused on the structure: the wall could prevent the waves. Hence, the local people just waited for the government but the entrepreneurs considered the scenery: the structure should be harmonious with nature in order to attract tourists, and largely regarded the benefits; for instance, the entrepreneurs had the budget for requesting the Khlong Kood Subdistrict Administrative Organization to design wave protection but if the entrepreneurs did not have enough budget, they would not build wave protection structure; thus, Khlong Kood Subdistrict Administrative Organization disagreed with building wave protection structure.

B. Insufficient practices of government's staffs and local organizations

The government officers' operations in terms of solving coastal erosion was inadequate due to the fact that the staffs from the central organization surveyed and interviewed local people and entrepreneurs' attitudes in order to determine and solve coastal erosion but this operation vanished. As interviewed provincial organization staffs and local organizations related to the constraint of government officer operations, this study found that (1) the budget of coastal erosion management was high but the allocated budget, in fact, was not enough. (2) The number of human resource was not enough for the burden such as public works section, Chanthaburi Provincial Office of Public Works and Town & Country Planning altogether 5 staffs but they were responsible for whole province and Marine office 6 Chanthaburi branch

had 7 staffs that were responsible for 2 provinces: Chanthaburi and Sakaew provinces. (3) The organization which was responsible for solving coastal erosion was not obvious because Department of Marine and Coastal Resources and Marine department was co-responsible for solving coastal erosion and then the Kung Krabaen Bay Royal Development Study Center proposed to be co-responsible of this problem. (4) The organizations separately worked; in other words, they lacked of coordination; in addition, they generally met at the big seminars such as provincial meeting. Therefore, coastal erosion problem of Chanthaburi province unsuccessfully solved.

C. Local people lack of awareness in terms of coastal erosion problem

The majority of local people neglected this problem because they were familiar with surge storm together with the economic crisis. The local people sold their land to the private sectors for building restaurants, hotels and resorts and moved to Mu Kood foothill that was far from the coast around 2 km. Moreover, the coastal erosion gradually severed during these 5 years as a result the local people who were affected concerned about this problem but the rich people in the community still ignored.

D. Lack of strong leadership to push forward the environmental problem

Department of Marine and Coastal Resources, Ministry of Natural Resource and Environment set up the seminar “The study of master planning project about coastal erosion issue and pier planning in order to support eastern seaboard expansion” at KP Grand Hotel, Chanthaburi province. This meeting gathered many organizations and related organizations about coastal erosion of Eastern part in order to find the approaches together with making the appropriated strategies. Moreover, the researcher participated in this seminar and acknowledged the attitudes of staffs from many organizations in Chanthaburi province that faced coastal erosion problem and environmental problems for long time due to lack of leader who concerned of the environmental problem (Interviewed government officer, 2009). There were few local staffs participated in each meeting even their province was the host because the leader did not pay attention to the environmental problem while there were many staffs from nearby provinces with high position participate in the environmental meeting. This

expressed the provincial organization potentiality and Chanthaburi province missed many chance in each meeting for instance the chance of sharing idea, the impact, level of problem intensity in Chanthaburi province and being pilot project of coastal erosion management.

E The interrupted implementation process of government agencies

Ministry of Natural Resources and Environment announced the wave protection structure on 31 August 2009 that there should be the environmental impact assessment before operation and it was valid on 30 December 2009. In the past, there was no environmental impact assessment for any construction but Marine department opposed this declaration because doing environmental impact assessment in Thailand took a long time including the cost was very high which was different from overseas while the coastal erosion problem continually occurred. Marine department, besides, suggested the Office of Natural Resources and Environmental Policy and Planning to make the manual in order to create the standard but it was unsuccessful.

The project operation was considered by national environment board (NBD), the Office of Natural Resources and Environmental Policy and Planning, who was the outsider and did not truly understand. Therefore, Marine department mentioned this operational process may decelerate solving coastal erosion problem in the whole country.

Other problems in the areas

1. Domestic waste problem

The domestic waste problem was the severe problem at Tambon Khlong Kood because this community lacked of landfills due to the fact that Chao Lao beach and Laem Sadet beach was the outstanding tourist places in Chanthaburi province; consequently, there were plenty of tourists that influenced on the garbage volume. Khlong Kood subdistrict administrative organization had to respond for this problem to find landfills even asked for help from district level until provincial level, they could not be helpful. As a result, the local people, at the moment, managed the domestic waste problem by landfill and burning around their houses. Some entrepreneurs expensed a huge of money for hiring people to collect garbage from

both tourist consumption and floating garbage along the river. The garbage problem severely happened in 3 villages: Mu 4 Baan Mu Kood, Mu 5 Baan Chao Lao, Mu 6 Baan Chao Lao Huan Laem and Mu 7 Baan Kung Krabaen which was assisted by Kung Krabaen Bay Royal Development Study Center and the garbage in the rest 6 villages, Mu 1, 2, 3, 8, 9 and 10, was less so the local people could manage their domestic waste. Thus, the domestic waste problem was one of the important reasons that local people and entrepreneurs did not care of coastal erosion problem.

4.2.4 The local participation in coastal erosion management

The government organization was dissemination the wave protection structure project in order to know the local people opinion. The local people and the affected entrepreneurs greatly participated in problem perception, sharing idea and making decision. The study of wave protection structure project was held at Kung Krabaen Bay Royal Development Study Center and the Marine department and consulting firms presented the wave protection that was analyzed into 4 options (Appendix E)

Option 1: Sea wall structure

Option 2: Revetment structure

Option 3: Breakwater structure

Option 4: Beach nourishment structure

There was the recommendation of positive and negative of each option (Appendix E) and the option 2, revetment structure, was an appropriated approach. However, some participants noticed that the option 3 was more interested so they could not conclude because there were few stakeholders participate in this meeting. Thus, the meeting considered that there should be another meeting. After set up the second meeting, there were 22 respondents. Of these 17 people agreed with the option 2 and only 5 people selected option 3. The local people explained that the areas were the conserved areas and tourism areas. The out-shore protection construction or outreach in the sea was not suitable plus with there was the wave protection be built by Kung Krabaen Bay Royal Development Study Center so the construction structure

should be compatible by considering architect, scenery and utilization such as the stairs and trail for dragging boat (figure 4-15 and figure 4-16).



Figure 4-15 Seawall in Laem Sadet beach
Source: Marine Department (2010)



Figure 4-16 Seawall in Laem Sadet beach
Source: Marine Department (2010)

Yet, the in-depth interview of community leaders and local people focus group discussion overall 10 villages at Tambon Khlong Kood found that the local activities, which could prevent coastal erosion, were forest replantation and mangrove forest conservation and Laem Sadet-Chao Lao coral resource conservation project “cleaning beach and under the sea” which had details as following:

Forest replantation and mangrove forest conservation project

This project was continuously operated by Kung Krabaen Bay Royal Development Study Center. The operations were in form of organization excursion and the center was set up the forest replantation activity during the important days such as father’s day and mother’s day. The local people significantly participated because of dissemination as well as they were able to assess by themselves through the pristine of mangrove forest and more income; besides, the local people lived the rear of mangrove forest said that if there was no mangrove forest, the people who lived at the rear of mangrove forest would be impacted by the monsoon. Therefore, the local people highly cherished their local resources.



Figure 4-17 Youth camp for mangrove planting project

Source: Candidate (2010)



Figure 4-18 Youth camp for mangrove planting project

Source: Candidate (2010)

Laem Sadet-Chao Lao Coral Resource Conservation Project “cleaning beach and under the sea”

Laem Sadet-Chao Lao Coral Resource Conservation Project “cleaning beach and under the sea” could lightly prevent the coastal erosion; nevertheless, the local people mentioned the importance of coral reef that if the coral reef was intact coral reef, it could reduce the wave battling seashore; for this reason, the researcher mentioned the local participation in this research.

The local participation in cleaning beach found that they generally corporate whether it was the community leaders, government organizations, local people and nearby people, entrepreneurs and institutes. This activity cultivated the awareness of marine and coastal resource conservation; moreover, the tourists recognized the community potential that was able to attract tourists particularly festivals such as new year festival and Song Krang festival. Additionally, the private entrepreneurs and the entrepreneurs, who did not stay at the area, also participated and realized the importance of this activity. The form of participation mostly was donation; for instance, they provided the shirt for the participants and beverages as a result this activity became annual activity.

The participation in terms of following up these 3 projects: study of wave protection structure project by public hearing, forest replantation and mangrove forest conservation and Laem Sadet – Chao Lao coral resource conservation project found that the majority of local people had never participated the following up assessment

project or assessment project information due to the fact that the operation of wave protection structure project was finished in 2010 and the surveillance assessment of other 2 projects was not obvious and the local people could observe by themselves because they were the direct user.



Figure 4-19 participation in cleaning beach



Figure 4-20 participation in cleaning beach



Figure 4-21 providing to cleaning under the sea

The participation process of these projects was concluded into 7 processes (1) problem of perception (2) sharing opinion (3) planning (4) decision making (5) practices (6) donation and (7) following up. The local participation in these 3 projects was demonstrated as table 4-2

Table 4-2 Local participation in the projects

Projects	problem of perception	sharing opinion	planning	decision making	practices	donation	following up
The study of structure design to protection for coastal erosion project	////	///	-	///	-	-	-
Forest replantation and mangrove forest conservation project	////	/	/	/	////	/	/
Laem Sadet-Chao Lao Coral Resource Conservation Project	////	/	/	/	////	///	/

4.2.5 The aggregation in coastal erosion management

There was no the coastal erosion management group at Chao Lao beach and Laem Sadet beach but there was only Chao Lao Conservation Association that would indirectly reduce coastal erosion. The aggregation of local people totally 70 people, who took part in local guide trainee, at Rambhai Barni Rajabhat University on 24 April 1994, set up local assembly in the name of “Chao Lao Conservation Group” then changed to “Chao Lao Conservation Association” on 19 February 1998 and it was approved by Department of Environmental Quality Promotion (DEQP), Ministry of Science, Technology and Environment to be “Non Government Organization of

Environmental Protection and Natural Resource Conservation No. 94” on 17 July 1998 which had the objectives as followed:

1. To support and promote local people, teenagers and people at Chao Lao beach recognized the value, maintain and coral reef conservation together with marine resources
2. To be the organization taking care of coral reef plus with marine resources and inform the people who were responsible for
3. To train, promote local wisdom in terms of local resource utilization as well as encourage local people to work together, to have responsibility and to be harmony
4. To exchange, research, publicize knowledge and idea about coral reef and marine environment together with cooperation with government organization, state enterprise, entrepreneurs and other associations in terms of marine conservation association related to the objectives

Chao Lao Conservation Association, at the moment, did not have the office because of several factors: age of leader, lack of budget which was only from environmental fund. Moreover, the budget mostly was from village fund and the budget almost 80% was for raising awareness related to marine and coastal resources and the remaining was for establishing local museum.

4.2.6 Receiving coastal erosion information

Information channel

This study found that the majority of local people received the coastal erosion information through directly facing this problem and watching television rather than the staffs providing information.

The related organization occasionally informed information for instance the wave protection structure. The organization conducted public hearing from local people, entrepreneurs and stakeholders in order to develop the construction to match needs, accuracy and according areas.

Additional knowledge and information needed

As from focus group discussion and in-depth interview, the researcher classified the receiver into 2 groups: local people group and government staffs which summarized the important points as following:

1. The information that local people wanted to know
 - Academic information related to cause of coastal erosion in general and linked to their coastal erosion problem
 - The general guideline and basic solutions including prevention approaches
 - Law information
2. The information that government officers wanted to know
 - The basic resource information of Chanthaburi province should be complete and up-to-date especially marine and coastal resources of Chanthaburi province
 - Technical engineering information was in line with the areas

The best way of receiving news of local people was the related organizations informed or publicized by appointing the local people or training the communities' leaders after that the leaders transferred this knowledge to their local people. The central government organizations critically provided the information to the provincial organizations that emphasized on workshop (Interviewed, 2009).

4.2.7 Solution plan of related local organizations in terms of coastal erosion problem

The researcher studied the agency planning that was responsible for coastal erosion management by both interview and review secondary data found that the central and local organizations undertook as following:

Central organization

1. Marine department

The Marine department had the coastal erosion plan as a dam, which was designed by Southeast Asia Technology (SEATEC) and Noi Chareun Construction Limited. was contractor, in order to prevent coastal erosion at Kung Krabaen Bay

Chanthaburi province (located at Laem Sadet beach). The total budget was 29,582,000 Baht and this project was completed on 23 March 2010 (figure 4-22 and figure 4-23). The total length was 304.45 m. In addition, the Chao Lao beach did not have any plan because of limited budget.



Figure 4-22 seawall of the building finished



Figure 4-23 seawall of the building finished

2. Department of Marine and Coastal Resources

The study of master plan of coastal erosion solution and pier planning in order to support the eastern seaboard expansion had the objectives as followed:

- To make the integrated planning with the current projects in order to support pier expansion in the eastern part considered the impact of coastal erosion, priority ranking analysis, selecting critical areas, determining appropriated solution which covered the participation of related organizations and local people including socio-economic assessment.
- To set up the appropriated operation in order to prevent and solve the critical coastal erosion areas through specific the undertakers and stakeholders for calculating economic value and budget plan.
- To set up the pattern requirements for the pilot project in 2 areas
- To prepare the local people readiness by providing the coastal erosion knowledge and the participation process in order to reduce conflict.

This project collected data, problems, cause and coastal erosion solution to make the master plan of Eastern coastal erosion solution at the Gulf of Thailand by suitability analysis and the protection and critical coastal erosion resolution plan including providing knowledge and local participation that covered Chonburi, Rayong, Chanthaburi and Trat provinces altogether 19 districts including Tha Mai district where was the study area of this research. For this reason, the government knew the problems and the impacts plus with creating the chance to Chao Lao beach and Laem Sadet to be the pilot project. This project was operated by SDCON Cooperation Ltd. The study duration totally was 450 days since the contact was signed on 11 July 2008 and the contact was completed on 3 October 2009.

Local organizations

1. Marine Office 6 Chanthaburi province

The responsibility of Marine Office 6 mainly was the dredging permission, the river encroachment permission, checking the water transportation security, Boat License Issuance, boat license renewal, ship item change application, seaman book, the boundary point, and issuing mechanic certificate and marine certificate. Furthermore, Somchai Eartrakul, Head of Marine Office 6 Chanthaburi branch, mentioned that the main work at Chao Lao beach and Laem Sadet beach emphasized on the navigation during the important festivals namely new year festival and Songkrang festival.

2. Office of Public Works and Town and Country Planning Chanthaburi province

Office of Public Works and Town and Country Planning Chanthaburi province considered as administration which had authority as followed:

- Operation, supporting, consulting and academic service in terms of country planning and public works under the department authority to the related organizations and local administrative organization.
- Co-operation or supporting the related organization practices and local administration organization

As from interviewed the staff, special expert planning analyst, found that there were 3 districts conducting city planning at Chanthaburi province: Ruam Mueang Kood city plan, Ruam Mueang Tha Mai city plan and Mueang Chanthaburi city plan. Making city plan was able to control the construction and regularity; on the other hand, Ruam Mueang Tha Mai city plan was expired since October 2008 so if the construction was not controlled, it would impact on Chao Lao beach and Laem Sadet beach that hotels, resorts and beach rapidly grew which risked on coastal erosion. Therefore, Office of Public Works and Town and Country Planning Chanthaburi province solved this problem by Mueang Tha Mai municipality should order the ordinance and the council promulgated the government gazette and the city plan specifying at the coast of Chanthaburi province had never conducted before but the city plan project was progressing in 2011.

Mr. Trairat Phoonsawat, senior civil engineer, additionally said that the strategy of Office of Public Works and Town and Country Planning was bank protection structure which specified at the coastal border and main rivers. At the moment, the dam was built for preventing Chanthaburi River bank but Chao Lao beach did not have any city plan project because of high cost and increasing study of general information. Whereas, Laem Sadet beach, was situated at the back of Kung Krabaen Bay Royal Development Study Center, asked for help from the Office of Public Works and Town and Country Planning to improve the bank protection structure because the based bank was eroded by the waves that changed the beach characteristic.

3. Office of Natural Resource and Environment Chanthaburi province

As from interviewed the staff of environmental section, this research found that the Office of Natural Resource and Environment Chanthaburi province just separated from forest office so their work related to collecting provincial resource information was less particularly marine and coastal resource information as well as the coastal erosion plan at the moment did not have.

However, Office of Natural Resource and Environment Chanthaburi province coordinated other organizations in Chanthaburi province to set up the workshop 3 times that executive brainstorming, staffs in provincial, district and local

level, private sectors and local people who involved in natural resources and environment at Chanthaburi province for collecting provincial database resources to make the environmental situation and development plan of Chanthaburi province report. This workshop emphasized on the urgent problems that were concluded into 5 problems: domestic waste problem, decreasing mangrove forest area problem, forest degradation problem and water pollution problem respectively corresponding with the natural resources and environment plan of Chanthaburi province in 2009 which indicated garbage problem as a first priority and paid attention to solve community problem; thus, the coastal erosion problem lately solved.

The researcher reviewed the information from provincial development plan in 2010-2013 in terms of natural resources and environment development found that this development plan paid attention to make the natural resource database and city plan, providing knowledge, raising awareness and every sector participation in conserving and restoring natural resources as well as the coastal erosion gradually became severe problem which needed technical knowledge base and high budget; hence, the central organization urgently solved by integration central organizations namely department of marine and coastal resources and marine department.

4. Khlong Kood Subdistrict Administrative Organization

The researcher interviewed the director of Khlong Kood Subdistrict Administrative Organization about coastal erosion plan during 2006-2009 found that there was no plan related to the coastal resource management but the 3th development plan (2009-2011) determined the infrastructure development strategy as following

- Bank protection construction project at Moo 8 had the objectives as preventing topsoil erosion. The construction objective was the height of wave barrier was 1 m. and its length was 500 m. and the public work of Khlong Kood Subdistrict Administrative Organization was responsible for the budget 500,000 Baht. The expected outcome of this project was the local people were secured from soil erosion and the other plans were concrete road construction, drain and bridge.

5. Kung Krabaen Bay Royal Development Study Center

The responsibility of Kung Krabaen Bay Royal Development Study Center mainly impressed on the experiment and research development in terms of agriculture and aquaculture. The institute administration system was limited due to respond the organization policy; thus, the plan or coastal erosion protection project could not fully perform excepting troubleshooting center problem. There were some operations that the center could do such as consultation with communities and sharing ideas, less impact on the local communities and resources, with the government organization that was responsible for coastal erosion management.

6. Kung Krabaen non-hunting area

Kung Krabaen non-hunting area was established, due to the fact that Tambon Khlong Kood was invaded for 30 years ago. The main purpose of Kung Krabaen non-hunting area was to protect, maintain or reserve, and conserve forest resources and wildlife. This area, at the present time, was abundant forest resources due to 4 main reasons: (1) the organization strictly followed the law enforcement together with the practices of staffs were appropriated and respectable; therefore, the local people cooperated in taking care of forest resources (2) this areas were located at the royal development project so the local people were afraid (3) setting youth camp was for the primary school around 11 schools and secondary school altogether 2 schools and (4) the public relation. Sombat Thamachod, head of Kung Krabaen non-hunting area, mentioned that the role of organization was able to reduce coastal erosion; for instance, the dissemination about not allowing the entrepreneurs excavated sand from the sea into their areas in order to maintain topsoil and be beautiful, not destroy mangrove forest, and participation in meeting with other organizations for bank protection structure project at Chao Lao beach and Laem Sadet beach. The subdistrict administrative organization, Marine Office 6, Chanthaburi province and Marine Department were responsible for law issues.

The head of Kung Krabaen non-hunting area, moreover, said that the coastal erosion problem could not directly solve due to high cost; therefore, the possible method was the public relation, good city plan and organizations that directly examined.

As the studied of plan, responsibility of local organizations and central organizations in relation to coastal erosion management, the researcher summarized the plan which included the existing plan and additional plan as followed:

Table 4-3 Summarized plan of related organization in terms of coastal erosion management at the study areas

Organizations	Coastal erosion management plan	Additional plan
<p><u>Local organization</u></p> <p>1. Marine Office 6, Chanthaburi province</p> <p>2. Office of Public Works and Town and Country Planning, Chanthaburi province</p> <p>3. Office of Natural Resources and Environment, Chanthaburi province</p> <p>4. Khlong Kood Subdistrict Administrative Organization</p>	<ul style="list-style-type: none"> - Building dam project to prevent coastal erosion at Kung Krabaen Bay - Preventing sea encroachment - Operation, support and academic service in terms of city plan and public works - Mainly work in the city - Bank protection structure project at Moo. 8 	<ul style="list-style-type: none"> - Enhance the related organizations collaboration with other organizations - Continuing current operation - Making resource database especially marine and coastal resource database - Focus on work and equally solve the problems in every areas - Public hearing to make truly local participation - Should set up the activity related to provide knowledge about coastal erosion to the local people and tourists in order to recognize the importance of problems

Table 4-3 (Cont)

Organizations	Coastal erosion management plan	Additional plan
5. Kung Krabaen Bay Royal Development Study Center	<ul style="list-style-type: none"> - Mangrove replantation - Coral resource conservation at Laem Sadet-Chao Lao Beach project “Cleaning beach and under the sea” - Participate in sharing idea including consultation with communities 	<ul style="list-style-type: none"> - Continuing current operation
6. Kung Krabaen non-hunting area	<ul style="list-style-type: none"> - Dissemination not to excavated sand 	<ul style="list-style-type: none"> - Continuing current operation

Table 4-3 (Cont)

Organizations	Coastal erosion management plan	Additional plan
<p><u>Central organizations</u></p> <p>1. Marine Department</p> <p>2. Department of Marine and Coastal Resources</p>		<ul style="list-style-type: none"> - Provide knowledge and understanding about coastal technical engineering to provincial organization - Increase the channel of public relation about coastal erosion problem and raise the local people and tourists' awareness - Support scholarship in order to promote doing research about coastal erosion at the study area

Moreover, the researcher reviewed the documents, reports related to plan or the operations of the organizations that were responsible for the coastal erosion management from the past until now including the future plan which had details as table 4-4

Table 4-4 The plans of organizations related to coastal erosion problem (Nawarat, 2010)

Year	Operations	Responsible organizations
<p><u>Policy and planning</u> December 2003</p>	<p>Set up the master plan for solving coastal erosion at Petchaburi estuary, Petchaburi province until Pranburi estuary, Prachuap Khiri Khan province (upper part of Gulf of Thailand) and coordinate with Marine department in order to raise budget. There were 2 areas already complete namely Maruekhathayawan palaces (in 2007) and Chao Samran beach (2008)</p>	<p>Office of Natural Resources and Environmental Policy and Planning</p>
<p><u>Policy and planning</u> October 2007</p>	<p>Setting up the protection and coastal erosion solution strategy presented to environmental committee for considering on 24 October 2007 which had to conduct with in 20 years. The operation processes consisted of 5 ways (13 criteria): (1) development and improvement coastal resource database system (2) the participation in prevent and solve the problem (3) setting up the master plan and integrated problem management at area level (4) protection and rehabilitation the coastal zone and (5) system development, investigation and</p>	<p>Department of Marine and Coastal Resources</p>

Year	Operations	Responsible organizations
<p>January 2008</p> <p>August 2008</p>	<p>controlling operation together with following up</p> <p>Setting up national strategy in terms of climate change management in 2008-2012 presented to the national climate change policy committees to approve and presented to cabinet on 22 January 2008</p> <p>Bank protection structure project through the local participation was summated to the cabinet by Department of Marine and Coastal Resources on 26 August 2008. Ministry of Natural Resources and Environment was the main organization in co-operation with the related organizations about protecting and solving coastal erosion in form of coastal erosion management strategy</p>	<p>Office of Natural Resources and Environmental Policy and Planning</p> <p>Department of Marine and Coastal Resources</p>
<p><u>Policy and planning</u></p> <p>September 2008</p>	<p>Setting up major plan and solution plan for coastal erosion at the upper part of the Gulf of Thailand following the environmental committees resolution on 24 October 2007</p>	<p>Department of Marine and Coastal Resources</p>

Year	Operations	Responsible organizations
June 2009	Setting up the major plan and solution plan for coastal erosion at the eastern coastal zone following the environmental committees resolution on 24 October 2007	Department of Marine and Coastal Resources
June 2009	Setting up the land use solution and coastal activities guideline presented to environmental committees on 9 June 2009 for the coastal provinces controlling and monitoring every type of coastal activities which impacted on environment according to the rules and restrictions	Office of Natural Resources and Environmental Policy and Planning
July 2009	Setting up the major plan and the coastal erosion at the lower part of the Gulf of Thailand solution following the environmental committees resolution on 24 October 2007	Department of Marine and Coastal Resources
September 2009	The integrated national coastal erosion protection and solution summated to the cabinet on 22 September 2009 in order to create the integrated protection and solution among the academic organizations, authorized agency of regulatory and coastal utilization including related organizations in relation to budget	Office of Natural Resources and Environmental Policy and Planning

Year	Operations	Responsible organizations
January 2010	<p>protection and prevention measure as well as decreasing coastal impact caused from oceanography change and climate change plus with environmental factor</p> <p>Department of Marine and Coastal Resources requested the fund for the office of coastal erosion protection and coastal areas as well as oceanography research that supported by Office of the Civil Service Commission (OCSC) and Ministry of Science and Technology providing Bachelor, Master and PhD scholarship altogether 8 fields: (1) Coastal engineering (2) Oceanography (3) Marine Meteorology (4) Marine science (5) Marine Biotechnology (6) coastal ecology (7) coastal management and (8) Economic resources/environmental economic/ Natural Resource and Environmental Economic</p>	Department of Marine and Coastal Resources

Table 4-5 The future operation plan of organizations

Organizations	Plan
<p><u>Policy and plan</u></p> <p>Department of Marine and Coastal Resources</p>	<p>1) Preparing the major plan and operation plan in terms of coastal erosion at Andaman sea cooperated with Marine department, Office of Public Works and Planning, provincial and local administrative to approve before sumitting the committees to precede the activities and the protected coastal erosion plan that were approved by National Environmental Commission and the cabinet</p> <p>2) Precipitate protection plan and integrated coastal erosion solution during 5 years according to the coastal erosion protection and management strategy which was approved by the environmental committees on 24 October 2007</p>
<p>Office of Natural Resources and Environmental Policy and Planning</p>	<p>1) Office of Natural Resources and Environmental Policy and Planning cooperation with coastal provinces studied environmental protection measure in order to announce environmental reserved areas and coastal ecosystem protection and to sustain and benefit to the coastal communities and national economic</p>

Organizations	Plan
<p><u>Academic section</u></p> <p>Department of Marine and Coastal Resources</p>	<p>1) Reviewing researches to know the form and protection method and mangrove forest and beach forest restoration were supported by academic for each coastal and wetlands characteristic; thus, local people, local communities and coastal provinces had the guidelines in terms of protection and effective coastal rehabilitation; then, the study submitted to the marine and coastal resources committees under the national environmental commission for operating the activities and the protected plan and coastal erosion solution</p> <p>2) Setting up the scenarios about the raising sea level impact which was increased by global warming at upper part of the Gulf of Thailand (Picture A) to recommendation, approaches, and measure adaptation and dealing with the impact for mitigating property damage and natural resources and environment</p> <p>3) Setting up the national, regional and international seminar in terms of coastal erosion and the change of sea level, both in national and regional level, for brainstorming and suggestion academic information for both national and</p>

Organizations	Plan
	international every year for purpose of technology development, measure, and appropriated methods in prevention and solving coastal erosion including national staff development regarding oceanography and marine ecology

4.2.8 Suggestion and recommendation of participated tourists in coastal erosion management

The researcher employed open-ended questionnaire to survey the opinion and recommendation of tourists who participated in coastal erosion management at Chao Lao and Laem Sadet beach altogether 400 people (Table 4-6).

Table 4-6 The participated tourists' opinion and recommendation towards coastal erosion management

Issues	Opinion and recommendation
The recommendation to local people regarding coastal erosion management	<ul style="list-style-type: none"> - Replantation and conserving trees along coastal zone in order to prevent soil erosion (94.5%) - Local people should be trained and participated in coastal erosion problem issues that operated by government organizations or other related organizations (90/0%) - Building rock barrier or bank protection (72%) - The local people should participated in sharing idea in case of hotel and resort expansion (67.5%)
The recommendation to local administrative	<ul style="list-style-type: none"> - Should have the activities that provided coastal erosion problem knowledge to tourists such as billboard or establishing knowledge center (90.0%) - Setting up the specific group to solve the coastal erosion problem and the local administrative should seriously prepare the policy or project that clearly determined the strategy and the most importance continually allocated budget (85.5%) - Local people brainstormed in order to create local participation (36.0%) - Should not promote groundwater usage because it caused land subsidence; additionally, this area was sand areas

Issues	Opinion and recommendation
	(4.5%)
The recommendation to government agencies	<ul style="list-style-type: none"> - The transparency submitting budget for constructing bank protection structure (being harmonious with the scenery) through asking for the local people' attitude and considering the positive and negative including continuous assessment (99.0%) - Dissemination about raising awareness and the protection (90.0%) - The government agencies should support, stimulate and aid including cooperate the systematic coastal erosion management (85.5%) - Strict law enforcement in order to prevent sea encroachment (54.0%)
The recommendation to tourists	<ul style="list-style-type: none"> - The tourists had fewer roles but should know rules, regulation, and tourism practices (81.0%) - Recognizing the importance of coastal erosion problem and pushing it as a national agenda (72.0%) - Donating tree and participating in forest replantation (67.5%)
The individual participation	<ul style="list-style-type: none"> - All sectors cooperated in solving the problem (94.5%)

Issues	Opinion and recommendation
<p>Other recommendation in the area that should improve</p>	<ul style="list-style-type: none"> - The garbage along the coastal zone (94.5%) - Inadequate toilet (63.0%) - The order stores at the coastal zones greatly encroached sea so the areas were decreased. There should prepare store zone (63.0%) - Inadequate car park (58.5%) - Hotel and resort expansion (49.5%) - Convenient transportation (18.0%) - Setting up tourist activities to promote ecotourism such as coral replantation, forest replantation and collecting garbage (13.5%) - Security both life and asset of tourists (9.0%)

The tourists’ recommendations could summarize the coastal erosion management guidelines as 1) the tourists, local communities and entrepreneurs should be trained in order to enhance their understanding and awareness that proceeded by the related organizations 2) setting up the specific group 3) law enforcement 4) budget allocation and 5) co-corporation with other organizations.

4.3 The guideline of coastal erosion management

The study of coastal erosion at Chao Lao beach and Laem Sadet beach at Chanthaburi province acquired the problems, constraint, attitudes and recommendations which was concluded into 2 parts: the in-depth interview management guideline and focus group discussion management guideline that had details as following

4.3.1 The coastal erosion management guideline from in-depth interview

The in-depth interview about coastal erosion problem altogether 25 people summarized into 4 approaches:

1. Coastal and marine recourses database system management of Chanthaburi province
2. Impelling law
3. Supporting budget
4. Local people participation

4.3.2 The coastal erosion management guideline from focus group discussion

The focus group discussion about coastal erosion problem altogether 95 people summarized into 3 approaches:

1. Creating knowledge related to coastal erosion problem including roles of related organizations
2. Aggregation for finding the coastal erosion management
3. Raising local people' awareness

4.4 SWOT Analysis

As mentioned 5 approaches above which were similar with in-depth interview and focus group discussion, the researcher analyzed this finding by SWOT analysis and the results of SWOT analysis conducted management approaches in order to find the possible operation and each guideline had any problems and constraint as **table 4-7**

External factor

Opportunity

- The people who were impact by the coastal erosion awaked to solve this problem including entrepreneurs especially the private sectors adverted and were ready to cooperate in solving coastal erosion problem.

- Lack of general information of natural resources and environment aided the meeting and coordination among agencies to collect the information, help each other and share idea.

- The local people helped, consulted and exchanged their idea when the problem occurred so it empowered the communities.

Threat

- The policy focused on the tourism at Chao Lao beach and Laem Sadet beach without concerning the carrying capacity of the areas so the natural resources and environment were destroyed together with the environmental problem particularly garbage problem

- Their responsibility was unclear because of lack of cooperation between each organization

- The communities and the local administrative still lacked of readiness in various aspects and of understanding and knowledge in coastal erosion problem

- The law enforcement was not effective and the entrepreneurs and local administrative mostly lacked of knowledge in terms of law and infraction as well as seeking benefits from the gap of the law

Internal factor

Strength

- The local people were ready to collaborate in solving coastal erosion problem
- There was the organization at the study area that was responsible for coastal erosion management by having many projects

Weakness

- Lack of database system for solving natural resources and environmental problem
- Lack of corporation among organizations in terms of coastal erosion management
- Lack of human resource that had no specific knowledge and the staffs of local organization and government agencies were not enough for the burden and their work did not match with their knowledge so they could not show their potentiality
- Communities and entrepreneurs lacked of knowledge, understanding and awareness of coastal erosion problem
- The support from government and private sectors were not obvious
- The organizations did not seriously work and continually followed up

Table 4-7 The possible management guideline analysis

Management approaches	Analysis
1. Database of marine and coastal resource should be completed and up-to-date	
<u>Measure 1</u> The impact areas were continually surveyed	1. The affected areas were occasionally surveyed and had no operations. If the Department of Marine and Coastal Resources continuously worked and gave the priority at the critical areas; thus, the information was always up-to-date
<u>Measure 2</u> Collecting marine and coastal resource information	2. Office of Natural Resources and Environment, Chanthaburi province was collecting provincial resources and environment but there were the constraints that was the update and accurate information for instance (1) mangrove forest resource, coral reef and seagrass information (2) the utilization at coastal zone information (3) coastal engineering information; thus, the operations was in a good direction. Office of Natural Resources and Environment, Chanthaburi province should collaborate with the central organizations such as environmental office region 13 department of marine and coastal resources in order to request the information and make the database system; besides, the information was collected by Marine office 6,

Management approaches	Analysis
	<p>Chanthaburi province should be completed including office of public works and city planning, Chanthaburi province faced the problem in terms of lacking of marine and coastal engineering information that the central organization needed to help.</p> <p>This information would be effective if the organizations had the systematic surveillance, good database system and optimization utilization</p>
<p>2. Creating knowledge, understanding, and awareness including cultivating the coastal erosion management consciousness</p>	<p>1. The dissemination and public relation would be the easiest way and fastest way to access. However, the study area lacked of this operation plan so Khlong Kood subdistrict administrative organization should cooperated with Marine department and Department of Mineral Resources making the dissemination plan to local people together with tourists in order to know the problems and recognize the importance of coastal erosion problem, both in present time and in future. The public relations should emphasize on announcement, flap,</p>
<p><u>Measure 1</u> Producing publicity and announcement</p>	

Management approaches	Analysis
<p><u>Measure 2</u> Setting activities or training</p>	<p>and video along the tourism places and other organizations aided such as Kung Krabaen Bay Royal Development Study Center and local club.</p> <p>Generally, each agency provided the information to the lower level but the information was least provided at the study area. If the central organization distributed information to provincial organizations and provincial organizations disseminated information to the local organizations so it could know the overall problem in their areas whereas the local organizations should collect data as well due to the fact that the local organizations were easiest to know the local people problems and the environmental change</p> <p>2. Most of activities at the study area were forest replantation and youth activities that happened every year but the coral reef conservation activity disappeared because of lacking of leadership and budget including the support from organizations. This activity was one of the activities that tourists paid attention and should be held for the tourists such as making artificial reef and artificial reef replantation project. Therefore, Khlong Kood subdistrict administrative</p>

Management approaches	Analysis
	<p>organization should be the main organization collaboration with the local people including the external support such as environmental fund and NGOs brought back this activity.</p> <p>Moreover, only department of marine and coastal resource trained the understanding of coastal erosion problem at the study area and the participants mostly were staffs from government agencies and community leader so department of marine and coastal resources, marine department and department mineral resources should be the main organizations to set up the training which cooperated with the local organizations that provided the experts to educate the local people</p> <p>(the training problem was the local people did not pay attention to this problem since they disappointed the work of government; thus, the training should present the potentiality in terms of solving the problem with the local people; consequently, the local people were enthusiastic and the operation plan would be effective)</p>

Management approaches	Analysis
<p><u>Measure 3</u> Study tour</p>	<p>3. The study tour normally was operated but only the community's representative and provincial organization were participated. If the study tour was worth and effective, the affected community, local people and local organizations should visit in order to see the macro picture and have the new ideas for solving the coastal erosion problem and it truly was knowledge transferring (the operation constraint mostly was the budget limitation)</p>
<p>3. Promoting aggregation and the participation in coastal erosion management</p>	<p>1.Established specialized center was advantage for the areas because this areas had no any specialized center so the local agencies should ask for assisting; for instance, the environmental fund acted as middle man to corporate with other organizations for making an appropriated coastal erosion plan together with establishing the small center in form of coastal conservation office, which was responsible for taking care of beach and giving advice. <u>However, the operations sometimes faced the limited budget</u></p>
<p><u>Measure 1</u> Established specialized center</p>	

Management approaches	Analysis
<p data-bbox="284 1099 783 1133"><u>Measure 2</u> Natural resource inspection</p> <p data-bbox="284 1653 831 1738"><u>Measure 3</u> The driving force from various agencies</p>	<p data-bbox="858 331 1406 1021"><u>problem, the location and period of approval</u> and there should be the operation follow up in order to know the defect for improving such as department of lands, marine department, department of fisheries and department of marine and coastal resources. The scope should be determined by local people and stakeholders such as fishery area, coral reef conservation area including the procedures that local people and entrepreneurs should follow</p> <p data-bbox="858 1099 1406 1574">2. Khlong Kood subdistrict administrative organization should collaborate with Kung Krabaen Bay Royal Development Study Center in order to promote the local people cherish and protect their marine and coastal resources plus with setting up the activities that motivated local people to participate in examined resource.</p> <p data-bbox="858 1653 1406 2018">3. The study area, at the present time, lacked of the support from many organizations. However, the collaboration of each sector was not complicated and difficult through the related government agencies provided academic knowledge and the private sectors supported budget</p>

Management approaches	Analysis
<p><u>Measure 4</u> Creating strong leadership</p>	<p>and improved morale. This could stimulate the aggregation and corporation in terms of effective coastal erosion management.</p> <p>4. Lacing of strong leadership was the problem of Chantaburi province. If there were the activities or the methods to create the strong leadership, the collaboration among government organizations or other sectors would increase, including protecting local people’s benefits; therefore, the work within Chantaburi province would be effective and successful.</p>
<p>4. Law enforcement</p> <p><u>Measure 1</u> Determine the activities scope at the coastal zone</p>	<p>1. There was the conflict among entrepreneurs and government agencies at the moment. Hence, the related organizations should understand the local people in relation to determine coastal zone such as Department of Lands, Marine Department, Department of Fisheries and Department of Marine and Coastal Resources. The stakeholders should participate in determining scope; for instance, fishing area, and coral reef conservation area together with</p>

Management approaches	Analysis
<p data-bbox="280 1048 831 1133"><u>Measure 2</u> The understanding of law enforcement</p> <p data-bbox="280 1597 783 1630"><u>Measure 3</u> Natural resource inspection</p>	<p data-bbox="853 331 1410 913">community procedure that the entrepreneurs preceded within procedure at their establishments. In general, the law at the study areas was strictly enforced both department of forestry and marine office 6 Chanthaburi province should make the local people understand their responsibilities as well as the central organizations and local organizations should understand the law in the same direction.</p> <p data-bbox="853 992 1410 1462">2. In general, the law at the study areas was strictly enforced both department of forestry and marine office 6 Chantaburi province should make the local people understand their responsibilities as well as the central organizations and local organizations should understand the law in the same direction.</p> <p data-bbox="853 1541 1410 2018">3. Khlong Kood subdistrict administrative organization should collaborate with Kung Krabaen Bay Royal Development Study Center in order to promote the local people cherish and protect their marine and coastal resources plus with setting up the activities that motivated local people to participate in examined resource.</p>

Management approaches	Analysis
<p><u>Measure 4</u> The appropriated city planning</p>	<p>4. The city planning at Chao Lao and Laem Sadet coast had never have the city plan but it had only city view at Ruam Mueang Tha Mai which already expired so there was the ordinance declaration but this announcement was neglected from the local government Tha Mai; as a result, the private sectors purchased the lands for constructing restaurants, hotels and resorts that conflicted with the local people who wanted to maintain their resources. For this reason, office of public works and city plan, Chanthaburi province cooperated with the director of subdistrict administrative organization draft the ordinance in order to control both beaches as well as collaboration with other organizations that was responsible to strictly use the law.</p>
<p>5. Budget allocation <u>Measure 1</u> Supporting budget for environment and natural resources issues</p>	<p>1. This operation depended on the authority responsible recognizing the importance of coastal erosion problem for allocating additional budget or setting up activity for tourists' donation.</p>

As analyzed management approaches total 5 approaches 14 measures, there were 2 approaches: creating knowledge, understanding and raising awareness as well as cultivating awareness related to coastal erosion easily operated by the communities and local organizations through learning, understanding and collaboration without asking help from other organizations while other approaches was the long term operations involving facing problem, obstacle and many influences that needed government agencies or other organizations aid. Therefore, the researcher noticed that the coastal erosion management operation at Chao Lao and Laem Sadet beaches, Chanthaburi province should start from creating knowledge, understand and raising awareness as well as cultivating awareness in relation to coastal erosion problem (Approach 2) that prior was the local participation then finding the method leading to other approaches.

CHAPTER V

DISCUSSION AND CONCLUSION

5.1 The abundance of Chao Lao and Laem Sadet beaches

The study of abundance of Chao Lao and Laem Sadet beaches found that Mangrove forests, Khlong-kood had good conditions and very fertile due to local people have good cooperation in conservation activities. Moreover, it was concerned by outsiders to conduct the activities of Youth Camp or Mangrove reforestation. As a result, the area has currently full of green and only few spaces for reforestation. The strict enforcement of the law was also the result of the abundance of Chao Lao and Laem Sadet beaches. For example, there were many aquatic animals that many people could bring home to cook or sell as their simple lifestyles. The forests along the coast also protect the waves in monsoon season as well. Currently, the villagers in the area feel affection for their own resources more than the previous. The plenty of corals, the information of the Department of Marine and Coastal Resources found that the abundance of corals near Chao Lao and Laem Sadet beaches has shown the medium rate in 2007. Nevertheless, in the past they were very plentiful. If there is agency approaches to provide knowledge and guidance for the conservation of coral resources to the villagers or visitors properly to make them more understand and concern of its significance, or all parties work together in good manner, the coral reefs along the shore will be refurbished and get better even if it will take a long time in recuperation.

5.2 Knowledge on coastal erosion

The problem of coastal erosion was an important issue occurring in all provinces along the shore. The problems and causes were different depend on the regions. Coastal erosion on Chao Lao and Laem Sadet beaches have been occurred from natural phenomena which caused by 3 main reasons: 1) the wave in the monsoon in the last 4-5 years, it was more severed and affected to the rising of sea level; 2) the

cause of the tropical cyclone; and 3) the lower sandbar made the ability in wave protection decreased. Noppol (2008), illustrated that the factors in water - meteorology are getting severe every year with the major cause of the coastal erosion influenced from the northeast monsoon.

In addition, unpredictable of the tidal change direction caused by the construction of the jetty whether one of the cause of problems that occurred from human beings or not. However, understanding in the process of problem management was the key to resolve the problem effectively and successfully. This was relevant to the research of Solomon *et al.* (1999) who studied about the impacts of geological circumstances and oceanography caused by cyclone storm of the South Pacific islands. The study found that a better understanding of the natural process of the coast was an important method for conducting management and protection guidelines for sustainable development in the area of the South Pacific islands.

5.3 Problems and obstacles

The findings showed that the obstacles in solving the problem of coastal erosion in Chao Lao and Laem Sadet beaches caused by the lack of problem awareness. One reason was that most villagers in the area were familiarized to the severity of wave along the coast since in the past. Moreover, most of them sold the lands for living and moved to live near Moodood village. As a result, they concerned more on their own benefits than public. It also caused by people in the communities, entrepreneurs, and local officials. They still lacked of knowledge and understanding in problem. It also the role of responsible agency was not clear. When the problem occurred, no one knowed how it should be performed, no any advices. This was related to the study of Darunee Suppawan *et al.* (2005) about the development projects of natural resources management of Kampaung Local Administrative Organization. The study found that the role of committees was not apparent; there was no any meeting for conducting operation plan; even the process in working was not conducted systematically. As a result, the work of local agency was not proficient enough to assist communities in solving the problem. Furthermore, the local administrative organization itself still lacked of the budget, office, personnel and expertise. This was

caused by the practice of public officials was inadequate and inefficient. They only worked on a function temporarily. Number of personnel in performing the duties were also insufficient to the burden of work assignment. This was connected to the research of Patrarawan Sananthai (2005) who studied on the participation of local fishermen in the conservation of coastal resources nearby Bangpakong River found that problems and obstacles of fishermen in participation in the project of coastal resources conservation was public relations of the government officials was not serious. As reasons mentioned above, there was no any projects or management guidelines for coastal erosion problem in Chao Lao and Laem Sadet beaches. There is only one project conducted by the Marine Department in present that is the resolution of coastal erosion problem in Kung Krabaen Bay.

The lack of strong leadership would be affected in the legal enforcement, budget allocation, or other management guidelines for coastal erosion problem. It was relevant to the research of Akachai Kaisang (1992) which found that one of the problems and obstacles in conservation of Mangrove forests of people in Trang province was the lack of suggestions from the leaders of communities. They neither concerned on its significance nor interested in its protection plan. The people, therefore, gave suggestions to government officials to train the community leader so that they could do activities or support invariable occupation to people. The lack of good leader was affected to the collaboration of lower agency both inside and outside organization. Furthermore, the process of problem management in Chao Lao and Laem Sadet beaches also had other complications, for example, waste problem. It has affected to severe impacts in Khlong-kood subdistrict in present and may reduce significance of the coastal erosion problem accordingly.

5.4 Community participation for coastal erosion management

The study on public's participation in activities to reduce the coastal erosion problem found that community participated in the project of reforestation and Mangrove conservation only in the process of problem recognition and operation. As for the activity of "Clean up the beach and sea" in the project of Laem Sadet - Chao

Lao coral resources conservation, people participated in the process of problem recognition, operation, and donation. This was due to in the study area there were many outsiders who were entrepreneurs of restaurants, hotels, resorts who were very wealthy and concerned more on their own benefits than the public. Moreover, the study found that some villagers had to work outside and had no time to participate in the process of sharing ideas, planning, making decision or follow-up. There were some people could join in those process and most of them were high ranking or had duty directly to problem management, for example, member of local administrative organization or conservation group or village leader, etc. Most of activities they attended mainly conducted by the public sectors and only on special occasions, therefore, the activity of community itself was very little. This was relevant to the research of Sareerat Taetrat (2003) concerning on public participation in coastal resources management nearby Veru River in Chanthaburi province found that the level of public participation in the process of planning, operation, getting benefit, and evaluation was low. The management on this issue was suggested to develop community leader, strengthen group of people, create conscious awareness to utilize coastal resources, stipulate measurement for coastal resources in Veru River, and use the law to enforce efficiently.

5.5 Integration

The study found that the activity concerning on conservation of community in Khlong-kood subdistrict was conducted rather little and no any integration to do activity of coastal erosion management. Chao Lao Conservancy Association currently has only name and lack of representatives or leaders. This was because there is no any budget supporting, leader is getting older and no replacement for this position. Integration, therefore, was difficult to be occurred. But if local people were supported by government or driven by private sector in terms of budget, information, or other continuously and seriously, it would believe that integration must be occurred actually.

5.6 Obtaining information on coastal erosion

The channels getting information of local people and entrepreneurs was confronting problem by themselves, television more than getting from officials. The problems and obstacles in this issue because sometimes it was technical data and hard to understand. Therefore, the best way to get information better was to increase the communication channels, public relations or clarification conducted by related agencies. Villagers should be informed of data with language easy to understand or representatives of villager should be trained and bring such knowledge to transfer to people in community. If villagers, entrepreneurs can get information of coastal erosion completely, they will feel of love and active to find management guidelines gradually more. The land for living will exist in the future. The budget for problem management will be not as much as previous. Lanchakorn Sakulkong (2005) found that leaders had knowledge in such matter in very good level. The channels of information were newspaper, radio, and television. Moreover, it also found that the leaders got different information regarding on natural resources conservation and environment, the roles and participation would be different as well.

5.7 Management guidelines for coastal erosion of Chao Lao and Laem Sadet beaches in Chanthaburi province

According to the problem, the cooperation from all related sectors was necessary to provide ideas or guidelines for problem management so that problem could be solved correctly, suitably and actually in the same direction. The management guidelines could be summarized into 5 guidelines for practice as follows:

5.7.1 Guideline for supporting coastal and marine resources database

5.7.2 Guideline for building knowledge and awareness for better understanding of coastal erosion

5.7.3 Guideline for promoting increased stakeholder participation

5.7.4 Guideline for increasing effectiveness on law enforcement

5.7.5 Guideline for budget allocation

According to the 5 guidelines aforementioned above, the details could be summarized as follows:

5.7.1 Guideline for supporting coastal and marine resources database

The study on Management Guidelines for Coastal Erosion Problem, database management of resources of Chanthaburi Province was one of the important causes to make management concerning on coastal erosion problem of Chao Lao and Laem Sadet beaches was not progressive. This was due to the information was not complete and up-to-date. Therefore, to make the problem management more efficient, the guidelines for information management system of resources especially the coastal resources should be conducted comprising of: 1) updated information: the surveying and collecting updated information should be implemented regularly especially the change of the coasts in order to facilitate the use of information for comparative study and find ways to manage problem further. This was relevant to the guideline no. 1 of strategy for protection and management on coastal erosion problem of the Department of Marine and Coastal Resources in 2007 was that to develop and improve the database management system used in the process of decision making, planning, and implementation; 2) data distribution: provincial or central agencies should inform local agencies the data in case that the local agencies could not prepare documents themselves in order to let them know about the problem occurred in the area covering all issues.

5.7.2 Guideline for creating knowledge, understanding, and awareness including cultivating the coastal erosion management consciousness

This guideline used in this case because people in communities, entrepreneurs were lack of knowledge and understanding on coastal erosion problem, lack of consciousness to feel affection for natural resources and environment so much, including both local and provincial officials had little knowledge in this field. Therefore, in order to manage the problem to be more efficient, guidelines for strengthening knowledge and understanding, awareness, and conscious cultivation on coastal erosion problem was conducted with the practice guidelines as follows: 1) to conduct public relations: related agencies should publicize and provide knowledge on

coastal erosion problem both in present and future to people in order to encourage them affection and awareness of the problem and realized it as public issues; 2) to conduct activities or training: activities or training conducted by related agencies for exchanging experiences and ideas; 3) to conduct the study visit: provincial or central agencies should conduct the study visit for local agencies or communities in order to challenge them to find new guidelines applicable to their areas as well as can transfer knowledge to communities truly.

5.7.3 Guideline for promoting aggregation and the participation in coastal erosion management

According to the problems and obstacles for problem management, the integration and participation of local people was one of the problems affected to management due to the group of people who realized on conservation were decreased. Therefore, to enhance the capability in management problem more efficient and have the management guidelines for problem in the same direction, the procedures should be conducted as follows: 1) establishing the special center in the area and allocate personnel who have knowledge and expertise to give suggestion for problem management; 2) conducting public forum for local people and neighboring to exchange knowledge and experiences for solving problem, creating network outside communities and strengthening the capacity in collaboration; 3) getting supports from many agencies for motivation: such as NGOs should give supports in various parts either information or budgets, etc. to motivate the collaboration for problem management to be more efficient; 4) encouraging strong leader as representative responsible for cooperation with public agencies or other related agencies as well as protecting benefits for local people not to be disadvantage. Furthermore, stimulating people in community to collaborate for powers in making negotiation with government agencies to urgently solve the problem in their areas. It was related to the guideline no. 2 of strategy for protection and management on coastal erosion problem of the Department of Marine and Coastal Resources in 2007: participation in protection and management of coastal erosion problem by strengthening capacity building of agencies, institutions, and related parties including enhancing public

relations to be more efficient and encouraging knowledge and understanding in problem management.

5.7.4 Guideline for increasing effectiveness on law enforcement

The study in the past found that people in the area were lack of knowledge in laws on marine and city planning formulated not meet their requirements. The mentioned problems all caused the conflict between officials and local people. Therefore, it should have the guidelines for legal enforcement and clear policy by conducting: 1) the zone of region in doing activities clearly, for example, fishing zone, coral reef conservation zone including specify the scope and practice guidelines for communities or entrepreneurs; 2) the use of law enforcement for the same direction and it should be flexible; 3) the appropriate city planning should be conducted transparent and meet the requirements of people in positive ways in order to protect resources destroyed and affected may be occurred in the future. In addition, the city planning that was expired should have municipal law to enforce strictly and rigorously.

5.7.5 Guideline for budget allocation

The problem of financial management in Chao Lao and Laem Sadet beaches was one of important factors that should be considered. It was relatively high and beyond the capacity of local administrative organization. Generating the realization on the significant problems and have more budget allocation, the practice guidelines suggested as follows: 1) strong leader both local and provincial agencies should have concerned on the problem of coastal erosions continuously and propose to the executives frequently; 2) surveying affected area continuously and strictly which responsible agencies should examine the level of impacts regularly to conduct the priority of crisis area and allocate budget appropriately; 3) increasing the supporting budget, the government should have more concerned and realized on the problem of natural resources and environment also solving problems.

According to the management guidelines of coastal erosion problem in Chao Lao and Laem Sadet beaches, the 5 guidelines have mentioned above should be published to local people, entrepreneurs, related agencies, comments and suggestions from visitors in order to enhance every sector, especially local agency to consider the

three-year plan or other future plans. In addition, provincial agency may bring these suggestions to practice for further problem management to be more efficient and tangible and it may be applicable for neighboring areas affected by this problem as well.

5.8 Conclusion

The study of coastal erosion had been divided the effects on people into two groups; direct affection and the effect segmentation on the future group. The direct affection group had enthusiastic to prevent the effects of coastal erosion. Therefore, news, data information of the problems would be more revised and accessed than another group. Moreover, it has also high level of corresponding between stakeholders rather than the effect segmentation on the future group. Due to difference opinions as following:

- 1) No directly effect and high attention to live opportunities rather than the problem.
- 2) Low access to the problem information and do not know the role to correspond and rectify the problems.
- 3) Unaware of the problem due to believe in the problem came by natural therefore, it cannot protect or controls.

The result revealed that people who were affected from the coastal erosion mainly local people lack of knowledge and also do not understand the roles of government sectors on the problem and situations. As results, the connection between stakeholders and government would be low and it led to uncover and retreated of management plans. Unawareness and lacking of concentration on the problems were also found with locals while as government sections had faced problems about geology and engineering data. The budget allocation were others significant of the strategic plans.

The study of management guidelines for coastal erosion at Chao Lao and Laem Sadet beaches could be perform with locals and Government sections as followed:

- 1) Database of marine and coastal resource should be completed and up-to-date creating knowledge, realization and learning system.
- 2) Creating knowledge, understanding, and awareness including cultivating the coastal erosion management consciousness
- 3) Promoting aggregation and the participation in coastal erosion management
- 4) Increasing effectiveness on law enforcement
- 5) Budget allocation

These five guidelines above also indicated some of the suitable suggestions. However, corresponds of people and hardly apply the plans would be the main parts to success. Furthermore, the accession of all plans will be another process to improve quality of the plans in the future.

5.9 Recommendations

5.9.1 Research recommendation

1. Some people still recognize the importance of coastal resource conservation including the coastal erosion problem. Therefore, the government agencies or private sectors should aid the communities to establish local organization or local conservation group that easily solves this problem.

5.9.2 Recommendation for the future research

1. Should study the changing process of coast at Chao Lao and Laem Sadet from the past until the present time as well as study the tendency and future expectation for benefit on planning and land utilization and reducing the impact such as architect landscape.
2. Should study the government policy and the organization operations related to coastal erosion management in Thailand in order to be the management guideline for every region.

3. Should study the Chao Lao beach and Laem Sadet beach carrying capacity in order to limit the number of tourists which leads to the land use planning in the future.

4. Should study the land use around the coastal zone at Chao Lao and Laem Sadet beaches that leads to effective coastal management together with protecting rapid land development such as controlling density of building, hotel and resorts that riskily causes severe coastal erosion.

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APPENDICES

APPENDIX A

แบบสำรวจความคิดเห็นสำหรับนักท่องเที่ยว

คำชี้แจง

1. แบบสำรวจนี้จัดทำขึ้นเพื่อศึกษาความคิดเห็นของท่านในฐานะนักท่องเที่ยวเพื่อใช้ข้อมูลมาเป็นส่วนประกอบในการจัดทำวิทยานิพนธ์เรื่อง แนวทางการจัดการปัญหาการกัดเซาะชายฝั่งทะเลแบบมีส่วนร่วม ชายหาดเจ้าหลาวและแหลมเสด็จ ต.คลองขุด อ.ท่าใหม่ จ. จันทบุรี ซึ่งความคิดเห็นของท่านจะเป็นประโยชน์อย่างยิ่งต่อหน่วยงานท้องถิ่นในพื้นที่ ทั้งนี้ ขอความกรุณาท่านในการตอบคำถามตามสภาพความเป็นจริง และโปรดตอบคำถามทุกข้อ ข้อมูลทั้งหมดจะเก็บไว้เป็นความลับ และจะไม่มีผลกระทบต่อท่านแต่อย่างใด

2. แบบสำรวจความคิดเห็นฉบับนี้ แบ่งคำถามออกเป็น 2 ข้อหลัก ดังนี้

ข้อ 1 เป็นคำถามแสดงความคิดเห็นเกี่ยวกับกิจกรรมต่างๆ ต่อปัญหาการกัดเซาะชายฝั่งทะเลในพื้นที่ โดยแบ่งออกเป็น 3 ส่วน ได้แก่

ส่วนที่ 1 กิจกรรมของหน่วยงาน/องค์กรปกครองส่วนท้องถิ่นได้จัดทำขึ้นในพื้นที่

ส่วนที่ 2 กิจกรรมในพื้นที่ที่จัดไว้บริการสำหรับนักท่องเที่ยว

ส่วนที่ 3 กิจกรรมอื่นๆ ที่เกิดขึ้นในพื้นที่

ข้อ 2 เป็นข้อคิดเห็นและข้อเสนอแนะในการจัดการปัญหาการกัดเซาะชายฝั่งและอื่นๆ ที่

ท่านคิดว่ายังต้องปรับปรุง

**แบบสำรวจความคิดเห็นเกี่ยวกับปัญหาการกัดเซาะชายฝั่งทะเลและการจัดการสิ่งแวดล้อมโดยทั่วไป
ของชายหาด**

คำชี้แจง กรุณาใส่เครื่องหมาย ✓ ลงในช่องที่ตรงกับความคิดเห็นของท่านมากที่สุด

ชื่อ-สกุล.....

เพศ ชาย

หญิง

1.1 คำถาม ท่านเห็นด้วยหรือไม่กับกิจกรรมต่างๆ ดังต่อไปนี้

โปรดเลือกระดับความคิดเห็นที่ตรงกับความรู้สึกของท่านมากที่สุด โดยใส่เครื่องหมาย ✓

ข้อความ	ระดับความคิดเห็น				
	เห็นด้วยอย่างยิ่ง	เห็นด้วย	ไม่แน่ใจ	ไม่เห็นด้วย	ไม่เห็นด้วยอย่างยิ่ง
ส่วนที่ 1 กิจกรรมของหน่วยงาน/องค์กรปกครองส่วนท้องถิ่น ได้จัดทำขึ้นในพื้นที่					
1. การปลูกต้นสน/มะพร้าวตามแนวชายหาด					
2. การสร้างกำแพงกันคลื่นร่วมกับหน่วยงานส่วนกลาง					
ส่วนที่ 2 กิจกรรมในพื้นที่ที่จัดไว้บริการสำหรับนักท่องเที่ยว					
1. การจัดกิจกรรมบริการเรือท่องเที่ยว					
2. การจัดกิจกรรมบริการเรือเร็ว					
ส่วนที่ 3 กิจกรรมอื่นๆ ที่เกิดขึ้นในพื้นที่					

1. การสร้างกองหินหรือวิธีการ อื่นๆ ด้วยตัวของ ประชาชนในพื้นที่					
2. การใช้น้ำใต้ดินในพื้นที่					
3. การขยายตัวของที่พัก โรงแรม รีสอร์ท บริเวณริมชายหาด					
4. การขยายตัวของร้านค้า ร้านอาหารริมชายหาด					

1.2 ข้อคิดเห็นและข้อเสนอแนะในการจัดการปัญหาการกัดเซาะชายฝั่งและอื่นๆ ที่ท่านคิดว่ายังต้องปรับปรุง

- ❖ ท่านมีข้อเสนอแนะอย่างไรต่อประชาชนในท้องถิ่นในการเข้ามามีส่วนร่วมในการแก้ไขปัญหาการกัดเซาะชายฝั่งทะเล

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- ❖ ท่านมีข้อเสนอแนะอย่างไรต่อองค์กรปกครองส่วนท้องถิ่นในการเข้ามามีส่วนร่วมในการแก้ไขปัญหาการกัดเซาะชายฝั่งทะเล

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❖ ท่านมีข้อเสนอแนะอย่างไรต่อหน่วยงานราชการในการมีส่วนร่วมในการแก้ไขปัญหาการกัดเซาะชายฝั่งทะเล

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❖ ท่านมีข้อเสนอแนะอย่างไรต่อนักท่องเที่ยวในการเข้ามามีส่วนร่วมในการแก้ไขปัญหาการกัดเซาะชายฝั่งทะเล

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❖ ท่านจะเข้ามามีส่วนร่วมในแก้ไขปัญหาการกัดเซาะชายฝั่งทะเลอย่างไรบ้าง

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❖ นอกจากนี้ ท่านคิดว่าสถานที่แห่งนี้ยังมีสิ่งใดที่ยังต้องปรับปรุงอีกบ้าง

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นางสาวเสาวลักษณ์ มาธุสรสกุล
นักศึกษาระดับปริญญาโท คณะสิ่งแวดล้อมและทรัพยากรศาสตร์
สาขาเทคโนโลยีการบริหารสิ่งแวดล้อม มหาวิทยาลัยมหิดล
e-mail: sayasung_27@hotmail.com

ประเด็นคำถามสำหรับการสัมภาษณ์เชิงลึก

1. สภาพความอุดมสมบูรณ์ของพื้นที่ชายหาดเจ้าหลาวและหาดแหลมเสด็จ

- เมื่อเปรียบเทียบสภาพความอุดมสมบูรณ์ของพื้นที่ชายหาดทั้งสองในอดีตที่ผ่านมา กับปัจจุบัน มีความแตกต่างกันหรือไม่ อย่างไร (สภาพชายหาด การกัดเซาะชายฝั่ง)
- จากปัญหาการกัดเซาะชายฝั่งที่เกิดขึ้นในพื้นที่ ส่งผลกระทบต่อใครบ้าง และเกิดความเสียหายอย่างไร
- การแก้ไขปัญหาการกัดเซาะชายฝั่งทะเลในพื้นที่ที่ผ่านมาเป็นอย่างไรบ้าง สำเร็จ/ไม่สำเร็จ เพราะเหตุใด

2. องค์ความรู้ในเรื่องปัญหาการกัดเซาะชายฝั่ง

- ท่านคิดว่าการกัดเซาะชายฝั่งโดยทั่วไปเกิดมาจากสาเหตุอะไรได้บ้าง และในพื้นที่ของท่านท่านคิดว่าเกิดจากสาเหตุใด (เรียงลำดับความสำคัญของสาเหตุ)
- ท่านคิดว่าการป้องกันปัญหาการกัดเซาะชายฝั่งทะเลในพื้นที่ในปัจจุบัน ควรแก้ปัญหาดตรงจุดไหนเป็นการเร่งด่วน เพราะเหตุใด
- จากข้อข้างต้นควรมีการดำเนินการอย่างไร และมีหน่วยงานใดรับผิดชอบ

3. ปัญหา อุปสรรคในการแก้ไขปัญหาการกัดเซาะชายฝั่งในพื้นที่

- ท่านคิดว่าการแก้ไขปัญหาการกัดเซาะชายฝั่งในพื้นที่นั้นมีปัญหา อุปสรรคหรือไม่ อย่างไร
(ปัญหาการเมือง สถานภาพทางสังคม ขาดความร่วมมือจากหน่วยงานที่เกี่ยวข้อง)

4. การมีส่วนร่วมของชุมชนในการจัดการปัญหาการกัดเซาะชายฝั่ง ได้แก่ โครงการปลูกป่าและอนุรักษ์ป่าชายเลน และโครงการอนุรักษ์ทรัพยากรปะการังแหลมเสด็จ-หาดเจ้าหลาว “กิจกรรมทำความสะอาดชายหาดและเก็บขยะใต้ทะเล

- ในรอบ 1 ปีที่ผ่านมา ท่านได้เข้าร่วมทำกิจกรรมใดบ้างจากโครงการเหล่านี้เข้าไปมีส่วนร่วมในขั้นตอนใดในกิจกรรมนั้นๆ (ใส่เครื่องหมาย ✓ ลงในช่อง) /กิจกรรมเหล่านี้เป็นของหน่วยงานใด ถ้าไม่ได้เข้าร่วม เป็นเพราะเหตุใด

โครงการ การมีส่วนร่วม	โครงการปลูกป่าและอนุรักษ์ ป่าชายเลน	โครงการอนุรักษ์ทรัพยากรปะการัง แหลมเสด็จ-หาดเจ้าหลาว “กิจกรรม ทำความสะอาดชายหาดและเก็บขยะ ใต้ทะเล”
ร่วมรับรู้ปัญหา		
ร่วมแสดงความคิดเห็น		
ร่วมวางแผน		
ร่วมตัดสินใจ		
ร่วมปฏิบัติ		
ร่วมบริจาค		
ร่วมติดตามประเมินผล		

โครงการอื่นๆ ที่เกี่ยวข้อง นอกเหนือจาก โครงการข้างต้น

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- จากการทำกิจกรรมต่างๆ ดังกล่าวข้างต้นท่านได้รับประโยชน์อย่างไร

5. การรวมกลุ่มในการจัดการปัญหาการกัดเซาะชายฝั่ง

- ในพื้นที่ของท่านมีการรวมกลุ่มกันเองบ้างหรือไม่ ในการแก้ไขปัญหาการกัดเซาะชายฝั่งที่เกิดขึ้นในพื้นที่ มี/ไม่มี เพราะอะไร
- ถ้ามี ใครเป็นผู้มีบทบาทในการรวมกลุ่ม/มีสมาชิกในกลุ่มจำนวนเท่าไร/ท่านมีหน้าที่ใดในกลุ่ม
- ความร่วมมือของคนในพื้นที่ในการเข้าร่วมกิจกรรมเป็นอย่างไร เพราะอะไร และมีอะไรเปลี่ยนแปลงหลังจากเกิดการรวมกลุ่มกัน

- มีหน่วยงานใดที่ให้การสนับสนุน หรือส่งเสริมการรวมกลุ่มของท่านบ้าง
- ถ้าไม่มี ท่านคิดว่าควรมีหน่วยงานใด หรือกลุ่มองค์กรใดบ้างที่ควรให้การสนับสนุน

6. การได้รับข่าวสารเกี่ยวกับเรื่องการกัดเซาะชายฝั่ง

- ในปัจจุบันท่านเคยได้รับรู้ข่าวสารเกี่ยวกับเรื่องการกัดเซาะชายฝั่งโดยช่องทางใดบ้าง
- ในกรณีที่ท่านได้รับข่าวสารด้านนี้แล้วท่านมีความรู้สึกอย่างไรเกี่ยวกับปัญหาการกัดเซาะชายฝั่งที่เกิดขึ้นในพื้นที่
- หากในปัจจุบันการรับข้อมูลข่าวสารยังไม่เพียงพอท่านคิดว่าในอนาคตควรมีช่องทางใดบ้างในการรับข้อมูลข่าวสารเพิ่มเติม

7. แผนแก้ไขของหน่วยงานในท้องถิ่นและหน่วยงานที่รับผิดชอบปัญหาการกัดเซาะชายฝั่ง (สำหรับหน่วยงาน)

- ท่านคิดว่าในพื้นที่ที่มีแผนการดำเนินงานแก้ไขปัญหาการกัดเซาะชายฝั่งเป็นอย่างไรบ้าง (เหมาะสม/ไม่เหมาะสม) เพราะเหตุใด มีการดำเนินการอย่างไร
- จากข้างต้นมีการปรับปรุงหรือวางแผนป้องกันในอนาคตอย่างไร

8. แนวทางการจัดการปัญหาการกัดเซาะชายฝั่ง

- ในบทบาทหน้าที่ของท่านคิดว่าท่านควรทำอะไร เพื่อให้ปัญหาการกัดเซาะชายฝั่งทะเลในพื้นที่ลดน้อยลง
- นอกจากท่านแล้ว ท่านคิดว่าใครหรือหน่วยงานใดควรจะเข้ามาร่วมดูแลชายหาดทั้งสอง เพราะเหตุใด
- นอกจากนี้ท่านมีข้อเสนอแนะอื่นๆ อีกหรือไม่ ในการแก้ไขปัญหาการกัดเซาะชายฝั่งทะเลในพื้นที่

ประเด็นคำถามในการสนทนากลุ่มย่อย

1. จากปัญหาการกัดเซาะชายฝั่งทะเลในพื้นที่ แต่ละท่านได้รับผลกระทบอะไรบ้าง คิดว่าเรื่องใดเป็นปัญหาที่สำคัญที่สุด และควรมีการจัดการอย่างเร่งด่วน
2. จากผลกระทบที่เกิดขึ้น แต่ละท่านมีวิธีการในการแก้ปัญหาอย่างไรบ้าง
3. นอกจากนี้ท่านมีข้อเสนอแนะอื่นๆ อีกหรือไม่

APPENDIX B

รายนามผู้ให้สัมภาษณ์เชิงลึก และการสนทนากลุ่มย่อย

รายนามผู้ให้สัมภาษณ์เชิงลึก

ชื่อ-นามสกุล	ตำแหน่ง	หมู่บ้าน/หน่วยงาน
คุณพรพจน์ เขียวศิริ	หัวหน้าช่างโยธา	องค์การบริหารส่วนตำบลคลองขุด
คุณอนันต์ เบญจวาริเดชา	ผู้ใหญ่บ้าน	บ้านสัตบุตร
คุณบรรทม บำรุงศาสตร์	ผู้ใหญ่บ้าน	บ้านนอกเขา
คุณบุญมา กิจชล	ผู้ใหญ่บ้าน	บ้านเนินประคู้
คุณพงศกรณ์ กิจขาว	กำนัน	บ้านหมูดุด
คุณไมตรี จงใจจิตร	ผู้ใหญ่บ้าน	บ้านเจ้าหลาว
คุณธนิศร ชักชวนวงษ์	ผู้ใหญ่บ้าน	บ้านเจ้าหลาวหัวแหลม
คุณนิต อิ่มสาระพวงค์	ผู้ใหญ่บ้าน	บ้านคิ่งกระเบน
คุณกาชน์ ะโร	ผู้ใหญ่บ้าน	บ้านอัมพวา
คุณวิสิทธิ์ บำรุงการ	ผู้ใหญ่บ้าน	บ้านคลองขุด
คุณชูศิลป์ รัตนโอกาส	ผู้ใหญ่บ้าน	บ้านคลองขุด
คุณอินทิรา มานะกุล	แกนนำสมาคมอนุรักษ์พิทักษ์เจ้าหลาว	
คุณสุบิน ภูสุวรรณ	แกนนำสมาคมอนุรักษ์พิทักษ์เจ้าหลาว	
คุณนพดล คำชาย	นักวิชาการประมง ชำนาญการ	ศูนย์ศึกษาการพัฒนาอ่าวคุ้งกระเบน
คุณสมาน รุ่งเรือง	ประธานกลุ่มประมงพื้นบ้านเจ้าหลาว	
คุณวรรณิ์ โรจนวรรณสินธุ์	วิเคราะห์ผังเมือง ชำนาญการพิเศษ	สำนักงานโยธาธิการและผังเมือง

ชื่อ-นามสกุล	ตำแหน่ง	หมู่บ้าน/หน่วยงาน
		จังหวัดจันทบุรี
คุณไตรรัตน์ พูลสวัสดิ์	นายช่างโยธาอาวุโส	สำนักงานโยธาธิการและผังเมือง จังหวัดจันทบุรี
คุณอนวัช สุวรรณเดช	นายช่างโยธาอาวุโส	สำนักงานโยธาธิการและผังเมือง จังหวัดจันทบุรี
คุณสมชัย เอียดระกูล	หัวหน้าสำนักงานการขนส่งทางน้ำที่ 6 จันทบุรี	
คุณสมบัติ ธรรมโชติ	หัวหน้าเขตรักษาพันธุ์สัตว์ป่าคู้ง กระเบน	
คุณฉัตรชัย สุขศิริรัตน	นายกองค์การบริหารส่วนตำบล คลองขุด	องค์การบริหารส่วนตำบลคลอง ขุด
คุณวรินทร์ เบ้าทอง	ผู้ช่วยผู้ใหญ่บ้าน	บ้านเจ้าหลาวหัวแหลม
คุณไพโรจน์ ตั้งเจริญศิริ	ประธานชมรมส่งเสริมการท่องเที่ยว เจ้าหลาว-แหลมเสด็จ	
คุณอนุชา เทียนไข	สมาชิกชมรมผู้ประกอบการชมรม ส่งเสริมการท่องเที่ยว เจ้าหลาว- แหลมเสด็จ	
คุณไพโรจน์ ไรโรจน์	ผู้ประกอบการร้านอาหาร	

รายนามผู้ร่วมสนทนากลุ่มย่อย

ชื่อ-นามสกุล	หมู่บ้าน
คุณหยุด ชำนาญชล	บ้านสัตบุตร
คุณธนา พานิชการ	บ้านสัตบุตร
คุณเต็ม เบญจวาริเดชา	บ้านสัตบุตร
คุณเส่นหา หอมเกษร	บ้านสัตบุตร
คุณไพฑูรย์ สระทองอ่อน	บ้านสัตบุตร
คุณนารี สาครรัตน์	บ้านสัตบุตร
คุณบุญเรือน สารศิลป์	บ้านสัตบุตร
คุณตำรวจ แสนสุข	บ้านนอกเขา
คุณเริงชัย แก้วกรอง	บ้านนอกเขา
คุณปัญญา สามีผล	บ้านนอกเขา
คุณสาริต ศิริสรรพ	บ้านนอกเขา
คุณประเสริฐ สิทธิประสงค์	บ้านนอกเขา
คุณพรทิพย์ ไพบูลย์กสิกร	บ้านนอกเขา
คุณวันดี แซ่เหลา	บ้านนอกเขา
คุณคำออย กิจชล	บ้านเนินประดู่
คุณสุรีพร อัครณะชัย	บ้านเนินประดู่
คุณสิทธิ กิจชล	บ้านเนินประดู่
คุณพิมพ์วรา ชัยภักดิ์	บ้านเนินประดู่
คุณสมควร กลองขุด	บ้านเนินประดู่
คุณสมพงษ์ แซ่มล้าน	บ้านเนินประดู่
คุณแสวง เผื่อแผ่	บ้านเนินประดู่
คุณคนอง หอคำ	บ้านเนินประดู่
คุณมะปราง บำรุงใจ	บ้านหมูดุด
คุณจำเป็น แนวสุภาพ	บ้านหมูดุด
คุณทัศนาวัด นันทกสิกร	บ้านหมูดุด
คุณปวีณา พัฒนงาน	บ้านหมูดุด
คุณวีระ ศรีปลัด	บ้านหมูดุด

ชื่อ-นามสกุล	หมู่บ้าน
คุณหวัง เจนจัดการ	บ้านหมูดุด
คุณหวย ชมศิริ	บ้านหมูดุด
คุณทวีศักดิ์ โงษชาติ	บ้านหมูดุด
คุณจำปา จงใจจิตร	บ้านหมูดุด
คุณสมฤทัย ชมศิริ	บ้านหมูดุด
คุณพันธ์สา สุขสม	บ้านหมูดุด
คุณชาลี เทียมทัด	บ้านหมูดุด
คุณนพรัตน์ วงเวียน	บ้านเจ้าหลาว
คุณวันชาติ อนุวัฒน์	บ้านเจ้าหลาว
คุณรังษิ วิถีธรรม	บ้านเจ้าหลาว
คุณบังเอิญ มั่นคง	บ้านเจ้าหลาว
คุณจรูญ บุญอินทร์	บ้านเจ้าหลาว
คุณวิจิตร ศรีปลัด	บ้านเจ้าหลาว
คุณวันเพ็ญ ไชยสืบ	บ้านเจ้าหลาว
คุณอัศนีย์ รักษาความจริง	บ้านเจ้าหลาว
คุณสมนึก ระพีแสง	บ้านเจ้าหลาว
คุณพิพัฒน์ เสริมสุข	บ้านเจ้าหลาว
คุณไพโรจน์ ตั้งเจริญศิริ	บ้านเจ้าหลาว
คุณณรงค์ กงศรี	บ้านเจ้าหลาว
คุณศิวาภรณ์ นวนกระโทก	บ้านเจ้าหลาวหัวแหลม
คุณมานัส สมากุล	บ้านเจ้าหลาวหัวแหลม
คุณปรีชา สุขสำราญ	บ้านเจ้าหลาวหัวแหลม
คุณกฤษฎา บุญรส	บ้านเจ้าหลาวหัวแหลม
คุณจรรยา สุขเหม	บ้านเจ้าหลาวหัวแหลม
คุณชำนาญ พุทธจร	บ้านเจ้าหลาวหัวแหลม
คุณกาญจนา สิงห์สุระ	บ้านเจ้าหลาวหัวแหลม
คุณสมหวัง เจนจัดทรัพย์	บ้านเจ้าหลาวหัวแหลม
คุณจิม ฉายแสง	บ้านเจ้าหลาวหัวแหลม

ชื่อ-นามสกุล	หมู่บ้าน
คุณสมใจ เกื้อวงษ์	บ้านเจ้าหลาวหัวแหลม
คุณบุญมา คงประการ	บ้านเจ้าหลาวหัวแหลม
คุณสุภาพรรณ อร่ามเรือง	บ้านเจ้าหลาวหัวแหลม
คุณแสงเดือน สุธาโร	บ้านคู้งกระเบน
คุณเดชา พาณิชการ	บ้านคู้งกระเบน
คุณคำารณ ชุมศิริ	บ้านคู้งกระเบน
คุณชุตติกาญจน์ กิจขาว	บ้านคู้งกระเบน
คุณศิริพร สุภาพบุต	บ้านคู้งกระเบน
คุณวรรณนา เสนาะ	บ้านคู้งกระเบน
คุณวันชัย กิจจาอาภา	บ้านคู้งกระเบน
คุณแก้ว เสนาะสรรพ	บ้านคู้งกระเบน
คุณมนุญ ศรีปลัด	บ้านคู้งกระเบน
คุณชาญ ศรีปลัด	บ้านคู้งกระเบน
คุณอำไพ อิมสาระพวงส์	บ้านคู้งกระเบน
คุณพลินี วงษ์วัฒน์	บ้านคู้งกระเบน
คุณศรีจันทร์ พิลาวุฒิ	บ้านอัมพวา
คุณสมปอง ภิรมย์พงษ์	บ้านอัมพวา
คุณช่วง น้ำเจริญ	บ้านอัมพวา
คุณสมคิด จันทแพทย์	บ้านอัมพวา
คุณมานะ ชนะภัย	บ้านอัมพวา
คุณเกษร คุณาเกื้อ	บ้านอัมพวา
คุณมานัส สุขทั้งโลก	บ้านอัมพวา
คุณบุญทิง จรวารี	บ้านอัมพวา
คุณนงนาฎ ดุมคณะ	บ้านคลองขุด
คุณชะวาล ประมวลสุข	บ้านคลองขุด
คุณสุวรรณ ไกรนิวัฒน์	บ้านคลองขุด
คุณสุมลมาลย์ ประมวลสุข	บ้านคลองขุด
คุณระย้า ชำนาญชล	บ้านคลองขุด
คุณประหัด รัตโนภาส	บ้านคลองขุด
คุณภัทรวดี ประมวลสุข	บ้านคลองขุด

ชื่อ-นามสกุล	หมู่บ้าน
คุณจา อยู่สุวรรณ	บ้านคลองขุด
คุณอารีย์ พุทธอาวี	บ้านคลองขุด
คุณบุษนา ตินสวัสดิ์	บ้านคลองขุด
คุณกัลยาณี เหล่าวงษ์	บ้านคลองขุด
คุณจันทร์ฉาย ผ่องสุวรรณ	บ้านคลองขุด
คุณเดือนเพ็ญ เจาะสุนทร	บ้านคลองขุด
คุณอรุณี สุขเกษม	บ้านคลองขุด
คุณมิ่ง บุญวงษ์	บ้านคลองขุด
คุณอรุณ บุญนิมิตร	บ้านคลองขุด
คุณกัณหา ตินสวัสดิ์	บ้านคลองขุด

APPENDIX C

	ระดับความคิดเห็น				
	ไม่เห็นด้วยอย่างยิ่ง	ไม่เห็นด้วย	ไม่แน่ใจ	เห็นด้วย	เห็นด้วยอย่างยิ่ง
<p>ส่วนที่ 1 กิจกรรมของหน่วยงาน/ องค์กรปกครองส่วนท้องถิ่นได้จัดทำ ขึ้นในพื้นที่</p> <ol style="list-style-type: none"> 1. การปลูกต้นไม้/มะพร้าว ตามแนวชายหาด 2. การสร้างกำแพงกันคลื่น ร่วมกับหน่วยงานส่วนกลาง <p>ส่วนที่ 2 กิจกรรมในพื้นที่ที่จัดไว้ บริการสำหรับนักท่องเที่ยว</p> <ol style="list-style-type: none"> 1. การจัดกิจกรรมบริการเรือ ท่องเที่ยวจากดูปะการัง 2. การจัดกิจกรรมบริการเรือ เร็วดูปะการัง 	<p>1 (0.3%)</p> <p>16 (4.0%)</p>	<p>3 (0.8%)</p> <p>46 (11.5%)</p>	<p>10 (2.5%)</p> <p>91 (22.8%)</p>	<p>180 (45.0%)</p> <p>152 (38.0%)</p>	<p>206 (51.5%)</p> <p>95 (23.8%)</p>
	<p>4 (1.0%)</p> <p>10 (2.5%)</p>	<p>9 (2.3%)</p> <p>43 (10.8%)</p>	<p>31 (7.8%)</p> <p>63 (15.8)</p>	<p>187 (46.8%)</p> <p>159 (39.8%)</p>	<p>169 (42.3%)</p> <p>125 (31.3%)</p>

	ระดับความคิดเห็น				
	ไม่เห็นด้วยอย่างยิ่ง	ไม่เห็นด้วย	ไม่แน่ใจ	เห็นด้วย	เห็นด้วยอย่างยิ่ง
3. การจัดกิจกรรมการเล่นกีฬา ทางน้ำ เช่น บานานาโบ๊ท เป็นต้น	7 (1.8%)	21 (5.3%)	55 (13.8%)	159 (39.8%)	158 (39.55%)
ส่วนที่ 3 กิจกรรมอื่นๆ ที่เกิดขึ้นใน พื้นที่					
1. การสร้างกองหินหรือวิธีการ อื่นๆ ด้วยตัวเองของคนใน ท้องถิ่น	7 (1.8%)	42 (10.5%)	129 (32.3%)	160 (40.0%)	62 (15.5%)
2. การใช้น้ำใต้ดินในพื้นที่	36 (9.0%)	103 (25.8%)	118 (29.5%)	115 (28.8%)	28 (7.0%)
3. การขยายตัวของที่พัก โรงแรม รีสอร์ท บริเวณริม ชายหาด	54 (13.5%)	109 (27.3%)	86 (21.5%)	103 (25.8%)	48 (12.0%)
4. การขยายตัวของร้านค้า ร้านอาหารริมชายหาด	41 (10.3%)	89 (22.3%)	100 (25.0%)	112 (28.0%)	58 (14.5%)

ตารางที่ ๑ ความคิดเห็นและข้อเสนอแนะที่ได้จากนักทอ่งเที่ยว

ข้อความ	จำนวน	ร้อยละ
<p>ประชาชนท้องถิ่น</p> <ol style="list-style-type: none"> 1. ประชาชนในท้องถิ่นควรได้รับการฝึกอบรมและเข้าร่วมประชุมเกี่ยวกับเรื่องปัญหาการกัดเซาะชายฝั่งทะเล ได้รับโอกาสในการเสนอความคิดเห็น โดยการจัดเงินจากภาครัฐหรือหน่วยงานอื่นๆ ที่เกี่ยวข้อง 2. การขยายตัวของรีสอร์ท โรงแรม ในพื้นที่ ควรให้ประชาชนในท้องถิ่นมีส่วนร่วมในการตัดสินใจด้วย 3. การสร้างกองหินหรือแนวกันคลื่น 4. ช่วยกันปลูก และอนุรักษ์ต้นไม้ตามแนวชายหาดเพื่อป้องกันการพัดพาทรายลงไปในทะเล 	<p>360</p> <p>270</p> <p>288</p> <p>378</p>	<p>90.0</p> <p>67.5</p> <p>72.0</p> <p>94.5</p>
<p>องค์กรปกครองส่วนท้องถิ่น</p> <ol style="list-style-type: none"> 1. ควรมีการจัดกิจกรรมที่เป็นการศึกษาเกี่ยวกับปัญหาการกัดเซาะชายฝั่งทะเล แก่นักท่องเที่ยวเพื่อให้นักท่องเที่ยวได้เห็นถึงความสำคัญ เช่น การทำป้ายประชาสัมพันธ์ หรือการจัดตั้งศูนย์ความรู้ขนาดเล็ก เป็นต้น 2. การจัดตั้งกลุ่มเฉพาะทางในการแก้ไขปัญหาการกัดเซาะชายฝั่งทะเลในพื้นที่ ในส่วนขององค์กรปกครองส่วนท้องถิ่น ต้องมีความจริงจังและจริงใจ โดยจัดทำเป็นนโยบายหรือโครงการ โดยกำหนดแนวยุทธศาสตร์ที่ชัดเจน และที่สำคัญต้องจัดทำเป็นงบประมาณต่อเนื่อง 3. ไม่สนับสนุนให้มีการใช้น้ำบาดาล เพราะจะทำให้ดินทรุด และที่สำคัญคือพื้นที่ในบริเวณนี้เป็นทราย จึงไม่ควรสนับสนุนอย่างยิ่ง 4. การจัดการระดมความคิดเห็นของประชาชนในพื้นที่เพื่อให้เกิดการมีส่วนร่วมอย่างแท้จริง 	<p>360</p> <p>342</p> <p>18</p> <p>144</p>	<p>90.0</p> <p>85.5</p> <p>4.5</p> <p>36.0</p>

ข้อมูล	จำนวน	ร้อยละ
<p>หน่วยงานราชการ</p> <ol style="list-style-type: none"> 1. การเสนองบประมาณแบบโปร่งใส เพียงพอ และทำการสร้างโครงสร้างป้องกันคลื่น (ให้มีความกลมกลืนกับธรรมชาติ) โดยมีการขอความคิดเห็นจากคนในพื้นที่ และทำไปถึงผลดี ผลเสีย ต่อคนในพื้นที่ รวมถึงมีการติดตามประเมินผลอย่างต่อเนื่อง 2. หน่วยงานราชการเข้ามาสนับสนุน สร้างแรงกระตุ้น รวมถึงการช่วยเหลือ ติดตาม ประสานงาน เกี่ยวกับการจัดการปัญหาการกัดเซาะชายฝั่งทะเลให้กับคนในพื้นที่อย่างเป็นระบบ 3. การประชาสัมพันธ์ให้ประชาชนตระหนักถึงปัญหาดังกล่าวและให้รับทราบถึงวิธีการป้องกัน 4. การใช้กฎบังคับอย่างเข้มงวดเพื่อป้องกันการสร้างสิ่งรุกล้ำลงไปทะเล 	<p>396</p> <p>342</p> <p>360</p> <p>216</p>	<p>99.0</p> <p>85.5</p> <p>90.0</p> <p>54.0</p>
<p>ข้อเสนอแนะต่อนักท่องเที่ยว</p> <ol style="list-style-type: none"> 1. นักท่องเที่ยวมีบทบาทน้อย แต่ควรรู้ถึงกฎ ระเบียบ ข้อปฏิบัติ ในการท่องเที่ยวอย่างถูกวิธี 2. การเห็นความสำคัญของปัญหาการกัดเซาะชายฝั่งทะเลและช่วยกันผลักดันให้ปัญหาเป็นวาระแห่งชาติ 3. ช่วยกันบริจาคต้นไม้และมีส่วนร่วม ในการจัดกิจกรรมปลูกต้นไม้ 	<p>324</p> <p>288</p> <p>270</p>	<p>81.0</p> <p>72.0</p> <p>67.5</p>
<p>การมีส่วนร่วมของแต่ละบุคคล</p> <ol style="list-style-type: none"> 1. ให้ความร่วมมือกับทุกภาคส่วนที่เกี่ยวข้องในการแก้ปัญหาตามกำลังความสามารถ 	<p>378</p>	<p>94.5</p>

ข้อความ	จำนวน	ร้อยละ
<p>ข้อเสนอแนะด้านอื่นๆ ในพื้นที่ที่ควรปรับปรุง</p> <ol style="list-style-type: none"> 1. ขยะตามแนวชายฝั่ง 2. สถานที่จอดรถไม่เพียงพอ 3. ความเป็นระเบียบของร้านค้าริมชายหาด รุกล้ำเขตพื้นที่ชายหาดมากเกินไป ทำให้บริเวณชายหาดมีพื้นที่สีเขียวน้อยลง ควรมีการจัดทำเป็นโซน ไม่กระจุกกระจาย 4. การรักษาความปลอดภัยทางด้านชีวิตและทรัพย์สินของนักท่องเที่ยว 5. ความสะอาดด้านการคมนาคม 6. การจัดการกรมให้กับนักท่องเที่ยวเพื่อเป็นการส่งเสริม อนุรักษ์การท่องเที่ยว เช่น การปลูกปะการัง การปลูกป่า การเก็บขยะ เป็นต้น 7. ห้องน้ำไม่เพียงพอ 8. การขยายตัวของโรงแรม และที่พัก 	<p>378 254 252 36 72 54 252 198</p>	<p>94.5 58.5 63.0 9.0 18.0 13.5 63.0 49.5</p>

APPENDIX D

ตัวอย่างภาพจากงานวิจัย

ตัวอย่างภาพขณะทำการเก็บรวบรวมข้อมูล (สัมภาษณ์เชิงลึกและสนทนากลุ่มย่อย)



ผู้ช่วยผู้ใหญ่บ้าน



แกนนำสมาคมอนุรักษ์พิทักษ์เจ้าหลาว



สมาชิกชมรมท่องเที่ยวเจ้าหลาว-แหลมเสด็จ



ประธานชมรมท่องเที่ยวเจ้าหลาว-แหลมเสด็จ



กำนัน



ผู้ใหญ่บ้านหมู่ 7



ประธานชมรมประมงพื้นบ้าน



ผู้ใหญ่บ้านหมู่ 4



สนทนากลุ่มย่อยชาวบ้านหมู่ 7



สนทนากลุ่มย่อย หมู่ 6
ในวันประชุม หมู่บ้าน

ตัวอย่างภาพสถานภาพชายหาดในปัจจุบัน

หาดเจ้าหลาว



หาดแหลมเสด็จ



APPENDIX E

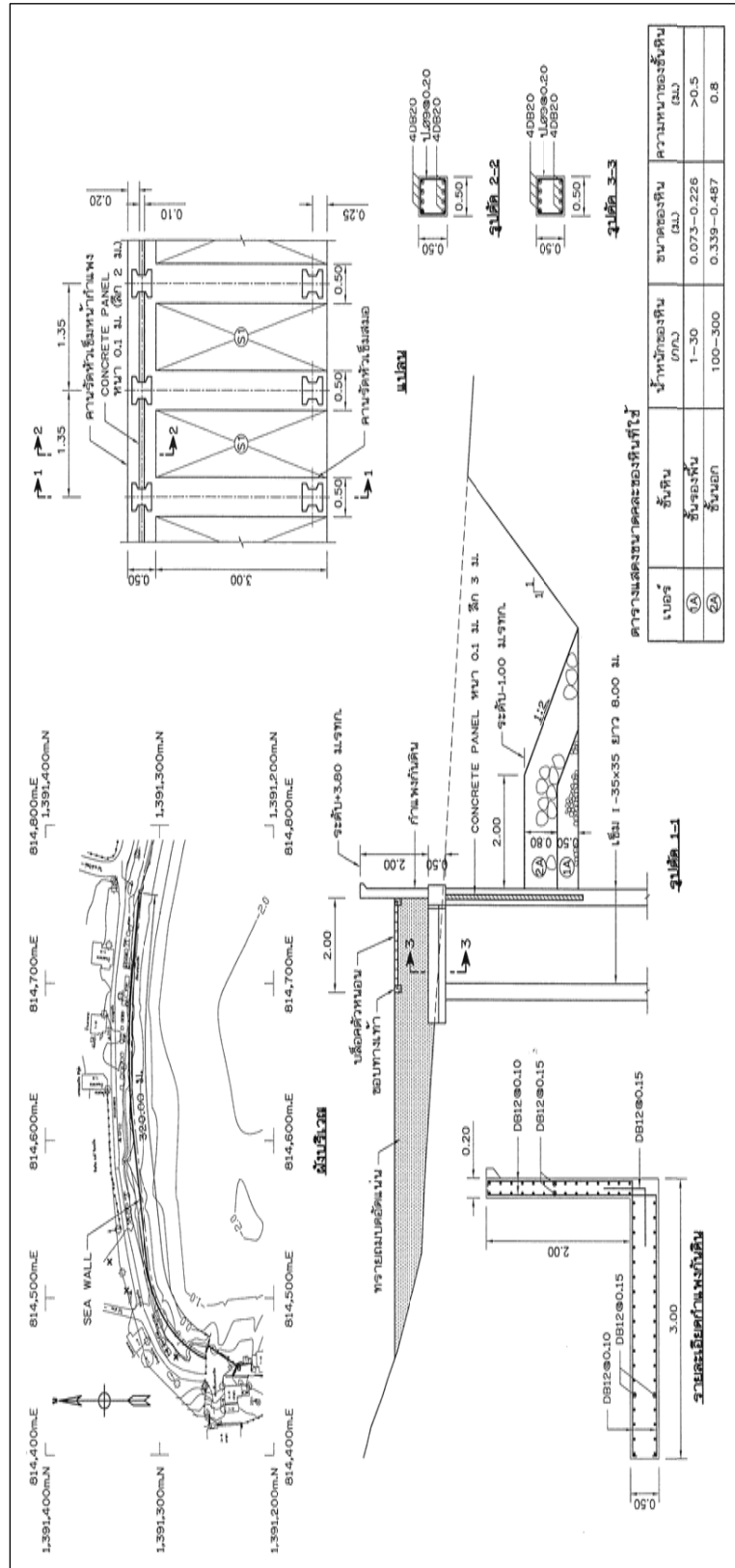


Figure d-1 seawall (Option 1)

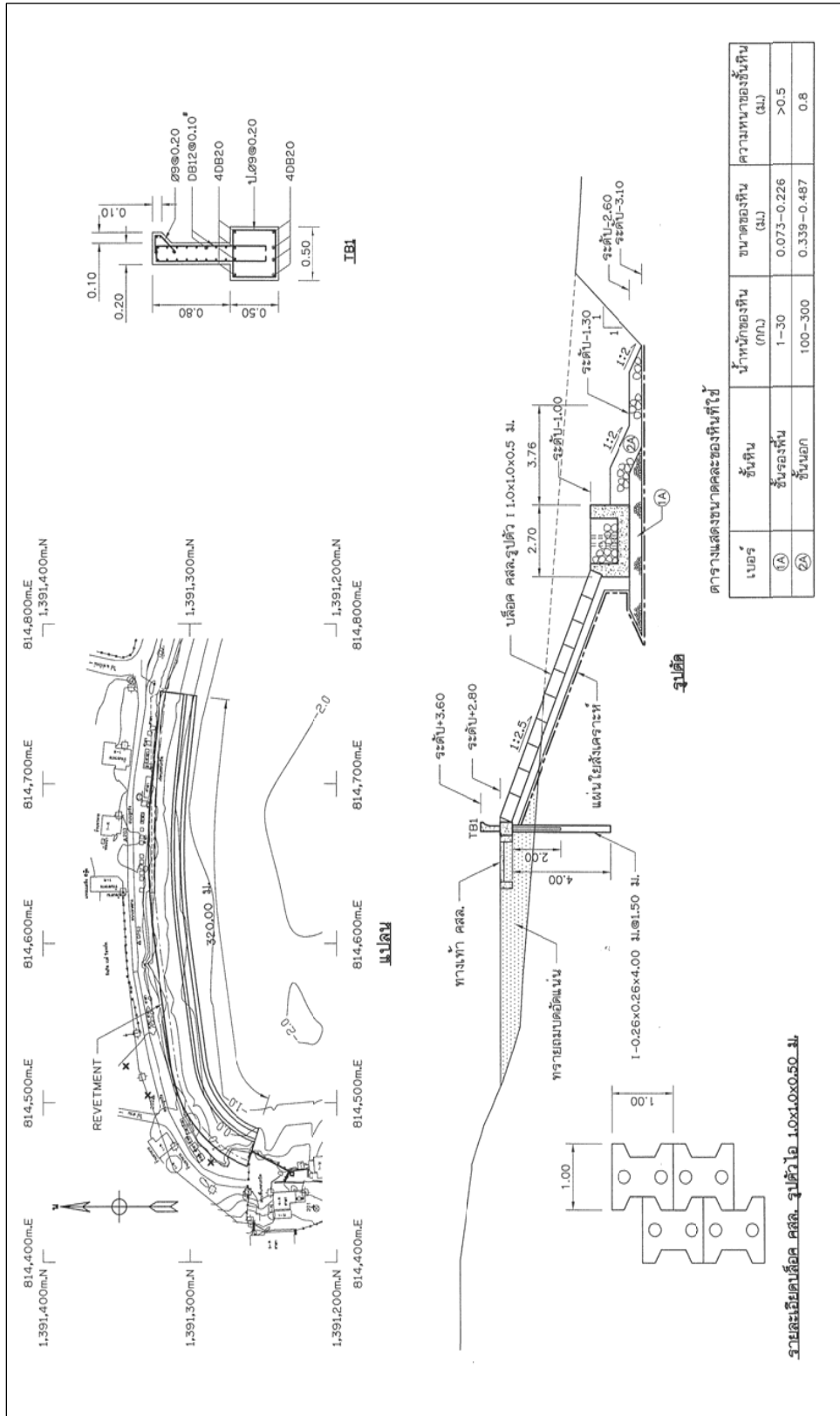


Figure d-2 Revetment (Option 2)

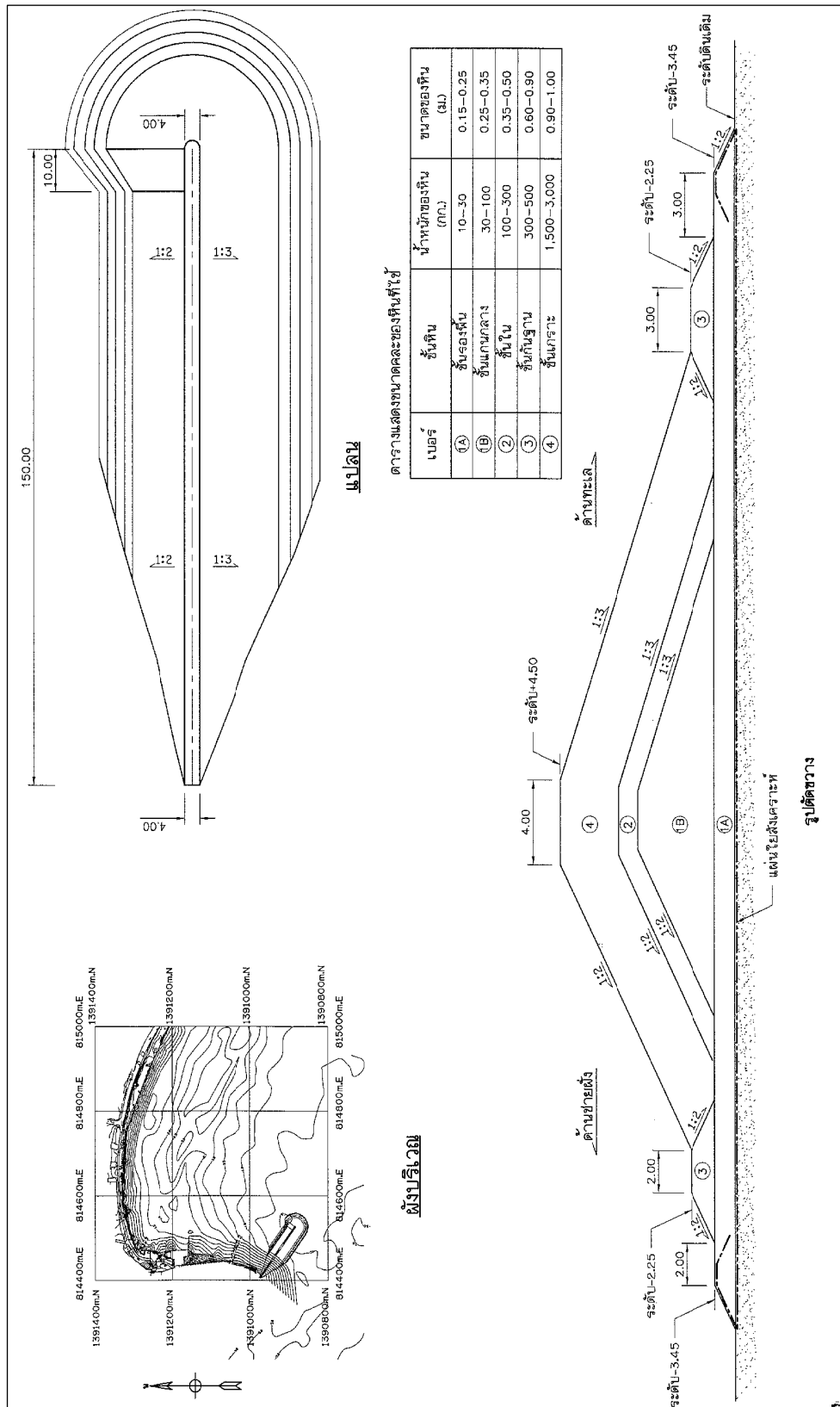


Figure d - 3 Breakwater (Option 3)

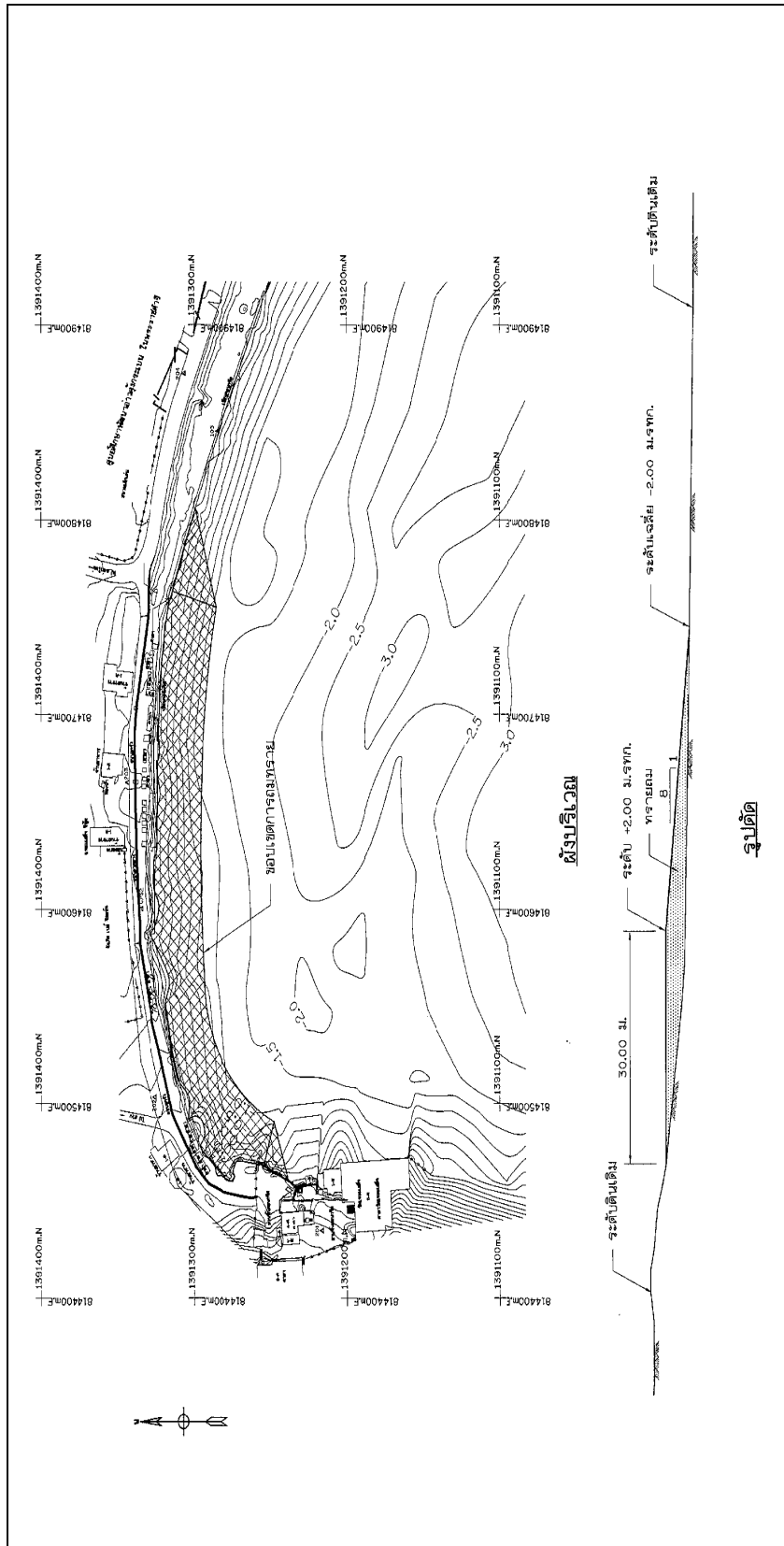


Figure d-4 Beach nourishment (Option 4)

สรุปรายละเอียดของทางเลือกต่าง ๆ ตามเกณฑ์พิจารณาแต่ละเกณฑ์

เกณฑ์พิจารณา	ทางเลือกที่ 1	ทางเลือกที่ 2	ทางเลือกที่ 3	ทางเลือกที่ 4
<p>1. ประสิทธิภาพในการรักษาสุขภาพชายหาด</p>	<p>ในฤดูมรสุมคลื่นจะกัดเซาะเข้ามาถึงด้านหน้ากำแพงทำให้ด้านหน้ากำแพงไม่มีสภาพชายหาดเหลืออยู่ อย่างไรก็ตามหลังจากฤดูมรสุมคลื่นก็จะค่อย ๆ พัดพาทรายที่ถูกกัดเซาะไปอยู่ด้านนอกชายฝั่งให้กลับมามีชายหาด ทำให้สภาพชายหาดกลับมาเป็นเช่นเดิมอีก การสูญเสียสภาพชายหาด จึงเกิดขึ้นในฤดูมรสุมที่ไม่ค่อยมีการใช้ประโยชน์จากชายหาดเท่านั้น</p>	<p>ในฤดูมรสุมจะเกิดการกัดเซาะเข้ามาถึงด้านหน้าโครงสร้างเช่นกัน แต่การกัดเซาะด้านหน้ากำแพงจะรุนแรงน้อยกว่าทำให้พื้นทรายชายหาดด้านหน้าโครงสร้างอยู่ต้นกว่าแนวทางเลือกที่ 1 นอกจากนี้ยังสามารถใช้ประโยชน์บางส่วนได้จากพื้นที่ลาดด้านหน้ากำแพง ส่วนช่วงเวลานอกฤดูมรสุมนั้น ทรายจะถูกคลื่นพัดพาเข้ามาและทำให้ชายหาดคืนสู่สภาพเดิม เหมือนแนวทางเลือกที่ 1</p>	<p>เป็นการสร้างสมดุลชายหาดขึ้นใหม่ ซึ่งขณะก่อสร้างมีการถมทรายเสริมแนวชายหาดเพื่อเร่งให้ชายหาดเข้าสู่สมดุลเร็วขึ้น แนวทางนี้ จะยังคงสภาพชายหาดไว้ แม้จะอยู่ในช่วงฤดูมรสุม ซึ่งแม้ว่าจะมีการกัดเซาะชายหาดเข้ามาบ้าง แต่ก็จะไม่กัดลึกเข้ามาถึงแนวสันทรายด้านในทำให้ยังคงสภาพชายหาดไว้ได้ตลอดเวลา อย่างไรก็ตาม ในช่วงฤดูมรสุมที่คลื่นลมแรงที่ไม่มีความปลอดภัยที่จะลงเล่นน้ำที่ชายหาดในบริเวณนี้</p>	<p>เป็นการถมทรายเสริมแนวชายหาดเดิมให้มีความกว้างมากขึ้นทำให้สามารถใช้ประโยชน์จากชายหาดได้ดี แต่ในช่วงฤดูมรสุมทรายที่ถมไปนั้นก็จะถูกคลื่นพัดพาไปด้านนอกชายหาดหมด หลังฤดูมรสุมคลื่นจึงค่อย ๆ พัดพาทรายกลับคืนสู่ชายหาดอีก โดยจะมีทรายบางส่วนถูกพัดพาออกนอกพื้นที่บริเวณนี้ วิธีการนี้ทำให้ชายหาดมีสภาพดี แต่ไม่มีเสถียรภาพต้องนำทรายมาถมเพิ่มทุก ๆ 2-3 ปี</p>

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<p>2. ความสอดคล้องของรูปแบบโครงสร้างกับสภาพพื้นที่</p>	<p>เนื่องจากบริเวณต่อเนื่องกับพื้นที่ที่จะป้องกันมีโครงสร้างป้องกันที่เกาะกันเป็นแนวกำแพงป้องกันชายหาดอยู่แล้ว โครงสร้างนี้จะมีความกลมกลืนเข้ากับแนวโครงสร้างเดิม แต่ระดับสันเขื่อนและความลาดชันด้านหน้ากำแพงจะมีความแตกต่างกับแนวกำแพงเดิมบ้างเล็กน้อยเพื่อประสิทธิภาพในการป้องกันคลื่นที่ตื้นและลักษณะโครงสร้างที่สูงมากนักเมื่อมองจากชายหาดจะไม่คิดวางสายตา</p>	<p>มีลักษณะเช่นเดียวกับแนวทางเลือกที่ 1 แต่ระดับสันกำแพงจะต่ำกว่า และลาดชันหน้ากำแพงจะมีความลาดมากกว่าทางเลือกที่ 1</p>	<p>เนื่องจากลักษณะของเขื่อนกันคลื่นสร้างขึ้นออกมาจากแหลมเสด็จยาว = 200 ม. และระดับสันเขื่อนอยู่ที่ + 3.50 ม.รทก. ตัวโครงสร้างจึงอาจเกิดขวางสายตาเมื่อมองจากแนวชายหาด รวมทั้งโครงสร้างที่มีลักษณะที่แตกต่างจากโครงสร้างเดิมบริเวณใกล้เคียงและอยู่แยกส่วนออกมา จึงอาจดูไม่กลมกลืนกับแนวโครงสร้างเดิม</p>	<p>ไม่มีการก่อสร้างโครงสร้างใดๆ เป็นเพียงการถมปรับทรายชายหาดเท่านั้น จึงกลมกลืนกับสภาพพื้นที่มากที่สุด</p>
<p>3. ผลกระทบของโครงสร้างที่มีต่อ</p>	<p>เป็นการก่อสร้างบนฝั่งบริเวณสันทรายชายหาดจึงไม่ส่งผลกระทบต่อระบบนิเวศบริเวณข้างเคียงแต่อาจมีผลกระทบต่อทัศนียภาพ ชายหาดบ้างในช่วงก่อสร้าง โครงการแต่ก็เป็น</p>	<p>มีลักษณะเช่นเดียวกับทางเลือกที่ 1</p>	<p>เนื่องจากเป็นโครงสร้างที่อยู่ในทะเล จึงส่งผลกระทบต่อระบบนิเวศในทะเลในขณะก่อสร้าง โดยสูญเสียตัวหน้าดินบางส่วน และเกิดตะกอนทำให้หน้าเขื่อนขณะก่อสร้าง ซึ่งอาจส่งผลกระทบต่อ</p>	<p>ในช่วงที่ทำการถมปรับทราย จะทำให้หน้าทะเลบริเวณชายหาดมีความขุ่นมากขึ้น แต่ผลกระทบจะเกิดขึ้นในช่วงสั้น ๆ เฉพาะช่วงเวลาที่ถมปรับทรายเท่านั้น</p>

เกณฑ์พิจารณา	ทางเลือกที่ 1	ทางเลือกที่ 2	ทางเลือกที่ 3	ทางเลือกที่ 4
สภาพแวดล้อม	ผลกระทบในระยะสั้น		แนวปะการังที่อยู่ใกล้เคียงบริเวณแหลมเสด็จ นอกจากนี้ ตัวเขื่อนยื่นออกไปในทะเลประมาณ 200 ม. จึงอาจกีดขวางทางเดินเรือ และการสัญจรทางน้ำในพื้นที่บ้าง แต่ไม่มีนัยสำคัญมากนัก เนื่องจากเป็นพื้นที่ด้านในของแหลมที่ไม่มีการสัญจรผ่านมากนัก	
4. งบประมาณค่าก่อสร้าง	ค่าใช้จ่ายในการก่อสร้าง ประมาณ 12,220,00	ค่าใช้จ่ายในการก่อสร้าง ประมาณ 23,395,000 บาท	ค่าใช้จ่ายในการก่อสร้างประมาณ 27,698,000 บาท	ค่าใช้จ่ายในการงบประมาณประมาณ 7,059,000.-บาทต่อครั้ง โดยต้องมทราขเพิ่มทุก 3 ปี หากเทียบระยะโครงการ 15 ปี (เท่าอายุโครงการป้องกันการค้าทะเล) จะต้องมทราข 5 ครั้ง คิดเป็นเงินรวม 35,295,000.- บาท

เกณฑ์พิจารณา	ทางเลือกที่ 1	ทางเลือกที่ 2	ทางเลือกที่ 3	ทางเลือกที่ 4
<p>5. ความยากง่ายในการก่อสร้างและบำรุงรักษาโครงการ</p>	<p>การก่อสร้างดำเนินการบนฝั่งจึงก่อสร้างและขนย้ายเครื่องจักร & อุปกรณ์ต่างๆ ได้ง่าย และในกรณีที่โครงสร้างเกิดการชำรุดเสียหายก็ทำการซ่อมแซมได้สะดวกกว่าทางเลือกที่ 3 เนื่องจากเป็นการซ่อมแซมบนฝั่งนอกจากนี้การที่โครงสร้างแบ่งเป็นส่วนๆ อยู่แล้วหากชำรุดในส่วนใดก็ซ่อมแซมเฉพาะในส่วนนั้นได้</p>	<p>เป็นงานก่อสร้างบนฝั่งเช่นเดียวกับทางเลือกที่ 1 จึงดำเนินการได้ง่าย ส่วนการบำรุงรักษานั้น จะดำเนินการได้ง่ายกว่าทางเลือกที่ 1 สาเหตุจากโครงสร้างนอกจากจะแบ่งเป็นส่วนๆ แล้ว ในแต่ละส่วนยังแยกเป็นคอนกรีตบล็อกรูปตัวไอเป็นก้อนๆ อีกด้วย ดังนั้นหากเกิดการชำรุดเสียหายที่ก่อนใดก็เปลี่ยนเฉพาะก้อนนั้นๆ ได้โดยไม่ต้องซ่อมแซมทั้งส่วน</p>	<p>แม้ว่าโครงสร้างจะอยู่ติดชายฝั่งแต่ไม่มีถนนเข้าถึงพื้นที่และเป็นงานก่อสร้างในทะเลจึงมีความยุ่งยากพอสมควรทั้งในกาขนย้ายเครื่องจักร&วัสดุอุปกรณ์เข้าพื้นที่ก่อสร้างและการควบคุมงานก่อสร้าง ในส่วนของการบำรุงรักษาโครงการนั้น การซ่อมแซมส่วนที่ชำรุดเสียหายอาจทำได้ไม่ยากนักเนื่องจากโครงสร้างเป็นหินทิ้งซึ่งอาจซ่อมแซมโดยการนำหินไปเรียงเสริมส่วนที่ชำรุดเสียหาย แต่เนื่องจากเป็นงานในทะเลจึงต้องเสียค่าใช้จ่ายสูงในการขนย้ายเครื่องมือ & อุปกรณ์และวัสดุที่ใช้ซ่อมแซม</p>	<p>การถมปรับทรายทำได้ง่ายใช้เครื่องจักรอุปกรณ์น้อยรวมทั้งการบำรุงรักษาโครงการก็ทำได้ง่ายมากแต่ก็ต้องดำเนินการบ่อยครั้ง (2-3 ปี/ครั้ง) จึงจะตอบสนองต่อวัตถุประสงค์ได้</p>

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6. การใช้ประโยชน์ในด้านอื่นๆ ของโครงสร้าง	ใช้เป็นที่นั่งพักผ่อนหย่อนใจริมชายหาด	ใช้เป็นที่นั่งพักผ่อนหย่อนใจริมชายหาด	<ul style="list-style-type: none"> - ใช้เป็นที่หลบคลื่นลมของเรือประมงได้ในบางช่วงเวลา - เป็นแหล่งที่จะมีสัตว์น้ำมาอยู่อาศัยตามซอกหิน - ใช้เป็นที่พักผ่อนหย่อนใจในการตกปลาแต่อาจไม่มีความเหมาะสม เนื่องจากอยู่บริเวณหน้าลำน้ำกตงษ์ 	หาดทรายที่กว้างขึ้นจะช่วยเพิ่มพื้นที่ของชายหาดที่เป็นแหล่งพักผ่อนหย่อนใจของนักท่องเที่ยว

BIOGRAPHY

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