

# DESIGNING A SUSTAINABLE COASTAL ECOSYSTEM MANAGEMENT FOR COMMUNITIES IN THE SOUTH OF THAILAND

## ABSTRACT

Koh Klang, a community located along the coastline of Krabi province, has severely suffered from the impacts of coastal erosion, as a result of climate change. The issue poses consequences to biodiversity loss and puts humans' lives in jeopardy. Moreover, as the erosion results in the loss of land areas, the locals' residences are also being destroyed. However, it is found that only certain actions provided by the governmental organizations to minimize the impacts have been carried out. Locals still have to find solutions by themselves, which is to repeatedly migrate and search for new living places.

This study aims to design sustainable coastal ecosystem management for the communities in Krabi. It requires a site visit to identify and carry out discussions with the locals, as well as acquiring hands-on experiences, to fully acknowledge and understand the actual problem occurring in the Koh Klang community. After visiting the community, interviewing relevant organizations and performing background research, the team discovered that the key issue is the inefficient coordination and the lack of a full understanding of each other's perspectives between involved parties on solving the issue of coastal erosion. Therefore, the team will propose a strategy for approaching the involved parties, comprising the locals and relevant governmental organizations, to understand the diverse perspectives and take account of the coastal erosion issues.

### Team Members

Atiwit Intarasorn  
Kornkanok Paramesirikuntorn  
Phattanan Pornsakulrat  
Sasilak Pinwattanachai  
Suchujnun Uparipahk  
Surawat Chukaew

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### Advisors

Prof. Dr. Supawan Tantayanon  
Professor Dr. Joel Farnworth  
Ass.Prof. M.L. Siripastr Jayanta  
Ass. Prof. Dr. Numpon Insin

### Sponsor



Population and Community  
Development Association  
(PDA)



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## **SUSTAINABLE ECOSYSTEM: COASTAL EROSION IN KOH KLANG COMMUNITY**

Climate change is impacting human health and livelihoods. Changes in weather and climatic patterns, due to climate change, can endanger humans' lives. Retrieved from Sciencing, scientists predicted that as temperatures rise as a consequence of climate change, the quantity and diversity of species that characterize biodiversity would decline drastically (Michelle, 2019)<sup>1</sup>. Likewise, this calls out for actions of conserving the biodiversity that remained, to protect both the wildlife and humans. To elucidate, biodiversity is the cornerstone of the planet's health and has a direct influence on all human lives. Indeed, a lower level of biodiversity means millions will face a future where food supplies are more vulnerable to pests and disease, and freshwater is scarce. The local communities existing in Koh Klang, Khlong Prasong sub-district, Krabi province are currently fighting against the consequential damages from climate change. The increasing severity and frequency of storms and droughts have impacted the biodiversity of environmental areas and worsened erosion of the coastal areas of Koh Klang. All individuals, henceforth, shall take into account the urgency and proceed with further actions. Nonetheless, with diverse perspectives on these particular issues, the obstacles in tackling them then arise.

Henceforth, the need for all parties involved, as well as those being affected by the issues, to understand each other's standpoint and possess a similar vision has then become a top priority.

Even though the construction of the bamboo dam is considered the main solution to help lessen the impact of coastal erosion in the Koh Klang community, as well as contributing to the biodiversity richness development, it was discovered that only one village of Khlong Prasong sub-district, specifically the Moo 2, had constructed a bamboo dam as protection. To elucidate, the importance of the bamboo dam is to slow down the wind waves and to increase sludge production (Department of Marine and Coastal Resources, 2015)<sup>2</sup>. Correspondingly, the bamboo dam not only serves as a sustainable erosion control tool, but also contributes to the increment of mangrove areas because mangrove reforestation can only occur in muddy areas, where sludge is formed.

However, locals in the community still lack awareness regarding the urgency of the issue, as well as the understanding of the impact that they will suffer caused by the erosion. Furthermore, merely several actions have been implemented to some extent by the governmental organizations to solve the problem due to the insufficient coordination between the involved parties and the locals themselves. Indeed, it is significant to extensively solve the problem to sustainably conserve the environment and maintain the conditions of the local community.

Consequently, constructing a bamboo dam by planting Samae trees and mangroves is considered one of the solutions that can help lower the severity of the current problem. Likewise, to construct a suitable plan for the parties involved, data collection from the leaders of the four targeted communities in Koh Klang and observation from the actual sites along the coastal areas are then necessary.

This project mainly aims to promote sustainable biodiversity development and the benefits for the Koh Klang community in Krabi provinces. The project also involves collecting data, analyzing and processing problems, and obstacles that may arise during the implementation of the strategy in order for coastal communities to live sustainably, given the impact of the climate changes. The relevant information will be obtained from the Population and Community Development Association (PDA), as well as from community leaders, locals, and relevant parties throughout the interview process. The interviews and observations are the crucial aspects of the data collection. To elucidate, the information gained from the interviews can potentially help support the analysis of the actual issues, and the well-being of individuals in the community. Thus, the team's main goal is to encourage all parties involved, including certain organizations and the locals in the Koh Klang community, to see and understand others' perspectives and the severity of the coastal erosion issues.

## COMMUNITIES IN COASTAL CITIES OF SOUTHERN THAILAND

Krabi is considered a small province, albeit, with diverse natural resources and cultural heritages. There is a harmonious combination of individuals of different races, religions, and different beliefs. Krabi is located on the west coast of Southern Thailand bordering the Andaman Sea with an area of 4,708.512 square kilometers.

Ban Koh Klang Community is in the area of Khlong Prasong Sub-district, Mueang District, Krabi Province. The Khlong Prasong Sub-district is an island located on the left of the Krabi River that is surrounded with bamboo canals and Khmao canals as a boundary line in every direction, except to the North. The area is located on the estuary of the Krabi River and the Gulf. Koh Klang has a total area of 16,250 rai consisting of 4 villages: Ban Ko Klang Village, Ban Khlong Prasong Village, Ban Khlong Kam Village, and Ban Bang Khanun Village.

Most of the area in the Khlong Prasong Sub-district is mangrove forests. The areas of this district which are adjacent to the sea consists of sandy beaches and also lagoons. Furthermore, the soil in the district is considered to be particularly suitable for agriculture. Most of the rice farming areas are in Moo 1 and Moo 2, with an area of approximately 700 and 200 rai, respectively. Other crops also grown include coconuts, cashew nuts, and palm oil.

The general occupation of the locals living in the community is characterized by a combination of coastal fisheries and agriculture. Major fishing activities include catching shrimps and fishes, hunting for sweet clams on sandy beaches, and catching black crabs in the mangrove forests. Conversely, there are also non-agricultural occupations, the majority of which are related to the tourism industry. Since Khlong Prasong is located near the city town of Krabi, consisting of mangrove forests, streams, and various canals, these are sources of attraction for tourists. Therefore, the non-agricultural occupations of the locals, for instance, driving boats for tourists, are considered to be an important additional source of income for the locals. In addition, there are also fish processing and local handicrafts made by women and elderly groups that can also generate income for the community.

### DAM TYPES

The major issue that the local community living around the island have been facing for many years is the problem of coastal erosion, which is a coastal transformation process that occurs constantly from the effect of the waves or wind. Sediment from one place falls onto another area which causes the original coastline to change. The area from which the sediment moves out in a larger quantity than moves in is known as coastal erosion.

Breakwater dams can be used to prevent the issues of coastal erosion and different types of dams will be built in different areas as appropriate.



*Figure 1. Bamboo dam*

To illustrate, there are 2 main types of dams that are used to construct along the shoreline or coastal area, which are offshore and along the shore. Offshore breakwaters are walls constructed parallel to the shoreline, but at some distance offshore, usually a tens of meters seaward of the ordinary surf zone. There are 2 main materials that are used for building the breakwater which is a hard material and soft material. The hard materials include concrete and rocks which are appropriate to the shoreline area and the soft material is trees such as bamboo which is most suitable for the mud flat area. For protection along the shoreline, seawalls are considered hard constructed structures with the primary goal of preventing further erosion, particularly of the shoreline or sand beaches. Seawalls specifically are constructed parallel to the beach with the goal of holding or inhibiting soil sliding while providing shelter from wave action. Seawalls serve as a defining barrier between the water and the land. Henceforth, they are typically employed in areas where additional coastline erosion would result in significant, additional harm.



## BIODIVERSITY

The environmental changes being driven by climate change are disturbing natural habitats and species in ways that are still only becoming clear. There are signs that rising temperatures are affecting biodiversity while changing rainfall patterns, extreme weather events, and ocean acidification is putting pressure on species already threatened by other human activities. The WWF Greater Mekong Program, known in short as the WWF-GMP, is concerned with the environmental alterations of the Greater Mekong Region (GMR) as a result of trade liberalization, demographic expansion, and fast economic growth, which is causing natural ecosystems and biodiversity to degrade. Climate change is exacerbating these issues, which will be compounded by a lack of integrated planning and a failure to incorporate the effects of these environmental concerns into economic policies and development aid. Climate change is predicted to exacerbate the danger to biodiversity, yet robust ecosystems can also assist mitigate the effects of climate change. To elucidate, climate change has a significant influence on biodiversity by increasing the severity and frequency of fires, storms, and droughts.

Changes in the incidence of marine algal blooms have also been observed. Despite the challenges to biodiversity presented by climate change, it is known that natural ecosystems play a vital role in climate regulation and may assist in absorbing and storing carbon.

Mangroves are huge carbon sinks, and the Amazon is one of the most ecologically diverse regions on the globe, albeit recent research suggests the Amazon may currently be spewing more carbon than it absorbs. Ultimately, protecting these natural carbon sinks from further harm is a critical component of mitigating climate change.

Due to the site's sheer closeness to Krabi town, one of the most popular tourist destinations in the peninsular of Thailand, biodiversity is endangered by tourism development, infrastructural development, and pollution. Other vulnerabilities to biodiversity include the conversion of mature mangroves into shrimp ponds and the lack of environmental protections in afforestation initiatives. Further to that, the dredging of river channels at the site is changing sedimentation patterns that are critical for the survival of sandbars and intertidal mudflats.

This aspect is significant when taken into account, as migratory water birds use Na Muang Krabi as a stopover. The internationally vulnerable Nordmann's Greenshank *Tringa guttifer* and Chinese Egret *Egretta eulophotes* are regular winter visitors to the site, while Masked Finfoot *Heliopais personata* is a non-breeding visitor. The location is home to two internationally vulnerable species, Mangrove Pitta *Pitta megarhyncha* and Brown-winged Kingfisher *Halcyon amauroptera*, as well as a third, Asian Dowitcher *Limnodromus semipalmatus*, which arrives on a regular basis as a passage migrant.



*Figure 2. The villager tried to protect biodiversity*

Birds are highly mobile animals which allows them to seek habitats that are suitable for living conditions in each season. Henceforth, birds are the most migratory animals. These bird migrations occur in a similar cycle every year, with the main reason being to find areas that have a rich and suitable food source for nesting and raising their young. Furthermore, they also need to migrate down to the southern hemisphere where food supplies are abundant.

Migratory birds, therefore, are effective indicators of species richness and endemism variations, or simply put, the environmental conditions. Changes in migratory bird population can also be used to predict relatively broad environmental changes. For instance, birds are an ecologist's preferred tool since they are sensitive to habitat change and are uncomplicated to quantify. These biodiversity indicators are essential, as the expenditure of conducting a thorough assessment of biodiversity is significant.



Likewise, the environmental conditions of the Koh Klang local areas or surroundings can be measured by various factors or indicators, of which migrating bird populations are one.

## **FOUR MAIN ISSUES CONCERNING SUSTAINABLE COASTAL ECOSYSTEM**

### **COASTAL EROSION AND WASTE POLLUTION**

Currently, the most concerning issues in the Koh Klang community are mainly coastal erosion and waste pollution problems. This is due to the fact that Koh Klang is a community that is surrounded by sea water. Indeed, the situation resulting from such problems, specifically the coastal erosion and waste pollution, tends to worsen and become more severe every year as the issue of global warming arises.

Regarding the coastal erosion issue, to illustrate, through the years, over 300 rai of the community's area has been flooded by the raising of sea water levels. As a result, the locals living near the coastal areas have been forced to evacuate and look for new living places, i.e. relocate. Furthermore, another effect from the coastal erosion is the issue of rice fields which were destroyed from being flooded with seawater. Essentially, in order to prevent the damages from the coastal erosion issue, building bamboo dams is being considered as a borderline protection.

The local community has noticed the changing of the environment, caused by global warming, that is becoming more frequent and intense, to the extent that it can no longer be ignored by the local community. Presently, there is simply a row of bamboo that is not well built, and planting of mangrove as layers of protection from the flooding and erosion of the area. This is a solution proposed by the local individuals in the community. However, it has been discovered that the bamboo dam has not been erected in every area of the Koh Klang community, even in the area near the coastal lines. Consequently, without the installation of the bamboo dam, the coastal erosion issues will significantly worsen causing salt water to enter the community areas, adversely impacting the locals' residences, their way of life, as well as their occupations.



*Figure 3. Houses in Koh Klang destroyed  
by erosion*



*Figure 4. Waste pollution in Koh Klang*

On the other hand, the waste pollution in Koh Klang is also considered to be one of the largest issues that the local community, together with the government authorities, still are not able to come up with any effective control policy measures to prevent the issue. To further clarify, the Koh Klang community area is located near the estuary of the Krabi River. Thus, estuarine litter, from small to large pieces of waste, can be pulled in from every corner of the sea, including neighboring countries. Significantly, during the low tide period, there are over thousands tonnes of waste per year that appear or end up on the coastal lines around Koh Klang areas.

Other than the coastal waste, the problem of waste pollution also arises from excessive quantities of waste disposal from the local community. Since the population of individuals living in the Koh Klang community is increasing, the amount of waste disposal likewise is increasing accordingly.

## *SALTWATER INVADES RICE FIELDS*

Sung Yod rice is well-known throughout the country, as it is local rice grown in Koh Klang, Krabi. It is a red-tinted long-grain-shaped rice cultivated annually by the local farmers. Intriguingly, due to the fact that Koh Klang is located in an area that is surrounded by salt water, in order to grow the rice effectively, both rainwater and brackish water are required. This particular geographic location, and combination of rain and brackish water used, helps the Sung Yod rice grown in Koh Klang have a soft texture and delicious taste that is distinctive from Sung Yod rice grown in other regions. Accordingly, this results in the Sung Yod rice becoming one of the OTOP products of Krabi, and it is favored by the majority of the tourists and the locals themselves. Additionally, Sung Yod rice has also become the staple food of the locals living in Koh Klang, due to its high nutrients and deliciousness. Interestingly, even though Sung Yod rice is known as a local rice grown by the Koh Klang community, Sung Yod rice originates mainly from Phatthalung province, where there is no salt water, and therefore only fresh water is used to grow the rice. Consequently, as the amount of salt water increases, the rice will wither and die.

Indeed, the issue regarding the invasion of salt water to the rice fields is due to the rising seawater levels, eventuating as a consequence of climate change.

To illustrate the damages, in the areas of Khlong Prasong Sub-district, where the Koh Klang community is located, there are a total of 700 rai that are able to grow rice. However, as sea water level rises, causing excessive amounts of salt water entering the rice fields, the available cultivated areas have reduced to 400 rai, meaning 300 rai of rice fields have been destroyed.



*Figure 5. Saltwater invading the rice fields*

Several governmental organizations, the Land Development Department and other relevant organizations, have come to assist with the problem by building salt water barriers. Nonetheless, only certain areas of the community have improved and are protected from the invasion of salt water currently.

## *SHRINKING OF MANGROVE AND COASTAL AREAS*

Mangrove forests in Krabi exist along the coastline around muddy beaches and the plain areas near the estuary.

The mangrove forest in Krabi, where the area is approximately 218,250 rai, has been invaded and destroyed for building construction. Furthermore, some areas have been destroyed for other uses such as cultivating coastal animals, especially shrimp farming.

Additionally, the issue of the shrinking of the canal-side mangrove area is caused by the removal of the mangrove area to turn into available areas for cage fish farming. Consequently, the destruction of mangrove areas has reduced the number of regional aquatic animals, due to the fact that coastal areas, especially mangrove areas, are a breeding ground for aquatic animals, as well as being a habitat and a refuge for aquatic mammals. However, unfortunately, the locals, for instance, the fishermen, are still highly dependent on the marine life species. Hence, the destruction of mangroves, leading to the loss of fish, definitely has a significant impact on individuals whose income relies mainly on fishing.

Tourism activities have also adversely contributed to the decline of mangrove distributions. Mangroves were destroyed as a result of tourism development since the lands have been cleared for the creation of infrastructures, such as beach resorts and hotels. Mangroves are also cleared and destroyed to create boat-riding paths for tourists. Accordingly, the regulations from the Sub-district Administrative Organization of Khlong Prasong were instigated to limit the boat speed mainly in relation to the tourism sector, to reduce the damage to the mangroves.



Besides, the loss of mangrove ecosystems also resulted from shrimp farming. For instance, in Krabi, approximately 56 percent of the total mangrove forest areas have been lost, specifically between the years 1961 to 1996, due to the conversion of mangrove areas to shrimp ponds. Following that, locals have turned the shrimp pond into natural aquatic animal ponds and planted more mangroves. Regardless, currently, there are still certain abandoned shrimp ponds that provide no advantage to the community.



*Figure 6. Mangrove Forest*

Lastly, mangrove destruction also contributes to the changes in coastlines, such as coastal erosion, since the roots of mangrove tree roots are huge and can be extremely effective in dispersing wave energy from the shorelines.

Accordingly, due to the coastal erosion issue, locals are forced to relocate and seek new safer areas to settle. As a result, the lives of the locals will be interrupted, as they need to start over in new locations. Moving to a new location has also resulted in the loss of life and properties, as well.

### **BAMBOO STRUCTURE PREVENTING COASTAL EROSION ON THE UPPER GULF OF THAILAND**

Coastal erosion is considered one of Thailand's main issues because it produces numerous negative impacts to both humans and the coastal ecosystem. Indeed, it has been discovered that the impacts from erosion can be divided into 3 aspects which comprise: economic impacts, social impacts, and environmental impacts. For instance, in regards to environmental impacts, coastal erosion has led to the loss of land, loss of mangrove areas, loss of coastal scenery, and a reduction in marine species. Undoubtedly, the loss of land then links to the social impacts, where local communities living around the coastal areas are forced to relocate due to the fact that the land on which they live has been destroyed. Worse than that, the migration of locals may give rise to the change in their lifestyles resulting in the loss of cultural traditions.

To illustrate the severity, the areas of over 17 provinces located along the coastal lines of Thailand, approximately 830 kms. in distance, have been eroded. Within that total of 830 km eroded distance, 730 km is situated in areas located near the Gulf of Thailand.

As these areas have been severely affected by the coastal erosion issues, the Department of Marine and Coastal Resources (DMCR) therefore considered starting a project of bamboo dam installation to solve the problem urgently. Interestingly, the concept of bamboo dams, as a coastal erosion prevention tool, had been noticed by the community leaders and the locals of Samut Sakhon province. To elucidate, bamboo was firstly used as a fish trap by local fishermen. However, it was found that the establishment of bamboo contributes to the sediment accumulation, whereby the sediment can help reduce the wave action. Therefore, locals then used bamboo dams, along with planting mangrove trees to restore mangrove forests, in order to lessen the impact of coastal erosion. In support, DMCR has stated that the increased rates of mangrove deforestation also adversely contribute to the severity of the erosion. Thus, to effectively and extensively prevent coastal erosion, mangrove replanting should also be taken into consideration.

In regards to the project of DMCR and the community to install the bamboo structure, the project had been started in 8 areas along the upper Gulf of Thailand.



For the design of the bamboo structure, the bamboo should be installed tightly close together with no space between the stakes. The bamboo with a size of at least 3 inches wide, and 5 meters long, were installed in 5 rows, where approximately 2 meters of the bamboo will be in the ground. The rows of bamboo were alternated in a zigzag design with at least 35 sticks in 5 rows per 1 meter of the structure.

Consequently, it is reported that the project was found to be successful in several areas. In other words, the construction of a bamboo dam, combined with the planting of mangrove trees, have shown positive outcomes towards coastal erosion prevention.

## **EROSION PROTECTION OPTIONS OF A MUD COASTLINE IN THAILAND: STAKEHOLDERS' SHARED RESPONSIBILITIES**

Noticeably, coastal erosion has become a worldwide problem that affects practically every nation that has a coastline, including Thailand. Constructing coastal protection structures along a mud shore is considered a challenging task. There are many restrictions and conflicts, many of which Thailand has already faced, which impeded the implementation. For instance, the coastline in Thailand can be divided into two types which are sand coastlines along the southern part of the country, and mud coastlines along the inner Upper Gulf of Thailand.

It is reported that from the year 1989 to 2010, in the Chachoengsao Province, Thailand, the shoreline had been aggressively eroded by the sea. Thus, the Department of Marine and Coastal Resources, the Department of Mineral Resources, and the relevant organizations then cooperated with each other to solve the coastal erosion issue in this area.

The local government and the Provincial Office of Public Works and Town & Country Planning (OPT), decided to construct three main structures which are Low-crested revetments or LCR, sand sausages, and bamboo fencing. Beginning with LCR, the OPT staff realized that the LCR structures could operate well. The final design of the LCR at that time had a height of 2 meters with big rocks and wooden piles to reduce the settlement. Nevertheless, the local government had to maintain and increase the height of the crest of the revetments every year. The local authorities claimed that sedimentation began on the lee side of the LCR shortly after it was constructed. It took approximately two years for the sedimentation to become thick and dense. Meanwhile, the Samae seeds settled behind the LCR and began to develop since they were protected from strong waves by the LCR. Later on, the local government constructed public rest areas to show off its successful efforts to conserve the shoreline.

Furthermore, sand-filled geocontainer or sand sausages was one of the structures that the local government chose to solve the coastal erosion issue.

The reasons provided by the Marine Department (MD) staff for choosing the sand sausages were because of their lightweight and simple installation and removal. Unfortunately, the land geography was a mud foundation which is not suitable for handling heavy constructions. Nevertheless, the local government stated that the sand sausages could only effectively protect the coast for the first few years, due to the fact that there were no measures to reduce the settlement rate of the sand sausages. Furthermore, local communities stated that the sausages easily disintegrated and leaked causing many negative impacts to the environment arising from the leakage. For instance, the sand which had leaked out could kill marine animals and harm the ecology of the mud coast

In terms of the bamboo fencing, this method was deemed compatible with mangrove protection and reforestation due to the fact that it is biodegradable. Moreover, the bamboo fencing building process was simple, and mangroves could be planted behind the fencing after it had been completed. The sedimentation, according to the contractor, would begin once the bamboo barrier was built and would take two years before the deposited mud was deep and dense enough to securely hold the roots of the planted mangroves. To conclude, the coastal protection measure that was finally approved was a low-crested revetment, with optional bamboo fencing, while the sand sausages were prohibited by all local communities as the sand sausages were considered both useless and a waste of money.

## APPROACH TO A SUITABLE AND EFFECTIVE STRATEGY PUT FORWARD TO ALL PARTIES INVOLVED

The main goal of this project was to propose a suitable and effective strategy to put forward to all parties involved, including certain organizations and the locals in the Koh Klang community, Krabi Province, with the purpose of encouraging them to fully understand others' perspectives, the severity of the coastal erosion issues, and the urgency of the conservation of biodiversity. In this particular case, the objectives of the project are concrete accomplishments that may be attained by performing the following steps in order to fulfill the stated goal:

1. Understand the needs of the sponsoring organization
2. Learn about the livelihoods of the local communities and gain insight on the actual issues
3. Obtain more in-depth information on the management of sustainable coastal ecosystems
4. Construct and transfer the suggestions to all involved parties

As shown in Figure 7, these methods will illustrate how the team can deliver helpful suggestions to the sponsoring organization, PDA. These suggestions are for the future benefit of all the involved parties and also for further improvement to the Koh Klang community in Krabi province.

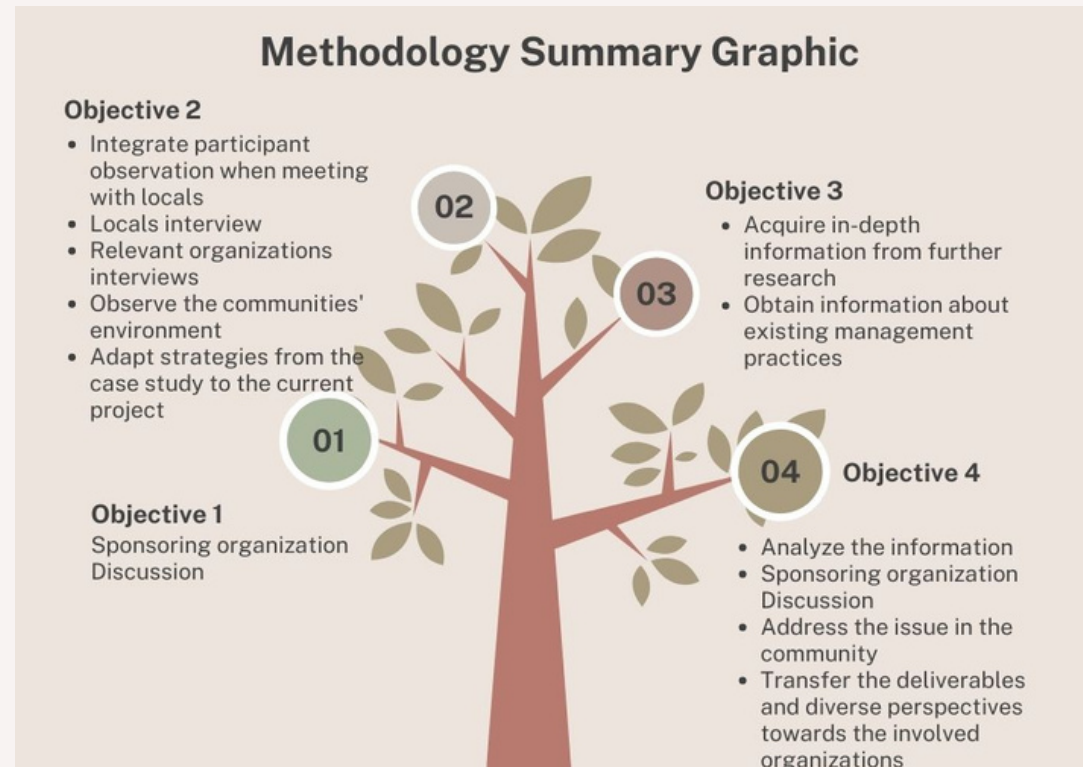


Figure 7. Methodology Infographic

### OBJECTIVE 1: UNDERSTAND THE NEEDS OF THE SPONSORING ORGANIZATION

#### SPONSOR MEETING AND DISCUSSION WITH POPULATION AND COMMUNITY DEVELOPMENT ASSOCIATION (PDA)

In terms of understanding the stated objectives and the actual issues of the project, a meeting with the sponsoring organization, Population and Community Development Association (PDA) is necessary in order to ensure mutual understanding between the team participants and the sponsor organization, as well as satisfying the sponsor organization's needs.

Furthermore, through the meetings the team can also present the project progress, report findings, and make adjustments accordingly. Therefore, a meeting with Dr. Wolfgang Frank and Khun Teerayuth Kukangwan was arranged to discuss the main concerning issue and to scope the area of the study. This will help the team identify the main focus which is on biodiversity and environmental conservation in order to effectively set the goal and objectives, and adjust the field visit plan suitably. Furthermore, for the field visit, a meeting with Khun Amnuay Chunu, the director of Population and Community Development Association (PDA) Krabi Center is therefore essential because Khun Amnuay Chunu can provide beneficial suggestions, as well as give supportive assistance while the team is in Krabi province such as coordinating and communicating with the relevant organizations in Krabi after the discussion.



Figure 8. Sponsoring Organization Discussion

## **OBJECTIVE 2: LEARN ABOUT THE LIVELIHOODS OF THE LOCAL COMMUNITIES AND GAIN INSIGHT ON THE ACTUAL ISSUES**

### **INTEGRATE PARTICIPANT OBSERVATION WHEN MEETING WITH LOCALS**

To fully comprehend and acknowledge the actual issues for sustainable coastal ecosystem development, it is crucial to meet and interact with the locals living around the Koh Klang community. The process will be carried out through participant observation, where the team will be involved in the local activities and have direct interactions with the local people. This activity is considered necessary as it will enable the team to put themselves in the shoes of the locals thereby allowing them to view the situation from the local's perspectives. By using this method of participant observation, the team will have access to the locals and learn about their livelihood without making them feel monitored or uncomfortable.

### **CONDUCT THE SEMI-STRUCTURED INTERVIEW TO OBTAIN INFORMATION AND EXPLORE THE LOCALS' LIVELIHOOD**

Regarding the semi-structured interview to explore the local's living conditions, their wants, and their needs, the those who participate in the interview sessions should be members of the local communities

because they can help in providing raw and authentic information based on the locals' point of view. This will enable the team to obtain more in-depth information on the frequent obstacles the locals may face and how they tackle and prevent these issues. As an example, certain individuals may choose to continually relocate rather than erect a simple barricade. Furthermore, the local individuals can also provide some input on how the organizations which are presently involved can handle particular situations regarding the coastal erosion issue.

### **INTERVIEW THE SUBDISTRICT ADMINISTRATIVE ORGANIZATION OF KHLONG PRASONG**

This process is to obtain more in-depth information in terms of the livelihoods of the individuals living in the local community, along with any existing or ongoing issues regarding the erosion of the coastal area and biodiversity loss.

### **INTERVIEW THE PROVINCIAL OFFICE OF NATURAL RESOURCES AND ENVIRONMENT OF KRABI**

This process would be beneficial in understanding how particular jobs or actions performed by the local individuals could potentially harm the environmental surroundings of the community, as well as the current stage of Krabi's biodiversity and issues of concern. The team would also ask for perspectives on the construction of a bamboo dam in different areas and come up with a method most suited to the Koh Klang community coastal area.



### **INTERVIEW THE MARINE AND COASTAL RESOURCES OFFICE 10**

An interview with the staff will allow for the team to gather insightful information on the environmental or natural aspects of the issues which are contrary to the local individuals' perspectives. Besides, the office can provide the team with recently updated qualitative and quantitative data of the erosion of the areas along the coast of all the areas in Krabi province

### **OBSERVE THE ENVIRONMENT OF THE COASTAL COMMUNITIES AND LIVING CONDITIONS OF THE LOCALS**

Besides all the necessary interviews with the individuals, the actual issues will be assessed through observation of the community's surrounding environment such as the Koh Klang community in order to acquire information involving the richness of biodiversity and any coastal damages currently present. Furthermore, the team will also observe the locals' livelihoods from a third-person's perspective to obtain fair or unbiased aspects and information regarding their living conditions.

### **ADAPT EFFECTIVE STRATEGIES FROM THE CASE STUDY TO THE CURRENT PROJECT**

This will enable the team members to gain knowledge from the data presented that can be further adapted to the development of suggestions for this particular project of illustrating diverse perspectives on the issue regarding the conservation of biodiversity.

## **OBJECTIVE 3: OBTAIN MORE IN-DEPTH INFORMATION ON THE MANAGEMENT FOR SUSTAINABLE COASTAL ECOSYSTEMS**

### **ACQUIRE IN-DEPTH INFORMATION FROM FURTHER RESEARCH**

Gathering in-depth information would be beneficial to deeply understand the concept of biodiversity conservation. This can be achieved by reviewing journals and articles, as well as the governmental organization's official reports. Being open-minded and acquiring knowledge from reliable sources, supported by evidence, or useful research can provide an opportunity to further develop the knowledge then adapt it into the project, as well as providing a full understanding of the topic.

### **OBTAIN INFORMATION ABOUT EXISTING MANAGEMENT PRACTICES**

Existing management practices can be beneficial to the project as with this information, the team can adapt previous and current management practices to the project. Moreover, being aware of any past and present management practice problems can help in avoiding future mistakes. To gather the information, the team will ask for information or construct an interview about existing projects from the responsible people as well as search for the relevant available information

## **OBJECTIVE NUMBER 4: CONSTRUCT AND TRANSFER THE SUGGESTIONS TO ALL INVOLVED PARTIES**

### **ANALYZE THE INFORMATION GAINED FROM THE INTERVIEW AND OBSERVATION**

First and foremost, the information and data obtained from the observation and interview from the field visit will be arranged and systematically collected for easier understanding. All the information will be written in Google Document, and the data that are collected in the form of photos or voices will be shared in Google Drive and Line group so the whole team will have access.

### **CONSTRUCT A SCHEDULED MEETING WITH PDA FOR DISCUSSION AND TRANSFER OF THE DELIVERABLES**

Throughout this particular process, the team will propose a plan for illustrating diverse perspectives on the issue regarding the conservation of biodiversity and report the findings to the sponsoring organization. Moreover, the team will provide beneficial information that has been obtained from the interview and observation to the sponsoring organization, PDA, for further future usage.

### DISCUSS AND ADDRESS THE PARTICULAR ISSUE TOWARDS THE LOCALS LIVING IN THE KOH KLANG COMMUNITY

The team will retrieve the information gained from discussion with all parties involved in the situation and then analyze them collectively and effectively. Furthermore, prior to addressing the issues to all parties, the team will once again hold a discussion with the local communities. This is because the local individuals play the most essential role, as they are the ones who possess the sole right in approving or refusing the help being given by external organizations. Likewise, the team shall seek to inform the locals of the urgency of the matter.

### TRANSFER THE DELIVERABLES AND DIVERSE PERSPECTIVES TOWARDS THE INVOLVED ORGANIZATIONS

The team will collect and transfer the information gained from the locals' perspective during the community visit to the involved organizations. This addresses the issue that the community is currently facing, as well as their needs. Accordingly, the team will then utilize the most suitable approaches in illustrating diverse perspectives to each of the parties for the most suitable outcome. Regarding the illustration, the team will address the urgency of the problem of the conservation of biodiversity and the standpoint of others for all individuals to acknowledge and take into consideration.

## **FINDINGS AND ANALYSIS**

This topic comprises both qualitative and quantitative results and data gained from prior discussion with the sponsoring organization, specifically the Population and Community Development Association (PDA), and interviewing the 3 relevant parties, the Subdistrict Administrative Organization of Khlong Prasong, the Provincial Office of Natural Resources and Environment of Krabi, the Marine and Coastal Resources Office 10, as well as from the local community through the integration of participant observation. This information will be used to assess and analyze the concerning issues in order to further report and provide suggested solutions for the sponsoring organization, the Population and Community Development Association (PDA), regarding biodiversity conservation and the benefits of local individuals in the Koh Klang community, Krabi province.

### DISCUSSION WITH THE SPONSORING ORGANIZATION, POPULATION AND COMMUNITY DEVELOPMENT ASSOCIATION (PDA)

To begin with, before the meeting with the sponsoring organization, the team had emphasized mainly on the ocean plastic wastes crisis, as well as how the COVID-19 pandemic had affected the environment and the tourism industry. This was because it had long been accepted that ocean plastic waste was one of the world's top environmental problems.

This led to the team's main goal of designing sustainable ecosystem management. However, at the first meeting with the sponsoring organization, the Population and Community Development Association (PDA), Dr. Wolfgang Frank and Khun Teerayuth Kukangwan stated that the plastic pollution issues are too immense to be solved.

Accordingly, Khun Teerayuth Kukangwan then suggested the team focus mainly on the concept of biodiversity, as well as providing crucial information regarding the importance of biodiversity to the team participants. Importantly, this made the team acknowledge the fact that biodiversity plays a critical role in supporting ecosystem functions that are essential for all life on Earth. Indeed, as biodiversity has degenerated, humankind itself will become more at risk from the negative impacts such as vulnerability to natural disasters.



From the discussion, the PDA stated that Krabi province was currently facing the issue of loss of biodiversity as a consequence of several local activities and the issue would most likely continue to worsen as the locals were more concerned about their own survival which depended on these activities which in turn adversely led to the destruction of biodiversity. Thus, the issue concerning biodiversity was the most concerning issue as stated by the PDA in which everyone should participate in conserving. As a result, the team could then understand the actual needs of the sponsoring organization, that was towards biodiversity conservation. This led to the team's decision to focus on the concept of biodiversity instead of the ocean plastic waste problem as recommended by the sponsoring organization. This is because the sponsor had indicated their needs and interests themselves.

In addition, the sponsoring organization wanted the team to visit and observe the local community livelihoods as well as the environmental conditions in order to see and identify the genuine issues relating to the loss of biodiversity. The PDA informed and gave clear direction to the team regarding the area with high levels of biodiversity richness, that was identified to be around the Krabi Estuary. Furthermore, the PDA also mentioned the migratory birds that could be found in the area about which the team later learned that these migratory birds play an important role in measuring biodiversity richness. The team also found that the anthropogenic activities of the communities nearby the Krabi Estuary had a direct threat

to biodiversity. From all the information gained through sponsor meeting and researching, the team then decided to frame and focus on the Koh Klang community due to the fact that the main occupations of the locals were related to fishery, agricultural, and the tourism industry and these activities might affect the rich biodiversity of the area. Moreover, according to the report retrieved from the Krabi official government website, it was also stated that Koh Klang community is an area with diverse species of animals including migratory birds. Meetings with Khun Amnuay Chunu, the director of Population and Community Development Association (PDA) Krabi Center were also conducted, both before and during the field visit. During the field trip to observe and identify the actual problems regarding biodiversity destruction in the community, both before and during the field visit. During the field trip to observe and

identify the actual problems regarding biodiversity destruction in the community, the team reported all the information gained as well as the issues observed, to Khun Amnuay. The issues reported were mainly on coastal erosion, which leads to other issues such as the loss of biodiversity, loss of locals' residence, and the destruction of Sung Yod rice fields. Khun Amnuay then emphasized that the main core problem that caused the coastal erosion issue to worsen and the reason there was very little assistance from the involved parties was the lack of coordination and communication between the relevant parties and the locals. All the involved parties played an essential role in advocating environmental campaigns, as well as proposing pragmatic solutions for natural rehabilitation but attempts by only the locals without any help from government authorities were inadequate to conserve biodiversity.



*Figure 9. Migratory bird viewing area at Koh Klang community*



All the involved parties played an essential role in advocating environmental campaigns, as well as proposing pragmatic solutions for natural rehabilitation but attempts by only the locals without any help from government authorities were inadequate to conserve biodiversity.

### SEMI-STRUCTURED INTERVIEW WITH THE LOCAL INDIVIDUALS OF KOH KLANG COMMUNITY

Regarding the semi-structured interview to examine current local's living conditions and ongoing issues in Koh Klang, the team had an opportunity to interview 2 involved persons which are Khun Kanit, the representative from Moo 2 community who had experience and a deep understanding of the ongoing environmental issue, and Khun Sure, the farmer who cultivates the Sung Yod rice. Regarding the first participant, the team found that Khun Kanit's house had been originally located on the coastal area but due to the rising sea level which resulted in the erosion of the coast, Khun Kanit had to relocate 5 times. Khun Kanit also informed us that other villagers of Moo 2 also faced the same problem.

In the interview Khun Kanit stated that only Moo 2 had acknowledged the urgency of this issue and taken action. Moreover, village or Moo 2 also had received the assistance from several government agencies in terms of providing the budget to construct the bamboo dam.

Conversely, the other three communities out of the four villages, which make up Koh Klang, abandoned their houses and evacuated to other areas in Koh Klang. Initially, the reason that the locals were building the bamboo dam was to prevent the seawater that was rebounding from other concrete or solid areas. Later, the people in the local community then planted the Samae tree lines behind the bamboo dam as another secondary protection, against saltwater. These Samae trees take approximately 10 years to mature. However, the team was informed that in the past the government agency used to solve the problem of coastal erosion by building both concrete dams, and stone dams as a barrier protection for the Koh Klang community. Unfortunately, the construction of these dams had caused other areas to suffer from erosion issues which resulted in the Koh Klang community choosing to use the bamboo dams rather than the concrete ones.

From the interview, the local community unanimously stated that as coastal areas deteriorate, erosion results in habitat and biodiversity loss. The impacts of erosion have negative influences on the plants and wildlife that rely on these environments. Moreover, in terms of the local livelihoods, the loss of these ecosystems leaves coastal communities more vulnerable to the impact of tropical storms and storm surges. The locals were also had to suffer the loss of their residence.

Accordingly, the team therefore decided to focus on the issue of coastal erosion as the top priority as it mainly affected the richness of the biodiversity and the local's living conditions in Koh Klang. From the interview with Khun Kanit, the team acknowledged that what the local community in Koh Klang wants the most is the Samae tree lines because when the bamboo dam is damaged or destroyed, the Samae trees can still prevent the erosion.



Figure 10. Coastal erosion at Koh Klang community

Furthermore, the coastal erosion issues also had an impact on Sung Yod rice fields. Since only several dams were constructed, the seawater was able to invade the rice fields and because of this occurrence, the team decided to interview another participant, Khun Sure, who worked as a farmer in Koh Klang. Khun Sure stated that the rice fields which were used for growing the Sung Yod rice are the largest and the most essential areas in Koh Klang. The collapse of the bamboo dam caused severe damage to the rice fields that are located nearby the coastal area. When the saltwater breaks through the damaged bamboo dams and flows into the fields, the saltwater then remains in the fields damaging the rice, and seawater intrusion can damage groundwater quality in a variety of areas, both coastal and inland. Khun Sure also stated that this invasion of sea water caused fields to be damaged for the whole year and also led to the fields being abandoned. This problem forced the farmers in the Koh Klang to wait for the next year before they could grow the Sung Yod rice again because rice fields which had been flooded by seawater could not be used to cultivate the rice. Furthermore, it was quantitatively reported that from a total area of 700 rai of rice fields, over 300 rai had been destroyed and abandoned.

From the information that had been gained, the team discovered that most of the areas around the coastal lines did not have a bamboo dam completely installed which resulted in the loss of the rice fields located nearby the coast.

However, the farmers in the community were still waiting for a government agency that is responsible for agriculture to tackle this issue.

### INTERVIEW WITH THE SUBDISTRICT ADMINISTRATIVE ORGANIZATION OF KHLONG PRASONG

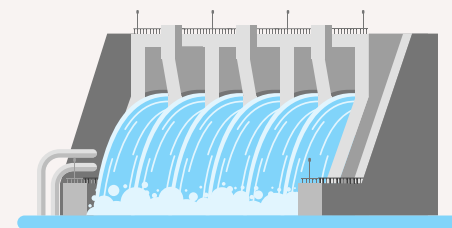
Throughout the interview with the Subdistrict Administrative Organization of Khlong Prasong, the team had prepared questions that will take an in-depth discussion of the issues in the Koh Klang. From the interview with the Subdistrict Administrative Organization of Khlong Prasong, 2 main problems were discovered.

The most concerning problem was coastal erosion which was essentially caused by insufficient budget for the development of coastal defense dams. The director of the Subdistrict Administrative Organization of Khlong Prasong stated that budget is the significant factor for their organization. The director mentioned that they had only 2 million baht as a development budget and that budget had to be divided equally for the 4 Moo Bans in the Khlong Prasong subdistrict. Consequently, the limited budget was one of the factors why a bamboo dam should be built rather than a concrete one.

From the interview, the team had found that governmental organization, the Land and Development Department, had come to assist with the coastal erosion problem by building an earth dam as protection from saltwater.

However, this dam later broke and disappeared resulting in the saltwater flowing into the rice fields, as well as the locals' residences the result being that the issue of coastal erosion persisted. Furthermore, the director of the Subdistrict Administrative Organization of Khlong Prasong also stated that the bamboo dams had once been constructed in the area of Moo 1. Unfortunately, those bamboo dams had decayed. Worse than that, it was found that none of the relevant organizations had reconstructed new bamboo dams. The team then revealed that the Subdistrict Administrative Organization of Khlong Prasong had many projects that had been constructed and integrated but however they were not followed through in later years. Moreover, in order for the issue to be extensively solved, locals were also considered as one of the crucial factors as they have the power to either accept or refuse the suggestions if they do not find the suggestions suitable for them.

The second problem was regarding waste pollution inasmuch as there was not only ocean waste coming from nearby countries that stuck to the coastal lines but also garbage disposal from the locals themselves. This was because the Koh Klang community does not have its own waste disposal point.

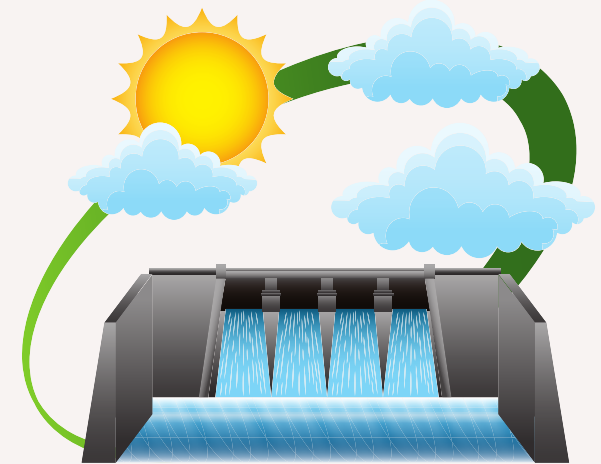


### INTERVIEW WITH THE PROVINCIAL OFFICE OF NATURAL RESOURCES AND ENVIRONMENT OF KRABI

Based upon the interview with Khun Phattipong Soontornworn, the director of the Provincial Office of Natural Resources and Environment of Krabi, the team had discovered that for each of the dams built in different particular areas, the dams' materials must be in accordance with the law and regulations proposed by each organization responsible for different areas surrounding the Koh Klang community. For further clarifications, the distinctive laws and regulations for each area were considered an assurance that the constructions of any dam built within the areas will be suitable for the environmental surroundings and would lead to no detrimental effects in the future. The Provincial Office of Natural Resources and Environment of Krabi perceived that certain materials built for the area of the Koh Klang community are more appropriate than the others and frankly, the organization certainly discerned that the utilization of natural resources, specifically bamboo, as the material for building the dams are more suitable for the community as whole, when compared to hard materials, such as concrete. For clarification, concrete dams can effectively protect the area from tidal surges or waves as a result of storms due to climate change, and lessen the erosion of the coastal area as their composition is hard and impenetrable and the waves are not able to pass through.

The waves are however forced to change the direction and as a consequence, hit and erode other areas, instead. This then causes detrimental effects to other areas which are also inhabited by locals and the erosion could spread to a wider range of the surrounding areas. Additionally, prior to further discussions, the team had briefly informed the organization of the local's struggles and perspectives on the issues concerning coastal erosion. The organization acknowledges the local's stance, but it was stated that the locals did not come forward enough with their struggles and statements with the Provincial Office of Natural Resources and Environment of Krabi and other organizations. So no further action could be taken. For instance, instead of strongly expressing their concerns, the local individuals chose to rather neglect the issues at times, and relocate to other areas in the Koh Klang community. The Provincial Office of Natural Resources and Environment of Krabi and other organizations were therefore not able to fully grasp and understand the conditions and urgency of the issues on an in-depth level. This, as well, prevented the organizations from bringing up the problems to other higher organizations and governmental agencies.

This, therefore highlighted the lack of communication and the inability to formally report the issues of coastal erosion. First and foremost, in relation to the lack of communication, this issue mostly involved the local individuals of the Koh Klang community in that the locals believed that

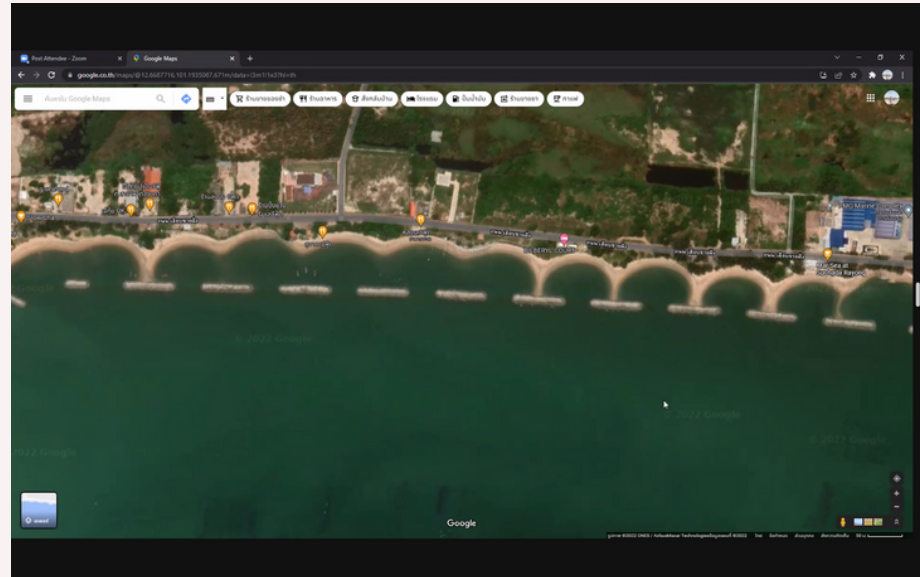


the Subdistrict Administrative Organization of Khlong Prasong held absolute power and was higher up in terms of authority resulting in the locals perceiving that these individuals would take charge and handle all the issues that may arise. This had a negative effect on the local individuals because it became a habit for them to believe that everything would be handled for them. The locals then stopped coming forward with any issues no matter how urgent because they were of the belief that the Subdistrict Administrative Organization of Khlong Prasong would take responsibility for everything. This led to the inability for all organizations involved to formally report the issues of coastal erosion and take further steps in building protective dams or barrages for the damaged areas of the Koh Klang community.



## INTERVIEW WITH THE MARINE AND COASTAL RESOURCES OFFICE 10

In accordance with the interview with Khun Rungruang Krueakaew, the deputy director of the Marine and Coastal Resources Office 10, the team gained further information and data regarding their perspectives on the construction of the dams or barrages for the Koh Klang community of Krabi province. The organization comprehends that the most appropriate materials for building the dams are hard materials such as concrete. Based upon the interview, it was discovered that concrete dams are extremely effective for protection against hefty tidal surges or waves as a consequence of storms due to climate change. Furthermore, the hard materials for dam construction are also suitable for withstanding or protecting against saltwater intrusion which is important because the migration of saline water into freshwater aquifers can potentially deteriorate groundwater quality. This will, consequently, contribute to the issues of Sung Yod rice fields being damaged by saltwater. Therefore, by constructing these particular protective dams, they will not merely protect against the erosion of the coastal area but also prevent damages to Sung Yod rice as a result of saltwater intrusion. In addition, further information gained from the Marine and Coastal Resources Office 10 in respect to diverse laws and regulations proposed by different organizations responsible for each area surrounding the Koh Klang community is similar and consistent with that of



*Figure 11. Interview for obtaining the information about the suitable dam*

the Provincial Office of Natural Resources and Environment of Krabi. They also stated that the laws and regulations proposed are to assure that any construction built or integrated will be appropriate and suitable to that of the environmental conditions and surroundings of those particular areas.

Another aspect of information gained involved the lack of communication from the local individuals in the Koh Klang community. As the Provincial Office of Natural Resources and Environment of Krabi stated, the locals did not immediately bring forward their issues of coastal erosion and struggles resulting from the erosion. Without formally reporting the issues to the Subdistrict Administrative Organization of Khlong Prasong

and other organizations involved, necessary registrations then did not occur. This, likewise, prohibited further actions for building dams or barrages and plans for the actual constructions to take place. This is because the involved organizations did not have required legal documents for visiting and finding the building sites of the local community in Koh Klang. Thereupon, the local individuals should collaborate with the Subdistrict Administrative Organization of Khlong Prasong in order to register and report the issues of coastal erosion. This will allow for further actions of planning and constructing the dams to potentially and ultimately take place as soon as possible, due to the severity and urgency of these particular issues.

## RECOMMENDATIONS

### THE ORGANIZATIONS: MARINE AND COASTAL RESOURCES OFFICE 10, KRABI PROVINCIAL ENVIRONMENT AND NATURAL RESOURCES, AND THE MARINE DEPARTMENT

Regarding the strategy of the organizations, comprising the Marine and Coastal Resources Office 10, Krabi Provincial Environment and Natural Resources, and the Marine Department, it is necessary to slowly and thoroughly approach the involved parties, including the locals and the Sub-district Administrative Organization of Khlong Prasong. For instance, the organizations should express their perspectives and reasoning on different matters, such as materials used for dam construction. To illustrate, the Krabi Provincial Environment and Natural Resources believes that soft dams, with the use of natural resources, such as bamboos, are more suitable for the Koh Klang community. This is because Koh Klang island consists of not only sand beaches, but mudflats as well. For instance, the bamboo stumps are able to be firmly pinned down into the muddy areas. In addition, the permeable dams and bamboo fences will lessen the possibility of wave deflections and erosion expansion. With different organizations possessing diverse perspectives on the dam construction materials, both the locals and the Sub-district Administrative Organization of Khlong Prasong possess in-depth knowledge



and understandings which can be used for making decisions themselves. Likewise, they will be aware of the advantages and disadvantages of whatever process they decide on. This also allows the locals to play an important role in a decision-making aspect and make their own choices with greater care. This is because they are the most significant party, as they are the ones currently suffering from the effects of coastal erosion. Additionally, the organizations should as well, understand and acknowledge the perspectives of the local individuals. For instance, the local individuals often feel threatened by the organizations due to past incidents. To elucidate, many locals living in the Koh Klang community were unaware of laws and regulations regarding title deeds and consequently many claimed unused land as their own.

This led to the organizations seizing the unregistered land, causing the locals to be forced out of what they believed belonged to them. Henceforth, the organizations should collaborate with the Administrative Organization of Khlong Prasong to form and build a stronger connection or relationship with the locals, expressing their concerns on the issues and well-being of the locals. For instance, they themselves should listen to the struggles the locals face and show empathy, as well as share their perspectives on how to fix the problem, such as suggesting materials that can be used for building the dams. As an example, this can be conducted through the organizations by illustrating all materials available for dam construction giving them more than one choice from which to choose which material is most suitable for their community.

### THE SUBDISTRICT ADMINISTRATIVE ORGANIZATION OF KHLONG PRASONG

The Sub-district Administrative Organization of Khlong Prasong has connections with the locals and other organizations, including the Marine and Coastal Resources Office 10, Krabi Provincial Environment and Natural Resources, and the Marine Department. This means that the Sub-district Administrative Organization of Khlong Prasong can play the role of being a bridge amongst the other parties. For further clarifications, the staff of the Sub-district Administrative Organization of Khlong Prasong organization are considered as locals who live in the Koh Klang community, as well. They, likewise, have suffered as much as other local individuals. Therefore, they possessed an in-depth perspective and hands-on experience which allowed them to be able to represent and be a voice for the community as a whole. Thereby, those who work in the office should not act as staff, but as local fellows to best hear a raw and clear stance of how other local individuals feel. This will allow them to become aware of the daily struggles faced by the locals regarding the issues of coastal erosion. As an example, the staff who lived in Moo 1 will be more understanding to those in the same village whose major income involves the use of fish cages. This can lead to them wanting dams to only be constructed in particular areas

that will not interfere with their occupations or livelihoods. For instance, most fish cages are placed along the shorelines where the dam constructions will take place, the result being that the locals will be required to remove their fish cages.

In addition, since the Sub-district Administrative Organization of Khlong Prasong is considered responsible for representing the community, the office is then accountable for listening to the local's issues and resolving them through collaboration with external organizations. To clarify, certain issues such as erosion of the coastal areas, require that higher authorities approve the budget for the construction. Likewise, the Sub-district Administrative Organization of Khlong Prasong has had various chances or opportunities to work with other organizations which include the Marine and Coastal Resources Office 10, Krabi Provincial Environment and Natural Resources suggesting that the Sub-district Administrative Organization of Khlong Prasong and other organizations may already have established connections with the aforementioned organizations no matter how strong or weak they may be. The Sub-district Administrative Organization of Khlong Prasong can therefore use this connection to their advantage to express their own perspectives as well as the perspectives of the locals on the issues regarding coastal erosion so the organizations can gain a deeper understanding of their struggles. Furthermore, the Sub-district Administrative

Organization of Khlong Prasong should prioritize major issues such as the erosion of coastal areas in order to find a way to resolve them, without delay. Since they are the representatives of the local individuals, they have the authority to hold the budget received from other organizations and prioritize which issues need to be resolved first which could lead to certain issues being prioritized based on their own judgment. This, in the past, had led to certain issues being neglected, specifically the coastal erosion issue was one of them. Henceforth, the Subdistrict Administrative Organization of Khlong Prasong should consider more thoroughly the issues of coastal erosion and their effects on the local individuals' well-being to reasonably prioritize them.

### THE LOCAL INDIVIDUALS OF KOH KLANG COMMUNITY

To further receive help from the Sub-district Administrative Organization of Khlong Prasong and the organization or any government agency, the local individuals of Koh Klang community should essentially provide the necessary information or actual crucial problems that arise within the community. This means that the locals should not merely inform the Sub-district Administrative Organization of Khlong Prasong of the issues in a vague manner. However, the locals should express their concerns and request for the Sub-district Administrative Organization of Khlong Prasong to travel to the areas in which the erosion takes place for example. Thereby,



the office can then receive hands-on experience and acknowledge the urgency of the issues. Following this, the Sub-district Administrative Organization of Khlong Prasong can immediately take the matter into their own hands and act as a bridge to further request help from other organizations that have the responsibility in each particular area as the Sub-district Administrative Organization of Khlong Prasong already possesses connections with external organizations as they have collaborated on projects in the past.

Additionally, the locals should provide all information or factual evidence to other parties, even when the information could potentially be negative towards them. For instance, some of the locals were afraid of losing the land on which they made a living which as earlier stated could arise from issues such as the locals not registering or not possessing title deeds of the land they use which resulted in local individuals being hesitant about informing the organizations about any issues that required an inspection of their land. The locals would feel threatened by the organizations as they have the authority to seize any unregistered or illegally used land. Likewise, with the local individuals being clear and open, this will allow all parties involved to be aware of the overview of the issues and potentially help solve the issue. In cases where the local individuals leave out certain information, the other parties will not be able to work at their fullest potential. This is due to the lack of a full, clearer image of the whole issue. Moreover, the locals should formally come forth with the issues that need to be resolved

such as those impacting the local's living conditions. With the issues being left unresolved, the livelihood of the locals lives could be jeopardized. For example, the ongoing issues within the Koh Klang community involve coastal erosion issues which specifically leads to consequences of the locals being forced to relocate and seek new living areas. Moreover, the coastal erosion issues also lead to the deterioration of the bamboo dams, which causes the saltwater to invade the rice fields which consequently impacted the local's major ways of earning income. Therefore, the local individuals should be truthful to the organizations who are desiring to help.

### CONCLUSION

The Koh Klang Island community which is located on the west coast of Thailand, at the mouth of the Krabi River in the Andaman Sea, is surrounded by rich natural mangrove forests and various different marine species. Situated on the right-hand bank of the Krabi River, it is the closest island to Krabi town. The sponsoring organization of the team, PDA, considered that it is best for the team participants to propose suggestions that could be utilized in conserving the biodiversity of the Koh Klang community. In order to fulfill the stated goal, objectives of the project are constructed as concrete accomplishments that may be attained by: understanding the sponsoring organization's needs, learning about the livelihood of local communities and gaining insight on the actual issues, obtaining more in-depth information on the management for sustainable coastal ecosystems, and ultimately, constructing and transferring the suggestions to all involved parties.

According to the conducted interviews, surveys, and qualitative data-collecting observations, it is discovered that, for the purpose of biodiversity conservation, the team shall propose a suitable and effective strategy to approach all parties involved, including certain organizations and the locals in the Koh Klang community, Krabi Province, with the purpose of encouraging them to fully understand the perspectives of others, the severity of the coastal erosion issues, and the urgency of the conservation of biodiversity as the difficulties in addressing these issues arise from the differing perspectives. Consequently, understanding each other's points of view and sharing a common vision has become a top priority for all parties involved, especially those affected by these issues.

As a means for all parties to share similar perspectives and goals, in terms of a way to approach the issues regarding coastal erosion, the team developed a strategy for each of the different parties involved to approach one another with the necessary information for the maximum benefit of all individuals. For the project goal to be achieved, the team will assist all parties with the perspectives from all sides to prevent a lack of information. With all parties possessing all information and an overview of the issues, they can further develop the dam-building plan to lessen coastal erosion issues. In the case that all local individuals and organizations follow the guided strategies, they will then be able to potentially reduce the erosion of the coastal area. In the near future, the locals and all organizations will be able to begin forming strong and enduring relationships with one another.

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