Chapter 7
COASTAL ISSUES and OPPORTUNITIES

The current issues confronting the people of Olango today are many and wide-ranging. In the island-wide PCRA conducted in 1998, the participants cited a range of environmental, socioeconomic, political, legal, and institutional problems as directly bearing on their lives. The identification of these issues by the islanders themselves indicates their awareness of and concern for their island. This is crucial in taking appropriate short and long-term measures in managing their remaining coastal resources and creating opportunities. Some of the immediate issues besetting Olango Island and its satellite islets with insights on their possible solutions, are summarized in this chapter.

ENVIRONMENTAL ISSUES

Exhaustion of Natural Resources

Fresh water resources

Adequate and affordable supplies of potable drinking water is the most common basic need reported by the Olango people during the 1998 PCRA. Since the main island has a very limited fresh water resource, this should be managed prudently; otherwise, seawater will slowly contaminate its source. Various wells in Olango have reportedly been abandoned due to depletion or contamination from too many users. The increased number of users and limited access to the existing source resulted in more well construction in the island. Modal range of well users is about 20-50 persons per well (Olofson 1992). To help address this problem, the USC-WRC organized in 1987 the Poo Community Self-help Association as part of the Olango Water Resource Management Project (OWRMP). It uses solar energy to pump water and distribute it to its constituents in Barangays Santa Rosa and San Vicente (Sitios Poo, Basdaku, and Bascoral). Members of the association are charged PhP2 per water container compared to PhP3 from the roving water vendors. The income of the association is used to maintain operation of the solar-pump system (Alburo *et al*. 1988).

The OWRMP conducted in 1998 a poll survey regarding the proposed closure of Poo Bay to establish a fresh water storage reservoir (Cusi *et al*. 1990). This was a highly debated issue, especially for the stakeholders whose livelihood depends on the bay's resources. Those who were in favor (36 percent) of the closure live far from the bay while those not in favor (49 percent) live near the bay, with 14 percent undecided and 1 percent no response. Different reasons were given by those against the closure (e.g., the bay is a resource for food and livelihood, influential people own a lot near the bay, the bay closure will lead to adverse effects such as beach erosion and flooding during high tide). Those who were undecided were described as "fence sitters" who relied on others to decide things for themselves e.g., "I will go with the majority, with my husband's decision or with the local leader's choice" (Alburo and Olofson 1988b).

Responses from those "in favor" did not seem to be keen on the issues. Most of the reasons described were shallow or with personal interest in mind. Examples include that we "want any development on the island", or we "don't use the bay as a source of living, since seawater will not enter the bay, it will be easy to walk across it". This information could help potential coastal managers and stakeholders to understand fully the significance and consequences in handling this resource.

Another proposed alternative source of water in Olango was a desalination project located at Barangay Talima, funded from the Countryside Development Fund (CDF) of a former congresswoman. Unfortunately, before the desalination plant became fully operational, it had to stop. The problem was that the deep well used as the plant's source supplied an insufficient volume of water and it was too salty for the plant specifications. They tried deepening the well but hit a solid surface and were unable to proceed without a significant increase in project cost. Recently, the desalination plant operated again but increased the price of 1 gallon of water to PhP3.

Fuelwood

Olango Island and its satellite islets with their rocky terrain, poor soil, seasonal rainfall, and high population density retain a very limited supply of a basic resource—fuelwood. This is especially prevalent during dry seasons such that even mangrove and coconut palm have already been depleted resulting in the importation of fuelwood from Bohol at a higher price. In some years, the problem is so severe that even dried roots (*tungdan*), which is a staple food, have been used as a fuel (Olofson *et al*. 1989).

Thus, it is imperative that fuelwood plantations should be expanded in Olango. These would also cool the soil surface, lessen the temperature and, evaporation, and so conserve the freshwater lens, provided that the trees to be planted have smaller leaves to lessen evaporation. A diversity of species, without reliance on any one species such as giant *ipil-ipil*, would also limit insect infestations. Leguminous species planted on large,

unused landholdings in the center could enrich soils there, and also provide feed for livestock that would, however, have to be separated from the growing resource (Olofson *et al*. 1989).

Coral Extraction

It is already common knowledge that coral extraction is illegal and punishable by law (PD 1219, as amended by PD 1698 and RA 8550). The damage caused by this activity to the environment continues particularly in the waters around Pangan-an Island and Barangay Sabang. The extracted corals are sold in the Punta Engaño area of Mactan Island for export.

Sand Quarrying

This has reportedly been going on in Barangays Baring, San Vicente, Sabang, Pangan-an Island and Tingo. The sand is reportedly sold to beach resorts as filling for their beach areas and to construction companies as material for their ongoing infrastructure projects.

Illegal Fishing Practices

Blast fishing

According to some Olango fishers, dynamite fishing is far better than cyanide fishing, because it merely fractures the corals into tiny bits and eventually those that are not directly hit grows back. But from repeated observations, this is not the case because the coral fragments apparently die from repercussion of the impact and related sedimentation. Homemade "dynamite" is made up of ammonium nitrate (NH_4NO_3) commonly used as mango fertilizers, soaked in gasoline, and supplied with a piston tube and blasting cap, costing about PhP79 per kg. Nearby Caubian Island is a well-known haven of dynamite users, where the practice is often passed from one generation to the next. For the marginalized fishers who want to increase their CPUE, dynamite fishing is usually employed.

Cyanide fishing

Olango Island, due to its proximity to Mactan-Cebu International Airport, is the traditional collection and marketing center of the marine aquarium fish trade in central Philippines. Most of the fishers engaged in this industry have at one time or another resorted to cyanide fishing due to the convenience of catching reef fishes. Sodium cyanide (NaCN) is a candy-like substance that is diluted in water and placed in a squeeze bottle. Once in contact, this chemical stupefies, disables, or kills the organism depending on the concentration. Widespread use of cyanide may also contribute to the bleaching and death of corals in collection areas. Human poisoning, especially among children eating cyanide caught fishes, has also been reported. Live reef fish collectors often use cyanide because of its higher CPUE compared to fine mesh nets, though the percentage of survival of captured fish of the latter method is higher. Cyanide can be easily bought in Olango at a retail price of PhP200 per kg or PhP15 per tablet.

Tubli

Aside from cyanide, a local vine known as *tubli* (*Derris elliptica*) which grows wild in the island is another source of chemical used for stunning fishes. This chemical is reportedly less potent than cyanide with rotenone the active ingredient of the plant's extracts.

Hookah diving

This is an innovative way to replace SCUBA as diving gear using a surface supplied air. This is made up of gasoline engine powered, air compressor used in vulcanizing shops, old beer or LPG barrel and hose. Divers usually wear heavy clothing for warmth and as added weight. Using this kind of gear can be advantageous because they can spearfish conveniently (compared to holding breath) and are able to access deeper waters where high prized fish and invertebrates are found. The disadvantage of hookah is that divers are lured by the "unlimited" supply of air, therefore ignoring bottom time, resulting to decompression sickness or the "bends". Most of the hookah divers have no basic training on deep water diving and the rules they have to follow. Already many casualties have been reported, some others were lucky enough to have survived but are paralyzed from the waist down (Santos *et al*. 1997b).

Potential diving injuries and casualties could be minimized through proper education of the hookah divers. In 1997, the USC-MBS initiated a practical education program designed to familiarize fishers on the possible physiological effects when a person dives into greater depths.

POLLUTION

Solid waste disposal

The general lack of solid waste management policy has been pointed out by many Olango residents as having caused both health risks and aesthetic burdens. There is no common or officially established dumping area in Olango to contain the solid waste generated by its growing population. Most resort to burning, burying, and discarding of garbage directly to the sea hoping the tides and currents will wash the waste away. Enterprising individuals can venture into the recycling business collecting all re-usable waste available in Olango and neighboring islands.

Sewage and sewerage facilities

There are no drainage and sewerage facilities in Olango as in many other parts of the province. With the increasing population, this is becoming an increasingly serious health and sanitation problem. In Olango, only 18 percent of the households reportedly have sanitary toilet facilities. People without toilets defecate behind the bushes and on the shores. There have been efforts by NGOs and the Department of Health (DOH) to improve the situation. For example, the DOH has a program which provides a free toilet bowl and 2 sacks of cement for the construction of sanitary toilets. The recipient provides for the labor and the construction of the septic tank. People have the notion that the government

should provide for all their needs. Evaluations of the program revealed that many of the recipients are not using their toilets but continue to defecate outside on the beach because the use of the toilet is, unfortunately, reserved for guests.

Air pollution

Some residents complain about the foul odor generated during the drying of the *sigay* shells (*Cyprea* spp.) which are commonly used in the shellcraft trade. This odor problem could be mitigated by having the drying areas in isolated open spaces with good wind circulation away from the residential houses.

VULNERABILITY OF OLANGO ISLAND TO CLIMATE CHANGE AND SEA LEVEL RISE

On 9 to 10 December 1998, a workshop on the "Vulnerability Assessment of Olango Island to Climate Change and Sea Level Rise" was held in Costabella Resort Hotel, Mactan Island, Cebu, Philippines.

The assessment exercise was sponsored by DENR-Region 7, Wetlands International, Environmental Research Institute of the Supervising Scientist and Asia-Pacific Network for Global Climate Change and was attended by representatives from the academe, NGOs, LGUs, CRMP, and PAMB. Among others, the workshop intended to:

1. Determine the likely impact of climate change and sea level rise on Olango Island,
2. Formulate management strategies and responses including monitoring schemes on climate change and sea level rise specific to Olango Island, and
3. Incorporate these potential strategies into coastal and other management plans in the country.

Proposed Mitigating Measures of the Possible Impact of Climate Change and Sea Level Rise on Olango Island

Based on the data presented during the workshop, it was concluded that Olango Island is vulnerable to climate change and sea level rise. According to Mapalo (1999), it was predicted that by the year 2030, the sea level would rise by 8 to 30 cm and 15 to 95 cm by year 2100. This predicted sea level rise and increase in sea surface temperatures will be accompanied by an increase in typhoon intensity by up to 20 percent and increase in storm surges. Rainfall intensity and frequency will tend to increase also.

To mitigate the possible future impacts caused by climate change and sea level rise, it was recommended to integrate the concept of sea level rise in the management plans of all agencies concerned at the local, regional, and national levels. It was further suggested to incorporate strategies on sustainable use of resources, disaster preparedness, and emergency responses.

Table 7.1 summarizes the proposed measures aimed to mitigate the predicted impact of climate change and sea level rise on Olango Island. At this early stage, it is essential that

Table 7.1. A summary of proposed measures to mitigate impacts to climate change and sea level rise in Olango Island and its satellite islets (Mapalo 1999).

Attributes	Proposed measures
Fisheries	● Shift to other livelihood ● Intensify law enforcement ● Establish marine sanctuary ● Install fish attracting device ● Monitor reef fish biomass ● Intensify proper solid waste disposal ● Intensify law enforcement
Coral reefs	● Intensify information and education campaign ● Encourage reef tourism ● Identify more recreational dive sites ● Monitor reef destruction
Seagrass beds	● Try seagrass planting ● Monitor seagrass cover
Mangroves	● Enrichment planting of natural stands ● Intensify information and education campaign ● Limit access to existing mangrove areas ● Monitor mangrove cover, growth, and distribution ● Revegetate water catchment areas ● Intensify mangrove cluster planting around the OIWS Nature Center ● Intensify information and education campaign ● Update management plan ● Develop community-based ecotourism and livelihood options
Terrestrial vegetation	● Enhance planting of salt tolerant species ● Encourage planting of fruit trees ● Intensify information and education campaign ● Ban the harvesting of erosion resistant vegetation ● Ban the extraction of soil along the shoreline
Bird sanctuary	● Monitor bird populations, zoobenthos, storm surges ● Intensify information and education campaign
Topography	● Construct wave breakers ● Review policies on mangrove establishment ● Intensify information and education campaign
Hydrology	● Regulate groundwater extraction ● Intensify information and education campaign ● Review proposal to close the bays ● Install rain collectors ● Declare areas over freshwater lens as protected

an information and education campaign on the effect of climate change and sea level rise on small islands like Olango and its satellite islets be launched.

SOCIAL ISSUES

The majority of Olango islanders are financially poor, poorly educated, and lack adequate health care. Without any other livelihood option in sight, the situation becomes complicated when some fishers involve themselves in risky fishing methods like hookah diving, and

environmentally damaging activities such as dynamite and cyanide fishing. Only a few enterprising and "well-connected" individuals have gained financially from the use of the coastal resources of Olango Island. This general situation is the basis from which the following socioeconomic issues emanate.

Coastal Users

The majority of the coastal users in Olango are marginal fishers engaged in subsistence fishing, gleaning, and firewood collection just to provide daily food needs and occasionally to earn extra cash. A small group of middle-income earners rent their pumpboats to tourists to go island hopping.

Some Olango inhabitants allegedly become business partners of foreign nationals or act as dummies in acquiring properties, which could later be developed into resorts, resulting in the displacement of some residents.

Olango islanders and outsiders both have long exploited the coastal zone around Olango Island. This is due to its open access system, where all one needs is diligence and one can fish anywhere (Santos *et al*. 1997b, 1997c). The locals have observed fishers from other islands fishing within the coasts off Olango with no fishing permit or license. According to the Lapu-Lapu City agriculturist, this encroachment may be due to the majority of the inhabitants being poor and marginalized and like any other fishers are continually looking for more productive fishing grounds.

Overpopulation

The growing overcapacity of small islands due to increasing population becomes a critical issue because of the enormous pressure on the existing natural ecosystems and its significant impacts on health. During the last 25 years, Olango's population has doubled and if Olango has to foster economic growth and sustainable development, this trend has to be halted through appropriate approaches and measures to better manage population growth.

Illiteracy

The low educational level in Olango, with 80 percent of respondents reportedly attaining only elementary education, hinders them to take on opportunities aside from fishing and it limits them from participating in the island developments. For example, environmental awareness among the islanders is low. Scholarship grants to poor but deserving students could encourage interest to seek higher education. Skills training and Adult Literacy Program of the Technical Education and Skills Development Authority (TESDA) and the Department of Education, Culture and Sports (DECS) could also increase their chances of employment, business success, and the sense of well being.

Table 7.2. Population trend of the 11 *barangays* from 1970 to 1995 (NSO 1995).

Barangay	1970	1975	1980	1990	1995
Baring	1,051	1,141	1,560	2,122	2,303
Caohagan	263	205	217	256	342
Caw-oy	661	791	846	970	1,002
Gilutongan Island	440	446	514	715	1,061
Pangan-an Island	807	955	1,089	1,263	1,229
Sabang	1,937	2,411	2,845	3,212	3,920
San Vicente	fused with Santa Rosa	fused with Santa Rosa	fused with Santa Rosa	fused with Santa Rosa	2,392
Santa Rosa	2,751	2,873	3,478	4,090	2,409
Talima	1,413	1,678	2,202	3,039	3,310
Tingo	1,451	1,651	1,815	2,266	2,449
Tungasan	1,128	1,000	767	1,331	1,421
Olango Island	**9,965**	**10,743**	**12,488**	**16,052**	**18,008**

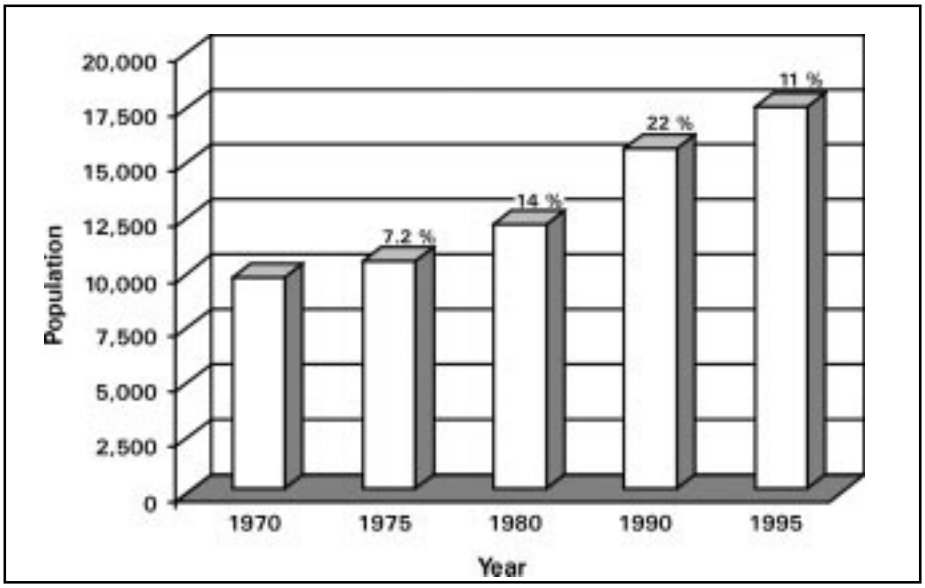


Figure 7.1. Population trend of Olango Island and its satellite islets from 1970 to 1995 showing percent growth (NSO 1995).

Gambling

This is one vice that is rampant in the island. On a visit to one *barangay* for example, the first sight that greeted the eyes was that of men, women, and children playing cards or *mahjong* under the shade of a tree or *nipa* shack. One mother interviewed said that the first and foremost reason that she gambles is due to boredom while her husband is out fishing. The second reason is to try her luck "*kay kong suwertehon makadaug*" ("if she gets lucky, she could win") and her *daug* (prize) could add to her daily budget for food, but if she loses, that is fate.

There have been attempts by the local government in the island to curb gambling activities in their respective *barangays*. For instance, the Barangay Council in Caw-oy passed a resolution banning gambling in the *barangay*. For some months, the *barangay* police, or *tanods*, made arrests and raids, but this was not sustained as some people in the *barangay* continue to defy the law enforcers.

To stop gambling, people should be provided with more productive activities. The Caw-oy Women's Group, for example, is provided with alternatives by engaging in shellcraft to augment their family income. Watching television and listening to radio drama are the other forms of entertainment.

ECONOMIC ISSUES

Livelihood Options

Several institutions have joined in proposing and providing livelihood options to the Olango islanders. For instance, in 1997, the USC-MBS started a 2-ha coral farm project in Barangay Caw-oy to provide an alternative source of income for fishers who had been using harmful fishing techniques. The basic concept involves fragmenting the natural stock of coral and transplanting it to coral-degraded areas with the active participation of fishers and the approval of the Barangay Council members. After 3 months, the coral fragments will be ready for marketing to rehabilitate degraded reefs in the beachfronts of the local resort. One could also sell the fragments abroad particularly to aquarists. The fishers and the local government get a certain percent of the proceeds. Although the concept is basically sound, the project has yet to prove its long-term viability.

Another project by USC-MBS is to grant loans to former illegal fishers with a seed money of PhP10,000 for them to invest on fish trap or *panggal* fishery, a passive, environment-friendly fishing gear. Beneficiaries are paying the loan either daily, weekly or monthly. Now the Caw-oy Fisherfolks Association has 60 members.

Enterprise development facilitated by CRMP focuses on the local resources of an area. Seaweed (*guso*) farms using a new variety and "net bag" technology in Gilutongan and neighboring islands have been started. A community-based ecotourism development in OIWS started in Barangay Sabang, to benefit the fishers, women, and youth. The setup has become a tourist attraction.

Aquarium Fish Trade

The live reef fish industry is a major source of income in Olango Island, especially for Barangays Sabang, Santa Rosa, and San Vicente. Of the 19 aquarium fish buyers based on Olango in 1997, only 12 were registered with the BFAR Region-7 (SUML 1997). The scarcity of aquarium fish in Olango Island has led fish collectors to travel to distant fishing areas to get the target fish. The IMA launched the CFRP and has since been training cyanide fishers in using environment-friendly techniques to catch aquarium fishes (i.e., barrier net, scoop net, etc.) and proper decompression of fish with bloated swimbladder.

In its 1996 report, IMA noted a substantial reduction of cyanide fishers in Olango. But despite the re-education by IMA and BFAR on the use of environmentally-correct gear in collecting live fish, some fishers are back to cyanide fishing due to the "ease" of catching the fish. Also, they reasoned that even if they had the permits certifying the use of environmentally safe techniques, they could not use these permits because many LGUs have passed resolutions banning the collection of live aquarium fish in their respective jurisdictions. Thus, the training and permits are not being fully utilized. Rather, this resolution has resulted in the loss of income for some Olango fishers who rely solely on catching aquarium fishes as their means of livelihood.

In its effort to reduce the number of fishers and operators using cyanide, IMA has set up a Cyanide Detection Test (CDT) facility in the BFAR Region-7 Office Complex. The facility monitors live fish shipments for the presence of cyanide and, if found, the shipment is confiscated and the shippers and collectors prosecuted.

Tourism

With the noted exceptions of Nalusuan and Caohagan Islands, only limited tourist facilities exist in Olango Island. Its tourism industry is still underdeveloped compared to the neighboring island of Mactan. There is still much to be desired; Olango Island needs: infrastructure development (i.e., sufficient road network to different *barangays* and causeways to accommodate the smooth flow of goods from other neighboring islands); a reliable water supply; and electricity.

Solar energy could be an alternative and if Olango has to develop its tourism sector it should not follow Mactan Island's experience because in spite of the profit generated by the industry, the benefits to local communities appear to be limited. In order to make it possible for the islanders to get a fair share of the income from tourism, the respective LGUs should adopt programs that ensure fair distribution of the income and other benefits derived from it. Community-based ecotourism is suggested and Olango Island can serve as a model for this new idea. Tourism development that is environmentally sound may not be easy to implement on Olango Island given its various limitations.

While tourism is a major source of foreign exchange and a factor in the economic development of the Philippines, there are some environmental and sociocultural trade-offs. The weak enforcement of policies on tourism development in the Philippines has resulted in disorganized development within the coastal zone. More often than not, small to medium-size resorts cannot afford to install a wastewater treatment plant. It is also unlikely that resort owners will "act" together in putting up a common sewage treatment plant. Sewage is often discharged directly to the sea during the night to avoid apprehension. As most resort owners are very influential, they use their influence to get what they want, which complicates and aggravates the situation.

Tourism Development within and near the Olango Island Wildlife Sanctuary (OIWS)
Among the islands close to Mactan Island, Olango is one of the favorite day-trip "island-hopping" and diving destinations for local and foreign tourists. One of the additional attractions of the island is the 920-ha OIWS, which receives about 2,000 visitors per year.

Several proposed and potential tourism-related developments are centered in or near the sanctuary. Community-based ecotourism has demonstrated the potential to serve both as a livelihood activity for local residents, as well as a means to strengthen their involvement and commitment to better manage and protect their environment and the OIWS (DENR-7 1998). Corollary to this potential project is the possible development of an Olango Wildlife Resort, a home stay program, which will cater to avid bird watchers and weekenders alike.

Another potential tourism development is the planned reclamation of 200 ha of shallow-water habitats near Sulpa Island into a man-made island to be known as “Dolphin Island”. This development, if realized, could be environmentally destructive and financially risky. While the entire concept may appear to be beneficial to the islanders to generate jobs, it may not be sustainable and could cause severe degradation of the marine environment.

POLITICAL ISSUES
Laxity in the Enforcement of Fisheries Laws by the *Bantay Dagat*
One of the Cebu Provincial Government’s thrusts to protect the coastal waters against indiscriminate fishing and garbage disposal was the creation of a task force called *Bantay Dagat* (Sea Watch) in 1979. Despite being reportedly ineffective during the initial years, it was revived in 1987. In Olango Island, the *Bantay Dagat* task force had an average of 10 arrests per year since 1992. This is very low compared to the number of illegal fishing activities observed everyday, particularly blast fishing. The age of the violators ranged from 18 to 60 years. Punishment means probation on the first offense, then 12-20 years in jail or imprisonment for the second offense. The *Bantay Dagat* team is also undermanned with only 30-40 personnel, has a monthly budget of PhP5,000-12,000 from the LGU, and lacks operational patrol boats (Santos *et al*. 1997a). The ineffective implementation of *Bantay Dagat* may be due to the lack of adequate police powers and the practice of sending violators to the respective LGU centers for case filing and not to their respective *barangays*.

Another reason is the contrasting affiliations among *Bantay Dagat* members and *barangay* officials, which hinder the efficient execution of their tasks. There were allegations that some strong political figures are coddling illegal fishers. With a low salary of PhP3,000 to 4,000 a month for *Bantay Dagat* enforcers, incidents of bribery in the form of a few *banyeras* or tin basins of fish caught illegally have been confirmed. In short, the devolution of *Bantay Dagat* functions to the respective LGUs has not created a significant impact on CRM.

Lack of Support from *Barangay* Officials

One devolved power to the LGU is the increased jurisdiction and management responsibilities of their natural resources. Conscious of this newly given power, some local government officials can make it difficult for proponents to implement some projects especially if the implementors have different political affiliations. Non-cooperation by the Barangay Councils could have been the result of non-consultation when the project was being conceptualized; hence, they do not fully grasp the goals and benefits to their constituents. In spite of this, it should be recognized that the involvement of the LGU is crucial to the success of any endeavor that affects its respective community, one of which is managing resources.

LEGAL ISSUES

Intrusion of Commercial Fishing Boats

This is both an environmental and political issue in Olango. The unabated trespassing of commercial trawlers within the municipal waters of Olango is one of the causes of dwindling catch as mentioned by the Olango fishers. These commercial fishers usually operate at night.

Although these illegal commercial fishing activities have been reported to the proper authorities many times, no action has been taken to eradicate or lessen this activity. It has been estimated that the one night's catch of a commercial fisher is equivalent to a month's catch for all the fishers in one *barangay*. That is why some fishers employ dynamite fishing to "outdo" their intrusive commercial fishing counterparts. Harmful fishing practices and the intrusion of commercial fishing boats can be minimized through a strict enforcement policy and stiffer penalty charges to the offenders.

Land Ownership

As the price of real estate continues to increase in Olango Island, the legal problem of land disputes in the island has become more common, to the detriment of the islanders who cannot afford to have their lands titled. As a consequence, islanders owning lands with only a tax declaration as their legal document are usually victims of land grabbing schemes.

INSTITUTIONAL ISSUES

It should be noted that many institutional issues relating to CRM are due to ineffective policies and jurisdictional capacity as well as the poor enforcement of fishery and environmental laws.

Unclear Mangrove Stewardship Contract

A decade ago, DENR launched a massive mangrove reforestation program for environmental and livelihood purposes. Mangrove plantation owners have now successfully grown the planted mangrove trees (*Rhizophora* spp.).

In the coastal areas of San Vicente and Sabang, they planted right in front of their lots, which were part of the OIWS. The problem surfaced when plot owners were stopped from harvesting because they were required to secure permits from DENR. Owners have complained why they could not harvest their planted trees without a permit. The majority of the complainants are stewardship contract holders who did not understand fully the terms in the contract while some were those who joined the "bandwagon" of planting mangroves. There is a need for DENR to clarify to the contract holders the terms of reference stipulated in the contract especially to those planters who are not well educated. A monitoring program is also necessary.

Extension of Seaweed Culture to Another *Barangay*

The fishers of Barangay San Vicente have complained that seaweed farms of Gilutongan fishers are extending into the waters off Barangay San Vicente, preventing them from fishing there. This conflict is brought about by lack of a foreshore lease agreement or permit on the part of the cultivator and the local *barangay* officials. Without this, anyone can just establish a farm anywhere. The respective LGU could issue permits prior to setting up a farm and generate revenues from it.

Nalusuan Beach Resort and Sanctuary Management

The establishment of a marine sanctuary by a private resort in Nalusuan Island needs to be reviewed in the light of the various stakeholders involved. Fishers complain that when they pass by or even fish within the waters off Nalusuan Island, the guards of the private resort fire their guns telling them to stay away from the water resort.

Table 7.3 is a summary of the above discussed issues and opportunities in the 11 *barangays* of Olango based on the PCRA (1998) results.

CONSERVATION AND MANAGEMENT PLANS FOR OLANGO ISLAND

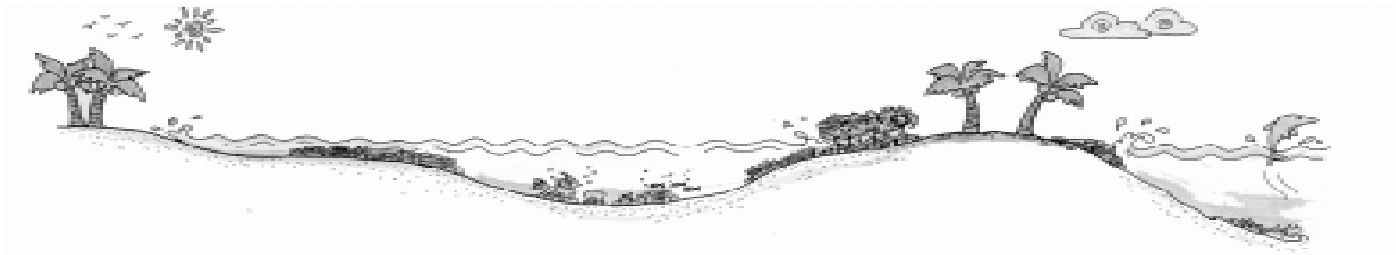
Olango Island Development and Management Plan

The City of Lapu-Lapu, Cebu Province has the political jurisdiction over the conservation and management of Olango Island. Yet, in the Mactan Island Integrated Master Plan Study (MIIMPS) prepared by Schema Konsult, Inc. in 1995, there was no comprehensive plan for the island except in the Environmental Management Section V under "Reserved Areas" where it mentions that the 920-ha OIWS has a Management Plan purposely formulated for its protection.

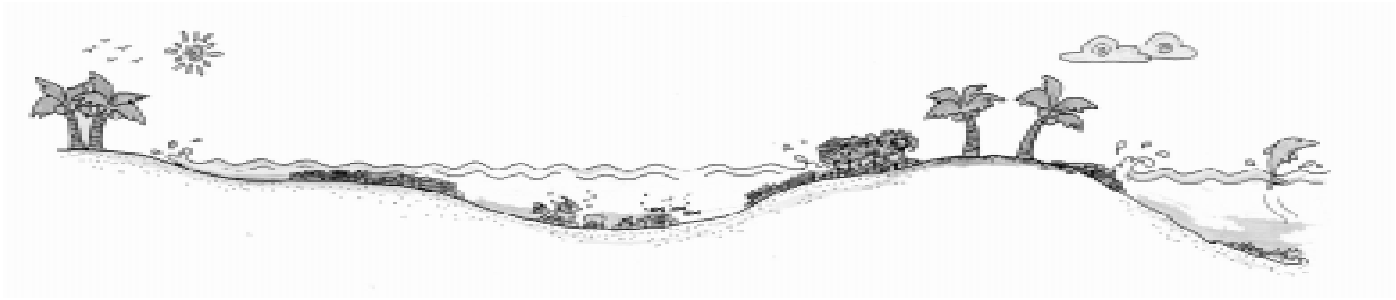
However, the Office of the Lapu-Lapu City Planning and Development prepared a land use map of Olango Island and its satellite islets (Figure 7.2) where areas are zoned with their corresponding use. Among the local development listed for Olango zone under the MIIMPS are:

- An expansion area for tourism development that considers the ecological fragility of the area and promotion of ecotourism activities

Table 7.3. Transect diagram of issues and opportunities in Olango Island (PCRA 1998).



Barangay	Land	Beach	Mangrove	Tidal Flat	Seagrass	Coral Reef	Oceanic
Issues							
Baring	livelihood, water	garbage	no mangroves present	dynamite, cyanide fishing	*sudsud* fishing	use of dynamite, cyanide and compressors	dynamite and cyanide fishing
Caohagan Island	water, electricity, garbage	garbage	no mangroves present	dynamite, cyanide fishing	overharvesting	dynamite, cyanide and compressors	trawl fishing
Caw-oy	livelihood, gambling	garbage	no mangroves present	dynamite, cyanide fishing	*sudsud* fishing	dynamite, cyanide fishing	dynamite and trawl fishing
Gilutongan Island including Nalusuan Island	water, electricity	garbage	no mangroves present	dynamite, cyanide, questionable Nalusuan sanctuary	sea urchins consuming the seaweed *guso*	cyanide fishing	dynamite and trawl fishing
Pangan-an Island	water, electricity, toilet, gambling, livelihood	sand extraction, garbage, tourism land conversion	*sudsud* prohibited, hiding place for bad elements, mosquitoes	dynamite, cyanide fishing	*sudsud* fishing	dynamite and cyanide fishing, coral extraction	dynamite and trawl fishing
Sabang	water, electricity, gambling, poor garden soil	sand extraction, garbage, closed access to beach, land dispute	mangrove cutting, unclear DENR stewardship agreement	cyanide, *sud-sud*, coral extraction, coral disturbance by abalone collectors	*sudsud*, fine mesh net, cyanide fishing	dynamite and cyanide fishing, coral extraction	trawl, commercial fishers, dynamite and cyanide fishing
San Vicente	only good side of proposed OIWS was explained, water, birds were protected more than humans, electricity	sanitation, garbage, epidemic	mangrove owners are apprehended without DENR's permit to cut	closed access to gleaners, cyanide	low harvest of *sigay* because of *sudsud*	overfishing by outsiders, coral extraction, dynamite and cyanide fishing	dynamite, cyanide fishing, use of *sahid* for *balo*



Barangay	Land	Beach	Mangrove	Tidal Flat	Seagrass	Coral Reef	Oceanic
Issues							
Santa Rosa	livelihood, gambling, garbage	reclamation, garbage, sand extraction	illegal cutting, garbage	dynamite and cyanide fishing	*sudsud* fishing	dynamite and cyanide fishing, compressor	dynamite and trawl fishing
Talima	livelihood, gambling, toilet	garbage	illegal cutting, garbage	dynamite and cyanide fishing	low harvest of *sigay* because of *sudsud*	dynamite and cyanide fishing, coral extraction	trawl, commercial fishers, dynamite and cyanide fsihing
Tingo	livelihood, water	garbage	no mangroves present	dynamite and cyanide fishing	*sudsud* fishing	dynamite and cyanide fishing compressor	dynamite and trawl fishing
Tungasan	livelihood, gambling, garbage	garbage, closed access to beach	illegal cutting, garbage	dynamite and cyanide fishing	*sudsud* fishing	dynamite and cyanide fishing	dynamite and trawl fishing
Opportunities							
Baring	construction of toilets, shellcraft enhancement, cleanup/ beautification drive	cleanup/ beautification drive to attract tourists	no mangroves present	none	prohibit fine mesh nets	enforce laws on illegal fishing	enforce laws on illegal fishing
Caohagan Island	24-hr water and electricity services	look for disposal area for garbage	no mangroves present	close access inside the sanctuary	enforce laws on illegal fishing	enforce laws on illegal fishing	enforce laws on illegal fishing
Caw-oy	cleanup/ beautification drive, efficient water system	cleanup/ beautification drive to attract tourists	no mangroves present	enforce laws on illegal fishing	prohibit fine mesh nets	establish a marine sanctuary	enforce laws on illegal fishing

Barangay	Land	Beach	Mangrove	Tidal Flat	Seagrass	Coral Reef	Oceanic
Opportunities							
Gilutongan Island incl. Nalusuan Island	24-hr water and electricity services, look for disposal area for garbage	additional toilets, cleanup/ beautification drive	no mangroves present	enforce laws on illegal fishing and abolish the Nalusuan sanctuary	plant high yielding variety of *guso*	enforce laws on illegal fishing	enforce laws on illegal fishing
Pangan-an Island	solar-powered water pump, deepen the water channel, livelihood	educate the people, full support to community programs	expand DENR's mangrove stewardship program	enforce laws on illegal fishing	*guso* farming	establish a marine sanctuary	educate the people, enforce laws on illegal fishing
Sabang	efficient electrical service, community-based ecotourism	cleanup/ beautification drive to attract tourists	expand DENR's mangrove stewardship program	enforce laws on illegal fishing	prohibit fine mesh net	enforce laws on illegal fishing	enforce laws on illegal fishing
San Vicente	efficient water system, community consultation	proper sanitation, cleanup/ beautification drive develop beaches	change the system for common good (OIWS), give rights to mangrove planters	*barangay* planning together with council and community	manage habitat with community	establish a marine sanctuary, community consultation, develop areas with tourism potential	enforce laws on illegal fishing
Santa Rosa	widen the causeway, create livelihood	cleanup/ beautification drive to attract tourists	expand DENR's mangrove stewardship program	enforce laws on illegal fishing	prohibit fine mesh net	enforce laws on illegal fishing	enforce laws on illegal fishing
Talima	construction of toilets, shellcraft enhancement, cleanup/ beautification drive	proper sanitation, cleanup/ beautification drive, develop beaches		enforce laws on illegal fishing, mariculture	prohibit fine mesh net, develop mariculture	enforce laws on illegal fishing, mariculture	enforce laws on illegal fishing, develop mariculture
Tingo	construction of toilets, cleanup/ beautification drive	cleanup/ beautification drive to attract tourists	no mangroves present	none	prohibit fine mesh net	enforce laws on illegal fishing	enforce laws on illegal fishing
Tungasan	desalination plant, formation of coop, more IEC, golf course	beach resort development, more toilets	community-based ecotourism, mariculture	environment-friendly causeway	develop mariculture, implement all ordinances	establish a marine sanctuary, mariculture, implement all ordinances	enforce laws on illegal fishing, develop mariculture

- Establishment of a commercial district at the island's center in Santa Rosa to serve the needs of inhabitants
- An expansion of the environmental protection area to include portions of San Vicente and Sabang and all the smaller islands south of Olango Island
- An expansion of the residential area for employees engaged in tourism and industrial activities in Mactan
- More specific infrastructure targets reported are:
  - Full electrification of Olango Island
  - Infra support to *barangays* and mini-city hall
  - *Bantay Dagat* protection, specifically the eastern coastline of Olango
  - Allocation of annual budgets for Olango infra projects

Whether this land use map is a result of a series of consultations with the islanders it is not known.

Olango Island Wildlife Sanctuary Conservation and Management Plan

Wetland areas in Olango are comprised of mangrove forests with about 424 ha, mudflats (33 ha) and other shallow areas (53 ha) that serve as a bird habitat. The OIWS was officially declared as a protected area in May 1992, 1 month ahead of the enactment of the National Integrated Protected Areas System (NIPAS) Act (RA No. 7586). The promulgation of the NIPAS Act of 1992 made the OIWS an initial component of the Integrated Protected Area System (IPAS). As such, its conservation and management are vested in the DENR-Region 7 and the Protected Area Management Board (PAMB) with the Protected Area Superintendent handling the day to day operation of the sanctuary.

As a designated area of national and international importance, the protection and proper management of the 920-ha OIWS should be a priority because it has future implications on the ecological integrity as well as the sustainability of the entire Olango Island and its inhabitants. In the confines of the sanctuary, issues are many and the possibilities are wide.

In January 1992, even before the 920-ha OIWS was declared as a Ramsar Site, a conservation and management plan for the sanctuary was already formulated. A multisectoral group spearheaded by the DENR through the Protected Areas and Wildlife Bureau (PAWB) participated in the formulation of the plan. Listed below are the 10 conservation objectives stipulated in the 1992 OIWS Management Plan which serve as the springboard in coming up with management options for the wildlife sanctuary in Olango Island. These 10 objectives were translated into projects and implemented from 1992 to 1998.

- Habitat maintenance for bird protection
- Zoning of the wildlife sanctuary
- Identification of allowable activities
- Maintenance of buffer zone

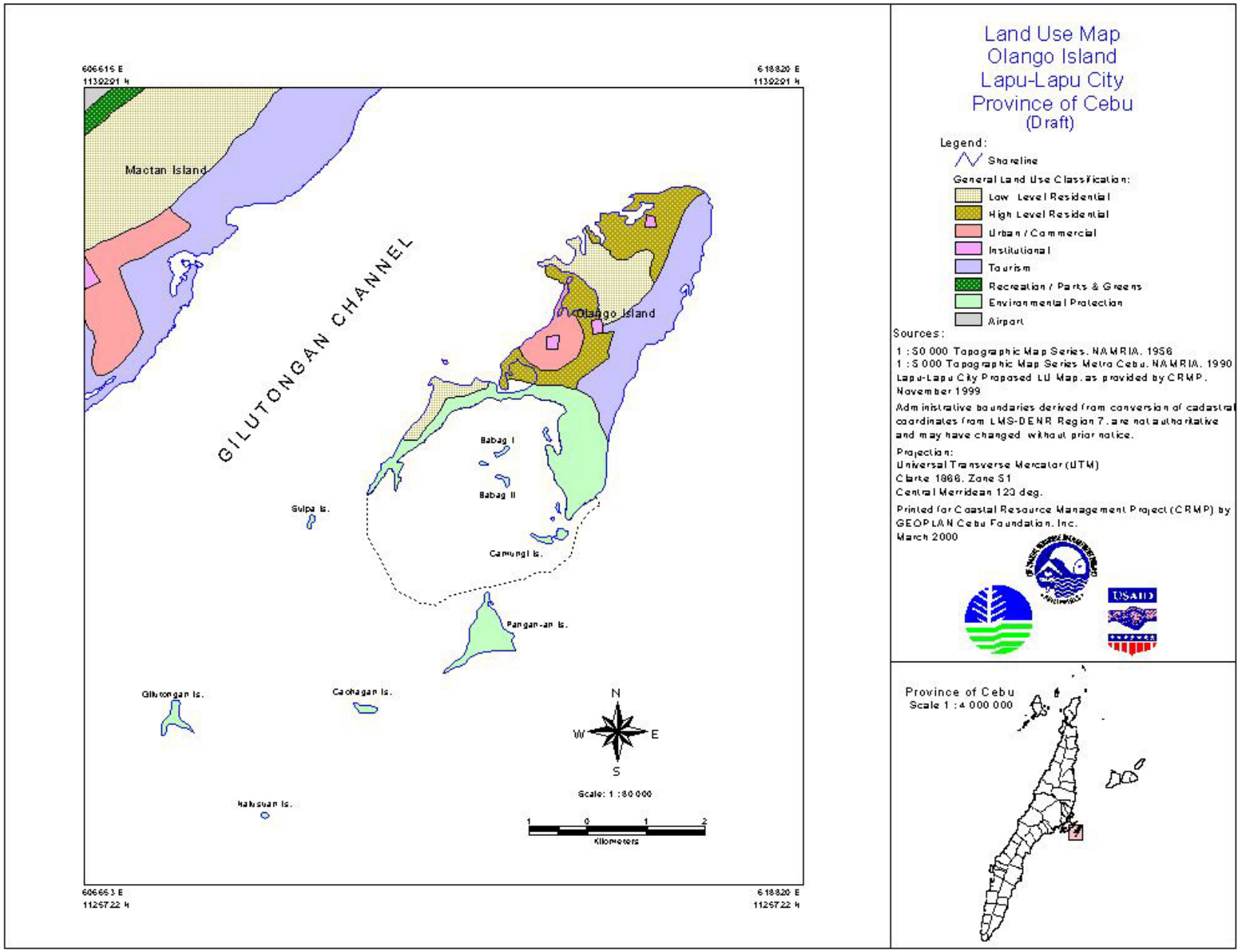


Figure 7.2. Proposed land use development plan of Olango Island and its satellite islets.

- Provision of livelihood projects
- Promotion and enhancement of ecotourism
- Creation of job opportunities for local inhabitants
- Provision of additional income to local government
- Community development
- Institutional linkages

On 23 to 24 October 1998, a planning workshop was conducted with the active participation of various government and nongovernment sectors to review the OIWS 1992 Management Plan, provide updates on the progress of implementation of the OIWS Management Plan 1992-1998 and identify management options with input from the 1998 PCRA results.

Status of the OIWS Protected Area Management Board (PAMB)

Under the 1992 NIPAS Act, a PAMB is mandated to handle the administrative jurisdiction of an established protected area. The creation of the PAMB, its functions, composition and membership, selection, and appointment of the Board members, term of office and compensation, and other provisions etc. are given in the Department Administrative Order (DENR-DAO) No. 25 Series of 1992 of the NIPAS Implementing Rules and Regulations Chapter V, Sections 18-28. The duties and functions of the PAMB and the membership are to:

- decide on matters relating to planning, resource protection, and general administration of the area in accordance with the General Management Planning Strategy (GMPS)
- approve proposals, work plans, action plans, guidelines, for management of the protected area in accordance with the approved Management Plan
- delineate and demarcate protected area boundaries buffer zones, ancestral domains, and recognize the rights and privileges of indigenous communities under the provisions of the NIPAS Act
- promulgate rules and regulations to promote development programs and projects on biodiversity conservation and sustainable development consistent with the Management Manual of the protected area
- ensure the implementation of programs as prescribed in the Management Plan in order to provide employment to the people dwelling in and around the protected area
- control and regulate the construction, operation, and maintenance of roads, trails, water works, sewerage, fire protection, sanitation systems and other public utilities within the protected area
- monitor and evaluate the performance of the protected area personnel, NGOs, and the communities in providing for biodiversity conservation and sociocultural and economic development and report their assessment to the NIPAS Policy and Program Steering Committee (NPPSC) and the Integrated Protected Area Fund (IPAF) Governing Board

The OIWS-PAMB was formed in 1996 and the present members are the following:

1. The Regional Executive Director of DENR-7
2. Representative from Philippine Tourism Authority (national government department)
3. Barangay Captain of Barangay Pangan-an, Lapu-Lapu City (Barangay Representative)
4. Philippine Wetland and Wildlife Conservation Foundation, Inc. (NGO)
5. Barangay Councilor of Barangay Sabang (Barangay Representative)
6. City Agriculturist of Lapu-Lapu City (City Representative)

The PAMB meets once a month as provided for in the NIPAS Act. Excerpts of the minutes of the monthly regular meeting and year-end report for CY 1998 of OIWS-PAMB on 3 September 1998 and 7 April 1999 are given in Table 7.4. There is a need to expand the membership of the PAMB to better reflect the current OIWS situation and management issues, particularly on the local NGO representatives due to the increasing number of groups organized working in the area.

Accomplishments of the Nature Center at Barangay San Vicente

1. **The Establishment of the Nature Center at Barangay San Vicente**

As claimed by the Philippine Wetland and Wildlife Conservation Foundation, Inc., the NGO representative to the Board, the most tangible accomplishment of the OIWS-PAMB to date is the construction of the nature and administration center in 1997 in Barangay San Vicente. The purpose of the nature center is to facilitate the effective management of the sanctuary and to provide conservation and recreational services to visitors, researchers, and the community in general. To visit the nature center, one has to pay an entrance fee of PhP8 for locals and PhP80 for foreigners per person. There are also binoculars and telescopes for rent.

2. **Setting up of Recreation and Tourism Facilities**

At present, the existing facilities provided for sanctuary users and visitors are boardwalks, observation hides, viewing decks, as well as a recreation center. Although the authority to manage the OIWS is vested on PAMB as provided for by the NIPAS Act, there are development initiatives towards the protection and management of OIWS spearheaded by other sectors. Such initiatives should be encouraged as long as they are in line with the OIWS Management Plan. Presented on Table 7.5 is a list of accomplished activities by various sectors from 1988 to 2000, which are in keeping with the OIWS Management Plan of 1992.

ISLAND ECOLOGY AND IMPLICATIONS FOR MANAGEMENT

Small islands are vulnerable because most of their resources are limited. Without subsidy from external sources, unabated and uncontrolled use of natural resources eventually leads to depletion causing importation from outside. When this happens, more capital is required for importation.

Table 7.4. OIWS-PAMB minutes of the meeting and year-end report, CY 1998.

Issues discussed	Agreement/Decisions	Remarks
1. Extension of boardwalk and improvement of restrooms at the OIWS	• The remaining capital outlay shall be for used the said extension as approved by PAMB.	• In process
2. Provincial Board of Cebu Resolution # 852,S.97 appropriating PhP60,000 as financial assistance for the OIWS PAMB	• PASu should prepare a work program for the PhP60,000.	• The OIWS-PAMB approved Resolution No. 02-98 in appreciation of the receipt of the amount of PhP60,000 as financial assistance from the Provincial Government of Cebu for the OIWS.
3. Use of timberland at San Vicente as water impounding dam	• Follow-up letter for the Lapu-lapu City Council.	• No response from the Lapu-lapu City Council
4. Request letter for RTD Barangan to utilize the pumpboat of Coastal Environment Program (CEP)	• Follow-up letter addressed to RED signed by RTD Melana requesting RTD Barangan to let OIWS PAMB to utilize their pumpboat.	• The pumpboat is already dilapidated.
5. Transfer of OIWS income to the National Treasury	• Resolution authorizing OIWS-PASu to withdraw the amount and transfer it to the National Treasury.	• Approved resolution #01-98, authorizing Delia P. Batasin-in, OIWS-PASu to withdraw the account of OIWS sub-fund from the Land Bank of the Phils., Banilad, Branch and transfer the account to DENR Depository Bank.
6. Planning Workshop on the RAMSAR Small Grant Fund to be conducted by PAWB on July 17 & 18, 1998 at Olango Island.	• Should be participated by OIWS PAMB and PAWD staff.	• Seminar/workshop for the review & update of the management plan was undertaken by the PAMB, NGOs, LGUs, DENR staff, etc. on 23 & 24 Oct 1998 at St. Jude Beach Resort. Planning Workshop proceeding for OIWS under Ramsar Small Grant Fund Project was submitted to PAWB on 6 December 1998.
7. Inquiring from the City Council of Lapu-lapu City the status of the 100-m wide Environmental Protection Area adjoining the OIWS and its allowable uses for development.	• Resolution be made regarding this inquiry.	• Approved resolution #03-98 inquiring from the City Council of Lapu-Lapu the status of the 100-m strip Environmental Protection Area adjoining the OIWS and its allowable uses for development.
Stale check given by Mr. Banzon of SPPI as donation for OIWS	• Letter request for a stale check to be changed.	• The letter was sent last 20 July 1998 but until now no response from SPPI has been received.
8. NGOs application for membership	• A resolution for rejection of PAMB membership for the Save Nature Society.	• Approved resolution #05-98 for the denial of the Save Nature Society application for OIWS PAMB membership. Approved Resolution No. 05-98, authorizing Engr. Jason Baclayon of PPDO as Liaison Officer of OIWS PAMB.

Continued

Table 7.4 Continued

Issues discussed	Agreement/Decisions	Remarks
9. Presentation of the newly-designated OIWS-PASu, Mr. Michael Merilles	• The outgoing PASu of OIWS should turn over all the OIWS documents to the newly designated PASu.	• Delia P. Batasin-in turned over the documents pertaining the development plan, work, and financial plan to the newly designated PASu.
10. Preparation for the RAMSAR Day	• Press release for the RAMSAR Celebration free of charge.	• Press release was published in the newspaper.
11. Celebration on 7 & 8 November 1998	• Donation box for the Nature Center	• Complied/Installed at OIWS.

Olango Island is no exception to this. It is small with limited physical resources in terms of arable land and majority of the islanders rely on marine resources. However, overharvesting and unregulated exploitation have led to the depletion of many economically important marine species such as fishes and invertebrates, which are utilized as food or raw materials for the shellcraft industry. As a result, over the years the marine waters around Olango became resource scarce which forced Olango fishers to travel to distant places as far as Palawan and Malaysia in search of more productive fishing grounds or to gather aquarium fishes and shells.

Meanwhile, those that remain in Olango have to be content with what is available and most often use destructive fishing techniques. Examples of these are the use of *sudsud* in collecting shells, which destroys the seagrass beds and disturbs the substrates. The use of sodium cyanide in collecting aquarium fishes not only further depletes these dwindling resources but also destroys the island's coral reefs. With the present status and ecological realities of Olango's resources it is imperative that proper management and conservation measures have to be taken to rehabilitate the depleted coastal resources.

On one hand, results of the 1998 PCRA surveys validate the studies conducted on Olango by outsiders because similar issues and problems identified still exist in Olango Island. It is hoped that all the information gathered by the participants made them see the realities of the status of their coastal resources.

With this information, they should be able to draw a realistic and implementable Integrated CRM Plan. Inasmuch as the responsibility to conserve and to manage the remaining resources are the tasks of every Olango islander, the role of the LGU in shifting these patterns of environmental degradation is equally important as well as creating opportunities for the people of Olango. Still the biggest challenge is how to reverse this pattern to a more sustainable utilization.

Table 7.5. Summary of CRM-related studies and projects implemented in Olango Island and its satellite islets.

Project title	Project leader	Duration	Funding source
1. The environmental impact of some activities on Olango Island	Alburo, R., H. Olofson	1988	USC-MBS
2. Early opinion on Olango Island with regard to the closure of the bay for fresh water conservation	Alburo, R., J. Adlawan, E. Pajaron, F. Soco, H. Olofson	1988	USC-WRC
3. Health status of Olango community and their attitude towards health	Amores, M.Y.	1988	USC-WRC
4. Water users awareness, involvement, and opinion survey: an example of participatory research	Alburo, R., H. Olofson, Self-Help Foundation	1988	USC-WRC/ Self-Help Foundation
5. Rapid Rural Appraisal of Olango Island: impression on demography, economics, education, and health	Remedio, E.M., H. Olofson	1988	USC-WRC
6. Baseline study of the marine flora and fauna of Poo and Talima bays, Olango Island	USC-MBS	1988	USC-MBS
7. Wells, well history, and water use in Olango Island	Walag, E., H. Olofson, E. Remedio	1988	USC-WRC
8. Survey of Olango Island, Philippines, with recommendation for conservation	Magsalay, P.M., R.P. Rigor, H.I. Gonzales, A.M. Mapalo	1989	AWBPF
9. Notes on ecology, history, and development on Olango Island: an approach using ideas from Bateson and Braudel	Olofson, H., E. Remedio, J. Neri	1989	USC-WRC
10. Environment and cognition: a comparative marine biological and cognitive study of two bays of Olango Island, Philippines	Cusi, M.A., R. Alburo and H. Olofson	1990	USC-MBS USC-WRC
11. Checklist and guide to bird watching in Olango Island	DENR-PAWD	1995	DENR
12. Socioeconomic profile of Olango Fisherfolks	Albert, S., F. Sotto, T. Heeger	1996	USC-MBS
13. Community profiles and site assessment surveys of Olango Island, Cebu, Bohol	IMA	1996	USAID/IMA
14. Preliminary resource scanning study of Olango	Flores, M.	1997	USAID/CRMP
15. Qualitative and quantitative analysis of fish trap or *panggal* catch in Caw-oy, Olango, Island, Cebu	Gatus, J., M. Cashman, T. Heeger	1997	USC-MBS
16. Livelihood and the environment: inextricable issues in Olango	Santos, L., F. Sotto, T. Heeger, S. Albert	1997	Barefoot Media USC-MBS

continued

Table 7.5 continued

Project title	Project leader	Duration	Funding agency
17. Status of the coastal resources of the Olango learning site	SUML	1997	Peace Corps-Phil USAID
18. Coastal environmental profile of Olango Island	Sotto *et al.*, USC-MBS	1997-2000	USAID/CRMP
19. Participatory Coastal Resource Assessment (PCRA)	Portigo, M.F.	1998	USAID/CRMP
20. Baseline assessment and annual monitoring in the Gilutongan Marine Sanctuary	Uychiaoco, A., UPMSI with USC-MBS, DENR, BFAR	1998- on going	UPMSI/DENR/BFAR USC-MBS
21. Environmental IEC caravan in Olango Island	Olango Synergy Group/ GREENCOM	1998	USAID/CRMP
22. Community farming as alternative livelihood for sustainable natural resource management and coral reef rehabilitation	Heeger, T., F. Sotto/ USC-MBS	1998-2000	GTZ, USC-MBS, CHED
23. Vulnerability assessment of Olango Island to climate change and sea level rise	Mapalo, A.M.	1999	Asia Pacific Network

COSTS OF MANAGEMENT FOR LOCAL GOVERNMENT AND COLLABORATORS

Olango Island is attracting increasing attention because of its rich resource potential. However, increasing tourism and resource use conflicts indicate the need for improved CRM. There are ongoing projects to assist the local governments with planning and conservation activities affecting both the reef and wetland systems and the people who use these resources. A framework for the CRM process in Olango includes an island-wide management committee, zoning for resource use, law enforcement, environmental education, community-level assessments and planning, and provision for sustainable tourism development. This CRM process for Olango is long-term and involves a number of parallel activities that engage local residents, their government, and other stakeholders in implementation. Although these ongoing activities do not require a large budget, they require continued support and proper technical guidance and mentoring through local and national government institutions. Investment for infrastructure is required for the OIWS to maintain the visitor center, as well as planned tourist reception areas and the necessary boats and equipment for local law enforcement.

The annual costs required for management to improve and maintain the condition of the reefs and wetland areas of Olango Island are summarized in Table 7.6. The essential activities that can easily be appraised include: resource assessments; community organizing, education and training; law enforcement and information dissemination; and various activities for macro and local planning and implementation. These costs are based on experience in other parts of the Philippines and are considered to be part of a local government basic service provided on a regular basis to maintain and improve the coastal resources for the

Table 7.6. Estimated annual costs required to support CRM in Olango Island[1] (White *et al*. 2000).

Olango Island-wide Management Costs[1]	
Resource assessments and monitoring	US$
2 reef surveys (2 x US$2,000)	4,000
2 wetland surveys (2 x US$2,000)	4,000
Community organizing	
4 Community Organizers full-time working with communities (US$4,000/person/year)	16,000
Education and training	12,000
12 seminars	3,000
Education and training materials	
Law enforcement	10,000
1 full-time patrol boat, crew and maintenance	
Information dissemination	2,000
Weekly radio broadcasts	6,000
12 public meetings	3,000
Visitor centers (2) (annually over 10 years)	
Planning activities	6,000
1 full-time CRM planner and technical guide	4,000
4 planning workshops (US$1,000/workshop)	**70,000**
Gilutongan Marine Sanctuary (1 km^2) Operations and Maintenance Costs[2]	2,000
Reef surveys, monitoring, and buoy maintenance	3,500
Community organizing	3,500
Education and training	1,000
Planning and resource center (annually over 10 years)	3,000
Law enforcement (small patrol boat)	2,000
Information dissemination	
Planning and operation	3,000
1 full-time Project Director (on-site)	3,000
Honorarium for part-time community staff	1,000
Municipal LGU staff and advisory group support	**21,000**

[1] This amount is intended to cover the Olango Island complex and is considered to be a minimum amount to maintain the area. The actual expenditure of the 2 LGUs combined is currently about US$6,000/year. The average CRM expenditure in the 29 LGUs that the CRMP is directly involved with in the Philippines is US$5,000/year. The actual annual expenditure of the CRMP for Olango Island management in addition to the LGU expenditure is US$65,000 plus overhead costs. In addition, the LGUs collect some taxes to offset expenses such as US$500 from the Nalusuan Resort in 1999.

[2] This amount is intended to support active management of the marine sanctuary, an area that is more heavily used than the larger Olango Island-wide reef area.

Olango area. Although some of these activities have been started by the CRMP, they are not yet part of the local government support system.

BENEFITS AND COSTS OF REEF MANAGEMENT IN OLANGO ISLAND

We now have a good idea about the potential net revenues (benefits) derived from the island resources on Olango and a sense about the costs of maintaining and improving the resource condition. Although our information base is not perfect and constantly changing, our assumptions are conservative and the figures quoted are based on actual revenue flows. Data on tourism, documented fish yield levels, and market prices and actual costs

of management, or estimated potential revenues and costs based on other similar situations in the Philippines have been used in the benefit and cost calculations.

Benefit and Cost Analysis: Can Investment in Management be Justified?

According to 2 local governments in charge of Olango Island, they want to know how much they should spend every year to improve the resource condition and management thereof and what will be the potential returns from such spending. Through donor-assisted projects such as the CRMP that works in Olango Island, the community-based process for conserving the resources is becoming known and accepted. The big question is whether the local governments can afford to support such conservation activities in the long term through their budget planning and allocation process. Since the responsibility lies with the local governments, they need to justify their budgets in terms that taxpayers and government planners can understand. The following benefit-cost framework portrays this basic information in a manner that can be readily used by national and local planners.

The annual net revenues (benefits) derived from the resources of primary concern with and without management interventions on Olango Island are summarized in Table 7.7. These benefits are compared with the cost of management and protection. The incremental annual benefit from management are substantially more than the costs. Since there are 2 LGUs involved, each will need to make calculations about the resources and benefits within its own jurisdiction and the needs and costs for management.

One basic assumption of the above analysis is that the island coral reefs and wetlands will at least be maintained and will not deteriorate. The Olango area is targeted for tourism development with the assumption that the quality of the environment will improve. This is important in that the area has a reputation for illegal fishing and overexploited reef resources. The investment in management needs to be scaled up to reverse these trends and to bring back the quality of the environment. The graph shown in Figure 7.3 highlights the accrual of incremental benefits resulting from management of the resources compared to the estimated cost of management over a 10-year period. The incremental benefits, although based on conservative assumptions about tourism growth, show that investments in management are more than covered by the net revenues from the natural resource base for fisheries and as an attraction for tourists.

Benefits by Unit Area of Habitat and Sensitivity to Improved Management

The local governments may not be able to support such a large investment as the CRMP has contributed on an annual basis, but the analysis clearly shows that it is their overall economic benefit to increase investment more in CRM. If we assume that no investment is made and business as usual prevails with overfishing and degradation worsening, there will be a continued decline of the coastal resources upon which Olango Island communities depend. It would also lead to a decline in the off-island tourism industry based on Mactan Island. One way to illustrate this effect is to look at the potential for increased revenue

Table 7.7. Summary of annual net revenues (benefits) (1999) and potential net revenues with management from coral reef and wetland resources of Olango Island and associated costs of management (White *et al*. 2000a).

Annual Revenues			
Sources	**Area**	**Current net revenue[1] (US$)**	**Potential net revenue with management[2] (US$)**
Coral reef	40 km^2		
Fisheries		336,000	672,000[a]
Tourism		1,458,000	2,187,000[b]
Seaweed farming		240,000	240,000[c]
Coastal protection		0	0[d]
Aesthetic/Biodiversity values		0	82,000[e]
Subtotal		2,034,000	3,181,000
Wetland (mangrove and other)			
Fisheries	424 ha	229,000	458,000[a]
Wood	424 ha	18,000	18,000[f]
Tourism	920 ha	142,000	214,000[b]
Subtotal		389,000	690,000
Total		**2,423,000**	**3,871,000**
Annual Cost of Management			
Estimated island-wide management costs (Table 7.6)			70,000
Estimated Gilutongan marine sanctuary costs (Table 7.6)			21,000
Actual CRMP investment, average per year			65,000

[1] Assumes current status of Olango reef and habitat and based on calculations derived in Tables 5.4, 5.5, and 7.6.

[2] Potential net annual revenues with CRM interventions in place after one full year of operation

[a] Assumes that reef and mangrove management can increase fish catch by 100 percent through a series of marine sanctuaries and improved law enforcement efforts; although this would take several years to take effect in reality, for simplification, it is assumed that one year is required

[b] Assumes that reef and wetland management will increase the number of visitors by 50 percent

[c] Assumes reef management will not significantly affect seaweed farming production

[d] Not quantified

[e] Assumes each visitor pays a fee of US$3 for entrance fees based on willingness-to-pay surveys (Arin 1997) and new legislation supporting user fees

[f] Assumes no significant change in wood production from mangroves

from improved and intensely managed reef areas such as the Gilutongan marine sanctuary. This sanctuary reef area is visited by up to 100 divers per day and if management improves, with implementation of anchor facilities, mooring fees, and other regulations, it will produce much more revenue than the average reef area of Olango Island. A quick calculation shows that about US$200,000 annual net revenues can be generated from the marine sanctuary, if properly managed. Figure 7.4 indicates the levels of net revenue possible from the resources of Olango Island by unit area. If the quality of the resource base improves, so will revenues in the long term to all concerned, on and off the island.

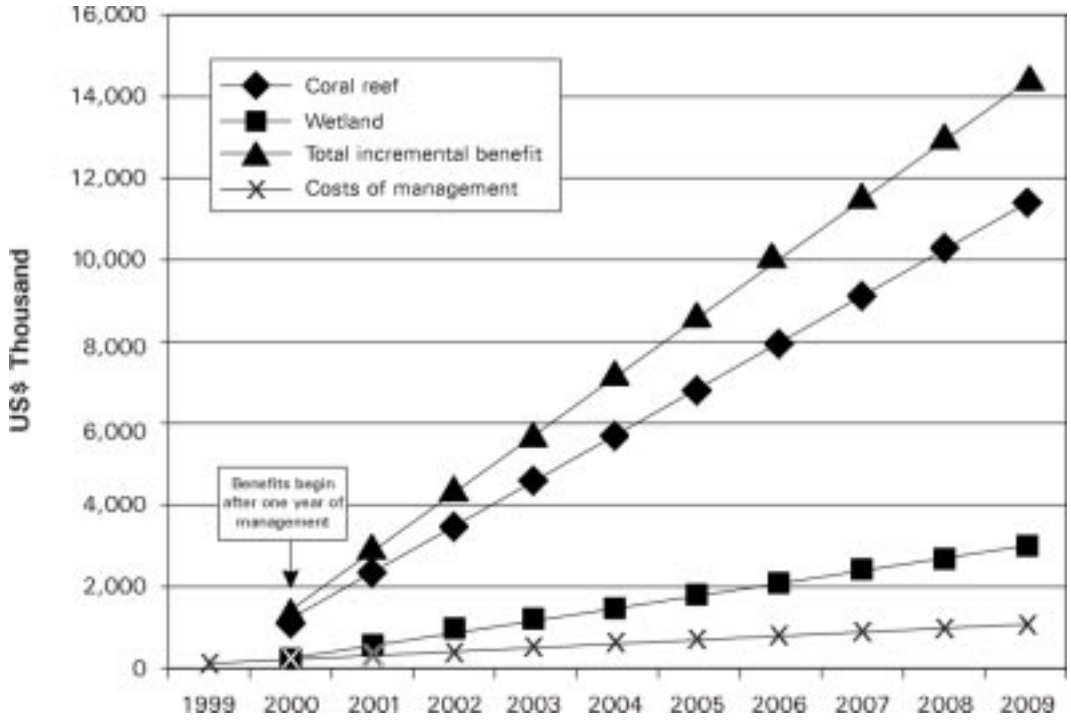


Figure 7.3. Accrued incremental benefits compared to costs of management from the sustainable use of Olango Island resources (White *et al*. 2000a).

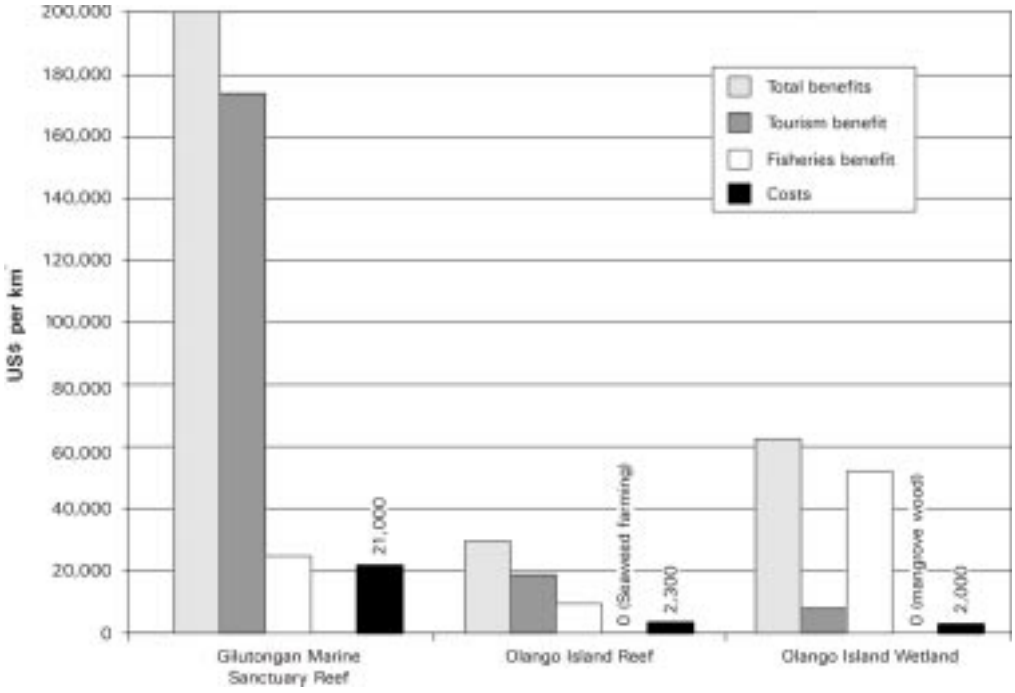


Figure 7.4. Incremental annual benefits from Olango Island resource use per km² for different management regimes and the cost of management (White *et al*. 2000a).

RECOMMENDED ACTIONS IN THE MANAGEMENT OF THE COASTAL RESOURCES OF OLANGO ISLAND

The current status of coastal resources of Olango Island is very much similar to other small islands in the Philippines. However, the solutions and the interventions may differ based on the unique characteristics of Olango, urban and tourism center and the distinctive characteristic of its people. Shifting the current use of resources to one that is sustainable entails an active community involvement and a political will on the part of the local government with the support of the various sectors working in Olango. The recommendations below are taken from some groups working in Olango Island.

Coastal Resource Management Project (CRMP) Future Plans

CRMP plans to pursue 3 goals in their efforts to sustain protection and management of the coastal resources of Olango Island (Parras *et al*. 1998):

1. To develop alternative enterprises that will benefit critical coastal resource users and reduce fishing pressure.
2. To create an island-wide CRM Council to include representatives from each *barangay*, DENR, PAMB, NGOs, youth, and private sector (resort owners, tour operators) to examine CRM issues and form resolutions to address them.
3. The creation of a zoning plan which will designate specific issues for different zones based on the most feasible economic and environmental use of the areas, e.g., seaweed farming, fish cage culture, SCUBA diving, marine sanctuary, etc. This zoning plan is a good tool to guide the coastal resource managers and planners and most especially the LGUs in the development of the island.

University of San Carlos-Marine Biology Section's (USC-MBS) Recommendations

1. The foremost challenge facing many small islands like Olango is how to curb the rapid human population growth and its destructive fishing activities. The prevalent use of destructive fishing methods by Olango fishers is a consequence of the pressure to catch more to feed the large and growing resident population. The local government should vigorously campaign for family planning and incorporate measures in the school curriculum from high school to tertiary levels. Projects and initiatives should come from government and NGOs to conserve and manage the remaining marine resources and to raise the standards of living of coastal dwellers.
2. In order to rehabilitate the degraded coastal resources and provide livelihood options for the people of Olango, an island-wide "Integrated CRM Plan for Olango Island" has to be formulated. The Lapu-Lapu City in partnership with the Olango islanders shall spearhead this with the support of the various government line agencies, NGOs, church, academe, and projects. In the formulation of the plan, the government should consider all inputs from the local resource users/communities supported by the LGUs, academe, and NGOs. The plan should incorporate all the issues identified by the islanders during the PCRA surveys according to priority, feasibility, and funding source.

SUMMARY

The main issues on CRM in Olango Island reflect the long held notion by the islanders that the marine resources surrounding their island is a common resource; hence, there is free access to these resources. This has led to "Malthusian overfishing" where massive exploitation of marine resources due to population pressure force Olango fishers to fish farther away in neighboring and even distant fishing grounds.

To reverse the present state of Olango's marine resources, short and long-term solutions should be undertaken and opportunities have to be created. The current changes in national legislation enabled the LGUs to directly manage their own resources. In fact, many LGUs are now instituting marine resource conservation and rehabilitation programs (i.e., fish sanctuaries and mangrove reforestation) in their respective territorial waters and are enacting laws to reduce the "open access" policy.

However, the areas previously available for "open access" to fishing would become smaller as more LGUs institute their own "restricted access" policy. With this new development, is a possibility that Olango fishers who presently fish outside the waters of Olango will be displaced.

To compensate for the lack of income of the fishers, external subsidies in the form of alternative income sources coupled with environmental education should be made available to them. In the long run, the success or failure of CRM in Olango will largely depend on how the fishers accept or reject the alternative livelihood program being instituted in Olango.