

PRIMER on Coastal Resource Management



Primer on Coastal Resource Management

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ABOUT THIS PRIMER

This Primer on coastal resource management (CRM) was developed as a road map to the key steps in planning and implementing sustainable use of coastal resources. It describes the overall CRM process and provides snapshots of critical activities to be undertaken as part of this process.

In the Philippines, the responsibility for CRM has largely been devolved to the local government. This Primer was therefore designed for use by local government units as well as supporting and collaborating institutions such as national government agencies, non-government organizations, and academic institutions as an orientation tool for CRM.

This Primer provides a brief overview of the CRM process that can be used by coastal communities in developing sustainable fisheries, maintaining economic benefit from coastal resources, and preserving marine biodiversity. It describes the what, why, and how for each step of the CRM process. In addition, the national policy and legal framework supporting CRM is identified.

The Primer captures the essence of the CRM process, but additional reading is required for a more detailed study of the process.

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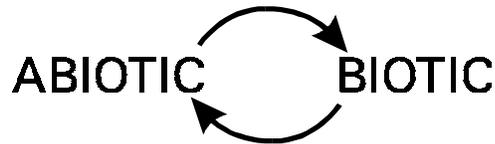
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COASTAL AND MARINE ECOSYSTEM BASICS AND VALUES

Ecosystems and their Linkages

The ecosystem is the basic functional unit of ecology in which both the biotic communities (living organisms) and the abiotic (non-living) environment are inseparably connected and interact, maintaining the equilibrium necessary for life.



All living things are bound together in the web of life – complex food webs, symbioses, nutrient cycles and other ecological interactions. All ecosystems are thus inter-related and linked to each other. So when we talk about ‘coastal resource management’ (CRM), we cannot limit our view to the shoreline and water, because there are tight linkages between upland and coastal ecosystems and what occurs in one ecosystem inevitably affects the other ecosystems.

The coral reef ecosystem, for example, provides a diverse habitat for a large number of organisms that forage and feed in the other coastal ecosystems, such as seagrass and mangrove, and also serves as a source of nourishment for non-reef species that forage there or prey upon their inhabitants. Reefs also play a role in maintaining the quality of local waters and thus have a positive and relevant influence on associated coastal habitats. Moreover, depending on their proximity to adjacent coastal areas, they serve to weaken incoming waves, thus minimizing erosion and coastal hazards behind the reefs.

Conversely, reefs are affected by biological and physical processes that occur in and above it. Coral reefs and coral reef organisms are extremely sensitive to freshwater inflows which reduce ambient salinity; water-borne sediments which interfere with the filtering action of the resident filter feeders; temperature extremes beyond the thermal limits of the coral organisms; pollutants (e.g. agricultural biocides) which may enter local waters; breakage, such as that caused by cyclonic storms and by boat anchors; and excessive nutrient loading which may stimulate the excessive growth of competing algae which cover and kill coral organisms.

The mangrove ecosystems also have a variety of linkages with the larger ecosystem in which they occur. Their most prominent role is the production of leaf litter and detrital matter which is exported, during the flushing process, to the nearshore marine environment, providing a nutritious food resource for a variety of marine animals. Shoreline mangroves are also recognized as a buffer against storm-tide surges that would otherwise have a damaging effect on low-lying land areas, or they help stabilize coastal shorelines that would otherwise be prone to erosion. Probably one of their more important roles is the preservation of water quality: they have the ability to extract nutrients from circulating waters, and thus help minimize the excess nutrient enrichment potential of nearshore waters.

Mangroves are relatively resistant to many kinds of environmental disturbances and stresses. But they are sensitive to excessive siltation or sedimentation, cessation of flushing, surface-water impoundment, and major oil spills, which reduce the uptake of oxygen for respiration and thus result in rapid mangrove mortality. In general, human activities are the biggest threat to mangroves. The conversion of mangroves to residential, commercial, industrial, and agricultural developments has

resulted in the loss of the basic mangrove habitat and its functions, which in turn results in the loss of a valuable food resource for a variety of marine animals in the various coastal ecosystems.

The seagrass community, the third major coastal ecosystem, plays beneficial roles in tropical coastal waters. Seagrass beds hold the substrate, provide special sanctuary for the young of many fishes, provide food for grazers such as parrotfish and conch, and export particles of plant material to be eaten by many of the smaller organisms in the food chain. Seagrasses are extremely sensitive to excessive siltation, shading, water pollution, dredge and fill activities, and fishing practices that use bottom trawls which scrape the beds. They are also sensitive to hot water discharges and are usually eliminated from areas subjected to effluents from power plants. Typically, when a seagrass community is eliminated, its marine animal associates also disappear from the area. Seagrasses are an important item and habitat for endangered species such as sea turtles and dugong.

And then there's the human community. Humans, an ecosystem by themselves, are an integral part of the environment. Evolving from hunting-gathering to agriculture to industry to being an information- and knowledge-based society, they have shaped and re-shaped their environment, sometimes changing it, for better or worse, forever. Today, human interaction with the various ecosystems is perhaps the most influential factor affecting the coastal environment and the vital natural processes occurring there. CRM, therefore, is above all else managing people and human activities so that their negative impacts on the coastal environment are minimized to the extent that would promote the natural productivity and sustainability of coastal and marine resources.

(Some parts of this section were adapted from Coasts. Coastal Publication No. 2, Renewable Resources Information Series. S.C. Snedaker, C.G. Getter, Research Planning Institute Inc. in cooperation with National Park Service-United States Department of Interior and United States Agency for International Development)

COASTAL AND MARINE ECOSYSTEM BASICS AND VALUES

Oceanography

The sea is a dynamic environment where countless natural biological, chemical and physical processes occur. Some of these processes are described below:

Tides, tidal currents and tidal flushing

The scale of the marine environment is mediated by the dynamic nature of the ocean, expressed in tides and currents.

Tides are a regular rise and fall in sea level that affect the extent of exposed shoreline throughout the day. Tides ensure that plants and animals living along the shoreline are being alternately submerged in water and exposed to the drying effects of air. They vary from time to time and from place to place. At any one place, the tidal range changes gradually and in a regular way from day to day. In the Philippines, it is less than 3 meters.

Tidal currents are horizontal water movements produced by the rise and fall of the sea, for example, water that falls into harbors as the tide rises (the flood tide and flood currents) and flows out of harbors as tide falls (ebb tide and ebb currents). Each time the current changes direction, a period of no current occurs (slack water). The shape of the coastal sea floor, coastline, waves, wind and other currents (e.g. river currents) can affect tidal currents, so in some areas there might be tides but no net tidal current.

The strength of a tidal current depends on the volume of water flowing through the entrance to a harbor, bay or reef as well as the size of the entrance. In general, the strongest currents in coastal areas tend to be tidal currents.

Tidal flushing refers to the concentration of waste removed from the water body in one tidal cycle.

Tides affect human activities along the shoreline, including fishing. During low tide, many coastal residents glean the shallows. At high tide in some areas, they may gather fry for pond culture, and boats come ashore to unload their cargo. Also, the effectivity of some fishing gears, such tidal waves (*pabhas*), is based on tidal patterns, and fishponds depend on the tide for water circulation and flushing.

Currents

Currents are large-scale water movements driven primarily by winds and by the unequal heating of ocean waters. Their transporting property is perhaps the most important factor linking different marine habitats. A basic understanding of the nature and causes of currents in the marine environment is therefore required in CRM, for example, for planning and managing marine sanctuaries.

There are two general types of currents:

- a. drift currents, which are caused by the wind
- b. geostrophic currents, which result from the meeting of bodies of water of different density, which is, in turn, controlled by water temperature and salinity

In general, currents along shorelines flow with the depth gradient, that is, along the shoreline. The drag of wind blowing across the surface of the sea sets up currents in the top 2-3 meters of water column. Much of the drifting food and larvae occur in this layer, thus wind-driven currents have a major effect on coastal habitats. Current speeds decrease below this surface layer.

Monsoonal winds also have significant effects on currents in the Philippines. Due to seasonal variations in strength and direction of prevailing winds and currents, planktonic larvae, silt and pollutants are likely to be distributed differently if they enter coastal waters during a southwest or northeast monsoon.

Waves

The wind blowing across the surface of the sea produces waves, the maximum height of which depends on wind speed, the length of time wind persists and the distance that the wind blows across the surface. Waves can greatly influence the distribution of plants and animals on reefs and in other coastal habitats. Waves break down corals and carry fragments of corals across the top of reefs. Also, the turbulence generated by waves, along with prevailing currents and long-shore currents (caused by waves and tides), transport sediment parallel to shore. Large-scale oceanic currents can greatly affect coral reefs and other habitats, depending on whether such currents bring nutrient-rich or nutrient-poor waters, whether those waters are warm or cold, and whether they bring planktonic food and larvae from far away.

Waves and currents also change the profile of beaches and have a significant effect on the shape and extent of sandy shorelines. During seasons of low swell and low-energy waves, sand is deposited onto beaches. During seasons of high energy waves, beaches are cut back by erosion. Sand bars develop offshore because of massive amounts of sand. Construction of wharves, jetties, sea walls and the removal of coastal-stabilization vegetation (e.g. mangroves) to develop mariculture ponds or for other uses will likely alter these processes and have major effects on the organisms living in these coastal habitats.

Currents can run in a linear fashion from upstream to downstream, as in estuaries or channels with strong and persistent uni-directional flow. Most systems are much more complex. Water currents change direction or even reverse under the influence of the tide, wind or variation in major oceanic patterns. In some offshore situations, the edge of a broad, strong current can wander or meander away from the mainstream and pinch off, forming a ring or eddy. Small, shallow eddies can also form when strong currents pass through coral reefs. These occur in depths as shallow as 15-60 meters. Eddies transport heat, nutrients and weak-swimming or planktonic organisms (e.g., larvae). Larvae tend to concentrate in island-effect eddies, which makes for good marine sanctuary sites.

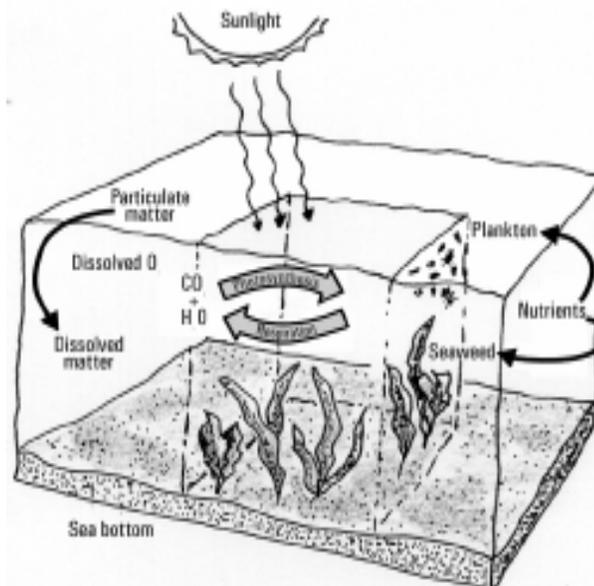
Some bio/physico-chemical characteristics of, and processes in, the marine environment

In order to appreciate why criteria for planning and management of the coastal and marine environment differ from those for terrestrial environments, it is important to look not only at the degree of interconnectedness among marine areas, but also at how the nature of the marine environment itself differs from the environment on land. Overall, the marine environment provides its inhabitants with more protective and more nurturing conditions than the terrestrial environment.

1. The marine environment is wet. This means that marine organisms generally do not need to expend much energy to maintain the concentrations of water they require to function normally.
2. One of the most biologically important properties of seawater is that it is relatively transparent, so sunlight can penetrate fairly deep into the ocean. This is vital because all plants need light to grow. The transparency of the ocean depends to a large extent on how much and what kind of material is suspended and dissolved in the water. Water near coasts often contains a lot of material brought in by rivers, which gives coastal waters a greenish tint and makes them less transparent than the blue waters of the open ocean.
3. Seawater is a "soup" of nutrients and food. It carries nutrients in the form of particulate

matter and dissolved materials, biologically important gases, living and dead organisms – indeed, in the sea, adults, juveniles and larvae of plankton (organisms that drift in the water), nekton (organisms that swim), and benthic organisms (those that live on the bottom) are surrounded by food.

4. Seawater is about 85% sodium and chloride, which is why it tastes like table salt. There are only a few types of dissolved materials (ions) present in seawater, and their relative amounts (percentage) are always the same. The relative concentrations of these ions are thought to have existed for 1.5 billion years. This makes it easier for marine organisms to control their internal salt and balance. Salinity is kept fairly constant by mixing and opposing the processes of evaporation by the addition of freshwater by rivers and rain. Acidity, on the other hand, is maintained by the strong continuous entry of carbon dioxide from the air into solution in seawater, making for a good buffer against changes in acidity caused by the by-products of photosynthesis and decomposition.
5. Salinity influences the density of seawater: the saltier the water, the denser it is. The density of seawater therefore depends on both the temperature and salinity of the water.
6. Being about 800 times denser than air, seawater can support plankton and nekton partially or totally against the downward pull of gravity. It can also support sessile organisms without their own means of support (e.g. soft corals, sea squirts, anemones and plants). Many invertebrates without internal or external skeleton take seawater into their bodies and/or are composed of 90-95% seawater to serve as their internal, “hydrostatic” skeleton.
7. There are gases as well as solid materials dissolved in seawater. These include oxygen, carbon dioxide and nitrogen, which are found in the earth’s atmosphere and dissolve in seawater at the boundary between the atmosphere and the sea surface, or released from the sea surface to the atmosphere. Gases dissolve better in cold water. This is important to marine organisms as this brings oxygen to the deep sea. In addition, the photosynthetic processes that occur in seawater produce oxygen, which is released as a by-product. Marine organisms also affect the amount of dissolved gases in the water, for example, by using up oxygen in their respiration.
8. Seawater is physically buffered against large temperature changes. It can absorb and release large amounts of heat without much change in temperature and thus has a much narrower range of temperatures than air. In a given area in the sea, daily temperatures typically fluctuate less than 5° near the surface and less than this in deeper waters.



(Adapted from *Staff Training Materials for the Management of Protected Areas*, R. Kenchington and K.L. Ch'ng (editors). RCU/EAS Technical Report Series No. 4, UNEP, 1994
Marine Biology, M. Kemp (editor). Wm C. Brown Publishers, 1997)

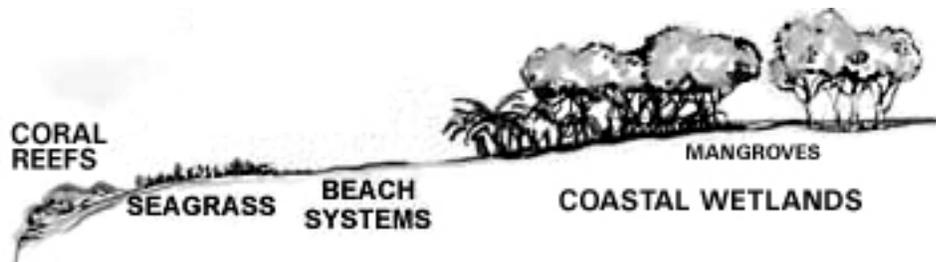
COASTAL AND MARINE ECOSYSTEM BASICS AND VALUES

The Coastal Zone

The coastal zone is defined as “the strip of land and adjacent lake or ocean (water and submerged land) in which the land ecology and land use affect lake and ocean space ecology and vice versa. Functionally, it is a broad interface between land and water where production, consumption and exchange processes occur at high rates of intensity. Ecologically, it is an area of dynamic biochemical activity but with limited capacity for supporting various forms of human use. Geographically, the outermost boundary is defined as the extent to which land-based activities have measurable influence on the chemistry of the water or on the ecology or biota. The innermost boundary is one kilometer from the shoreline except at places where recognizable indicators for marine influences exist, like mangroves, nipa swamp, beach vegetation, sand dunes, salt beds, marshlands, bayous, recent marine deposits, beach and sand deposits, and deltaic deposits in which case the one-kilometer distance shall be reckoned from the edges of such features.” (*National Environmental Protection Council, 1980*)



The Philippine coastal zone is typical of tropical coasts, with at least four major resource units occurring along its shallow coastlines: coral reefs, beach systems and coastal wetlands (including mangroves).



Coral reefs. Coral reefs occur along shallow, tropical coastlines where the marine waters are oxygenated, clear and warm, and free from suspended sediments, excessive freshwater runoff, and pollutants. The actual reef consists of large and rigid structural mass of calcium carbonate formed by the cemented skeletal remains resulting from the successive growth and development of reef-building corals. Although corals are colonies of small animals, each living unit contains algal populations within its own tissues which are capable of photosynthesis, thus providing an energy source for both the coral and the algae. The corals themselves are relatively slow-growing colonies of animals with growth rates ranging between 0.1 cm and 10 cm per year in length.

Coral reefs are considered as the “rainforests of the sea” and one of the most complex and diverse ecosystems in the world. The large and diverse animal populations associated with the reef – nearly a million species in all — are supported both by the net primary production occurring on the reef and by the organic materials that are continually brought to the reef by marine currents. Up to 3,000 species of marine animals may co-exist in a single reef, where the density of fishes can be 100 times greater than the ocean average. Reefs can grow to tens of meters high and as long as 2,000 kms.

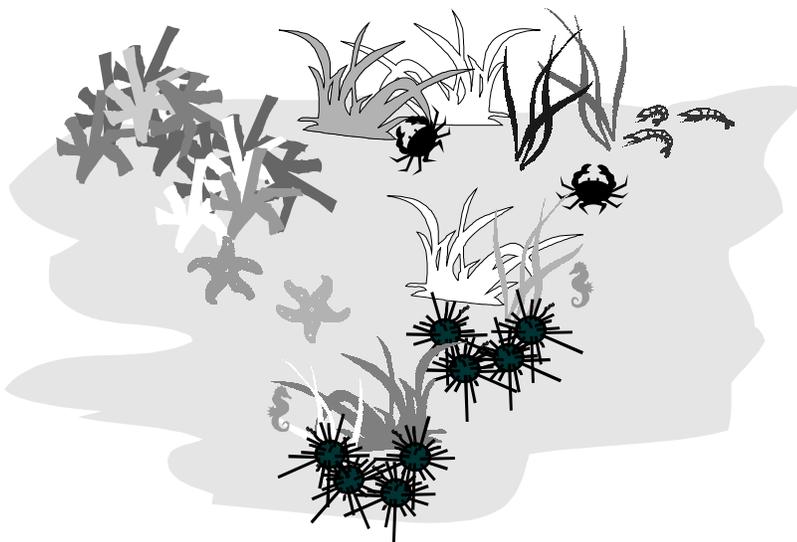


Coral reefs are found in more than 100 countries of the tropics. For thousands of years, coastal communities have relied on reefs for a host of products. Today, people continue to depend on reefs for an essential protein source, fish for a variety of products and services, including food, building materials, recreation, and shoreline protection against storms.

The Philippines lies in the Indo-West Pacific Region, reputedly the world’s highest biodiversity marine area, and is part of what is known as the “coral triangle,” the center of the most diverse habitat in the marine tropics. The country’s coral reefs host about 400 species of corals, 971 species of benthic algae, and a third of the 2,300 fish species known to inhabit Philippine waters. There are 27,000 sq km of coral reef areas in the Philippines, with 60% of them occurring in Palawan.

Seagrasses. Seagrasses are seed-producing marine plants that occur in shallow, nearshore waters, the only group of submerged flowering plants in tropical and marine environments. They grow in the intertidal region to depths of 30 meters, and are most conspicuous in the shallow subtidal area. Largely taken for granted, they perform many important functions. They stabilize and hold bottom sediment even under the force of hurricanes and storms. They provide shelter and refuge for adult and young marine animals, many of which are commercially important. They provide food for fish, sea turtles and other marine animals, including the endangered Dugong and the Green sea turtle. They trap debris and small particles and produce dissolved organic matter, thus contributing to nutrients cycle within the ecosystem. They also serve as a nursery ground for many fish species.

The Philippines has 16 known species of seagrasses, the highest number in the Indo-Pacific region. These species are valued mainly for their role as fish nursery areas and as foraging grounds for food fish, Dugong, turtles and wading birds. The depletion of seagrass beds is known to result in high water turbidity and lower production of seagrasses and their associated fauna. Sadly, seagrass ecosystems in the Philippines are under threat from various natural and man-made forces – typhoons, tidal waves and volcanic activity as well as mining, aquaculture, deforestation and blast fishing.



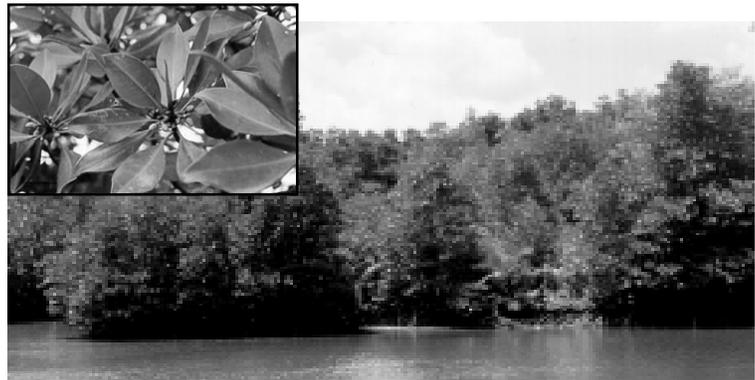
Beach systems. Beaches consist of accumulated, unconsolidated sediments transported to shore and molded into characteristic forms by wave-generated water motion. Beaches are located between the lowest seaward tide level and the inland limit of the average highest storm waves, exclusive of catastrophic storm events. Changes on a beach are responses to processes acting far outside the limits of the beach itself, however. Beaches are dynamic, not stable, land forms, constantly subjected to forces that promote erosion and/or accretion. Differences in beach form (or type) and position reflect the local balance or imbalance between deposition (or accretion) and erosion (or loss). Worldwide, there is general belief that erosional forces, both natural and man-induced, tend to dominate the accretional forces. This is indicated by a loss of beaches and beachfront in many parts of the world.

Most small Philippine islands have coral sand beaches, i.e., beaches formed by coral reef growth and erosion. Forming an integral part of the reef communities, these beaches depend on healthy coral reefs for continued supplies of sand, at the same time supporting crustaceans, mollusks and some worms. Undisturbed beaches also serve as nesting places for turtles. Unregulated and unplanned development of beaches for tourism, construction of sea walls, jetties and harbors, and the quarrying of sand for construction and other purposes are some of the most common threats to beaches in the Philippines.

Coastal wetlands. This covers mangroves and their associates, such as *Nypa fruticans* (nipa palm), and rivers.

Mangroves. Mangroves are salt-tolerant, woody, seed-bearing plants. They range in size from tall trees to small shrubs; worldwide, there are more than 50 species, more than 35 of which occur in the Philippines, where they cover about 138,000 hectares. They are characterized by their common ability to thrive along sheltered, inter-tidal coastlines on sediments that are saline, often low in oxygen, and sometimes acidic. This ecosystem is economically and socially significant for its role in the existence and perpetuation of nearshore fisheries, the protection of coastlines, as a renewable resource, and as a location for permanent and temporary human settlements. Mangroves form an important link between the shore and coastal ecosystems. They can form dense forests along coastlines and rivers and act as effective traps of sediment, nutrients and pollutants. They control freshwater surface flow, stabilize coastal areas, export detritus and act as refuges for fish fry.

Mangroves have been used for centuries by Filipinos for food, forage for animals, building materials, fuel, folk medicine and various other purposes. In fact, the Philippine capital Manila was originally called *Maynilad* ('there is *nilad*') after a mangrove species known locally as *nilad* and found extensively in the old days in the Pasig River Delta.



(Some parts of this section were adapted from Coasts. Coastal Publication No. 2, Renewable Resources Information Series. S.C. Snedaker, C.G. Getter, Research Planning Institute Inc. in cooperation with National Park Service-United States Department of Interior and United States Agency for International Development)

COASTAL AND MARINE ECOSYSTEM BASICS AND VALUES

Resource Values

The benefits that can be derived from coastal resources are well-known and widely recognized. These benefits, expressed in economic terms, are described below:

Coral reefs. Coral reefs are the coastal ecosystem which provides the most substantial and sustainable source of sustenance to people in the Philippines. The 18,000-km coastline of the country is estimated to have about 27,000 sq km of coral reef fringing its shores or in offshore areas in the form of submerged reefs or coral atolls. This area is equal to slightly more than 10% of the total land area of the country.

It is estimated that more than one million small-scale fishers depend directly on reef fisheries for livelihood. In addition, reef fisheries supply a sizable amount of protein in a country where more than 50% of the animal protein is derived from marine fisheries and aquaculture.

The contribution of reef fish to the total fisheries of the Philippines ranges from 8% to 20% (or about 143,200-358,000 tons). The contribution of reef fishery to some small island fisheries in the Philippines is as much as 70% of the total fish harvest. The average documented reef yields for the Philippines is 15.6 tons per sq km per year. When we destroy reefs, we destroy income for various beneficiaries in the order of US\$50,000 (Php1.9 million at Php38:US\$1) per sq km per year of healthy coral reef. With 27,000 sq km of coral reef, if 50% of this is in a condition which will support estimated revenues at an average level, coral reefs can contribute almost US\$1 billion (Php38 billion) annually to the Philippine economy.

Mangroves. Mangrove ecosystems have extremely high natural productivity in terms of plant growth and all the associated organisms. Much of this productivity translates into useful products for people in the form of wood, fish and crustaceans and various other ecological and economic benefits. Direct economic values estimated in the Philippines for mangrove wood and fish products combined range from US\$153 to US\$1,396 (Php5,814 to Php53,048) per hectare per year. The lower estimate is based on the Pagbilao (Quezon Province) mangrove forest for which direct observation of occurring species (for both fish and forest) was made in a relatively degraded mangrove area. The higher estimates, which do not include revenues generated from aquaculture, are consistent with a study that estimates the value of a complete mangrove ecosystem to be in the range of US\$500 to US\$1,550 (Php19,000 to Php58,900) per hectare per year. Based on these estimates, the average annual conservative return used for Philippine healthy mangrove forests and habitats is US\$600 (Php22,800) per hectare per year. A simple calculation for all the abandoned fishponds in the country, which were once thriving mangroves, will tell us that we can afford to replant mangroves and to maintain their continuous benefits.

Fisheries. The Philippine population is highly dependent on fish food. Recorded per capita consumption of the “fish, meat and poultry food group” is 54 kg per year in 1993, of which 67% is composed of fish and fish products. The food group that includes fish is thus the second most important component of the Filipino diet next to rice.



On a national scale, fisheries contributed 3.5% to the gross domestic product (GDP) and 16% of gross value added (GVA) in the agricultural, fishery and forestry sectors in 1996, both at current prices. In the same year, exports of fishery products amounted to Php 15 billion with the top commodity exports being tuna, shrimp and seaweed, in descending order of importance.

The fishing industry also provides employment to about one million people, roughly 5% of the country's labor force. Of this, 60% is accounted for by the municipal fishing sector, 28% by aquaculture, and the rest by commercial fishing.

The nearshore area is the most biologically productive area for fisheries, and also the most overexploited. In 1996, the total catch of the municipal sector reached 700,000 tons valued at Php25.4 million, including the value of inland catch. Municipal catch, however, is often underestimated because the number of small-scale fishers who consume or sell the fish is not recorded.

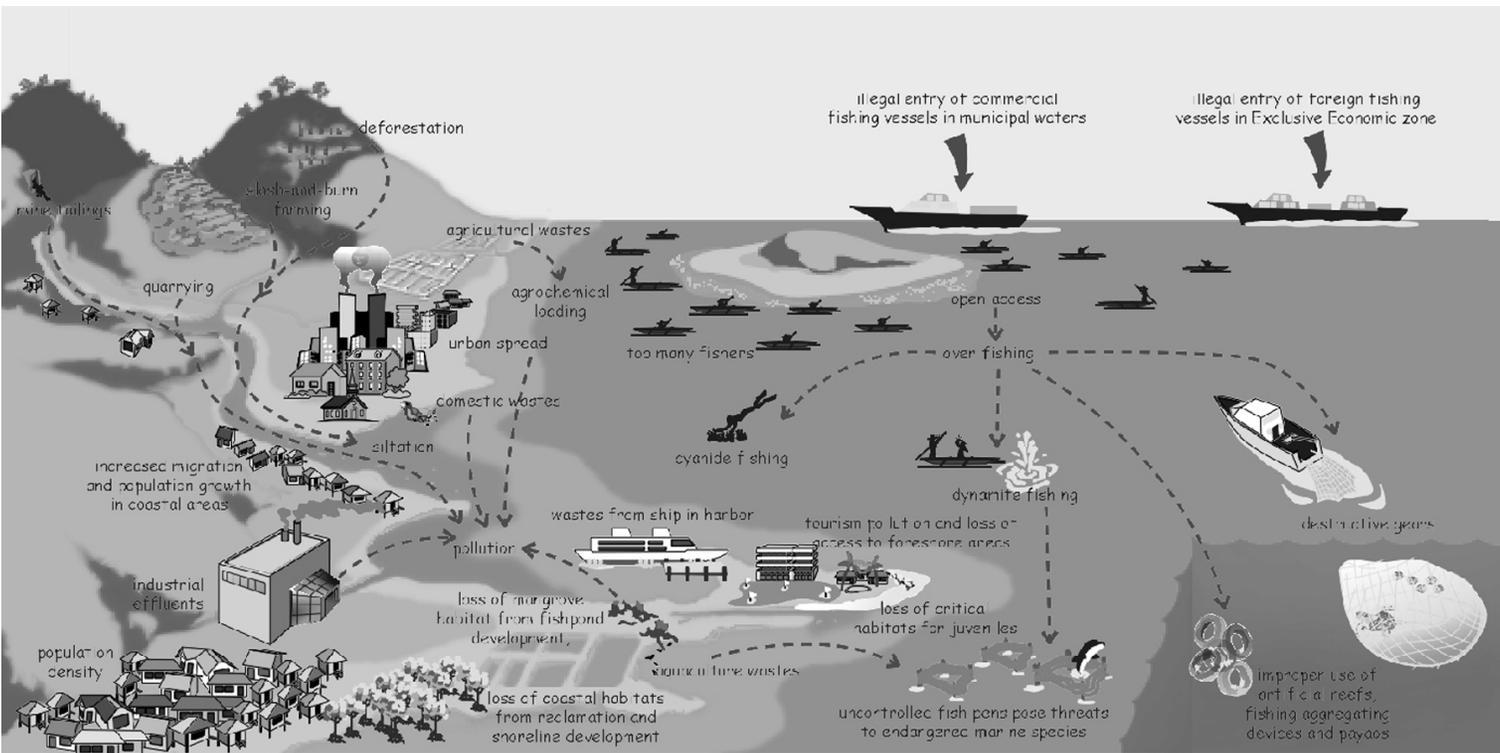
The sad story is that fisheries are beginning to decline. There is clear evidence that overfishing or too much effort per unit area and catch is occurring in all the important fisheries of the country. The consequences are that the overall catch is decreasing and catch per unit effort is decreasing and that profits to all concerned are declining. The loss in economic rent is about US\$0.5 billion (Php19 billion) annually for small pelagic fisheries alone.

Water quality. There is one crucial link binding all coastal resources together and affecting their conditions and economic usefulness to humans. This, of course, is *water*. Water and its transport role are crucial in the maintenance of all coastal ecosystems because these ecosystems and their numerous organisms are dependent on the incubation and movement of larvae which provide new recruits of fish, invertebrates and plants to all coastal systems. Water quality directly affects the viability of these minute living organisms to survive and be successfully transported to their eventual home where they reproduce.

Most kinds of pollution are carried by water and affect all living coastal resources and their ability to grow and reproduce naturally. As the sea becomes more polluted, we will lose living coastal resources at an increasing cost to society. For example, if a coral reef is destroyed from urban runoff or fresh water flooding, the losses could be equal to the original productivity of that reef plus whatever other benefits derived from it, such as coastal protection. This can amount to Php1.9 million per sq km per year from fishing and tourism. Or, looking at polluters' willingness-to-pay for losing their ability to dump into the ocean or a river for free, the cost of pollution for Lingayen Gulf would be approximately Php366 million annually. This amount is probably a conservative estimate of what is actually lost in terms of decreased fish catch and lowered tourism appeal in the Gulf.

(Adapted from The Values of Philippine Coastal Resources: Why Protection and Management are Critical. A.T. White and A. Cruz-Trinidad. CRMP/DENR/USAID. 1998.)

STATUS ALERT
Human Impacts on Coastal Resources and Ecosystems

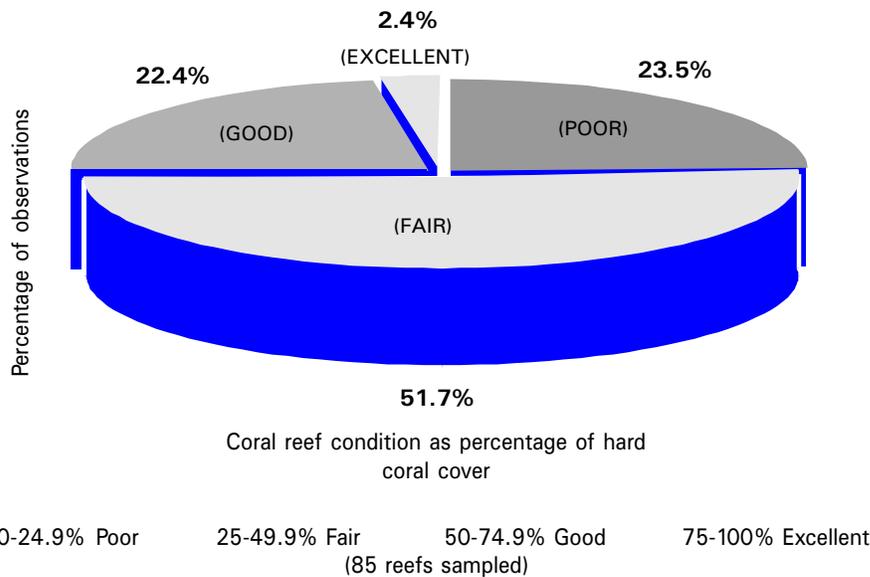


“The coasts are the natural crossroads between human activity and the sea.” – Weber 1993

As an archipelagic nation, the Philippines is essentially one big coastal zone. Impacts on coastal resources may be felt from activities conducted from the highest mountain peak to the coastal and marine waters. Human impacts on coastal resources in the Philippines continue to intensify as increased population pressure on land and in the sea are resulting in the degradation of fisheries, coral reefs, and mangrove areas that serve as the basis for food security, economic development and biodiversity conservation.

STATUS ALERT *Coral Reefs*

The overall condition of the coral reefs in the Philippines is grim. Most reef areas have been adversely affected by human activities, and less than 5% are considered to be in excellent condition. Siltation from deforested uplands, destructive fishing practices, pollution, and physical removal are the major factors causing their degradation. Fishing techniques that damage coral reef habitats, especially the use of dynamite, cyanide and fine mesh nets which remove small fish and inhibit successful reproduction, have short-term benefits and huge long-term costs. Reefs that are damaged or destroyed can take 50 years or more to recover. When reefs are destroyed, the fish catch declines accordingly. One square kilometer of “good” reef can produce about 20 tons of fish per year for harvest; in contrast, a square kilometer of reef in poor condition produces less than 5 tons of fish per year.



Status of Philippine coral reefs in 14 localities (about 75% of the reefs are in poor and fair categories).

Source: A review of the status of Philippine reefs by Gomez, E.D. et. al. Marine Pollution Bulletin 29 (1-3): 62-68

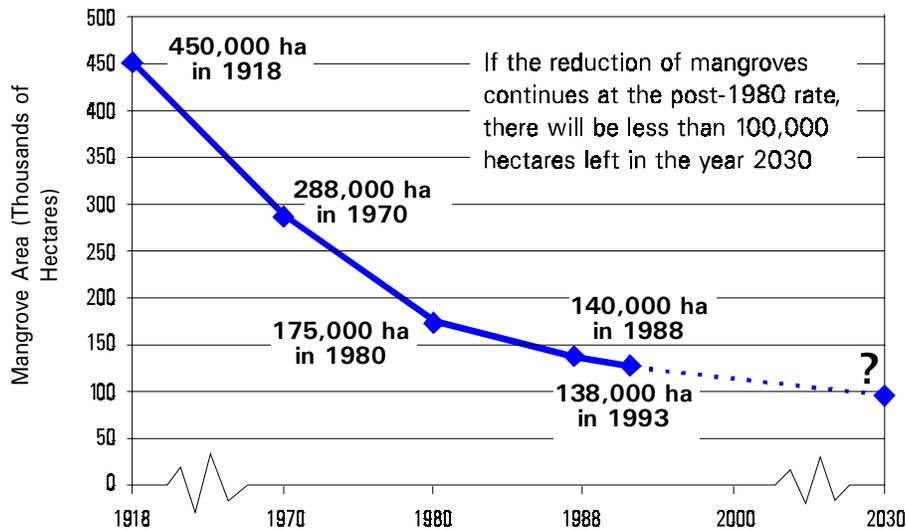
For immediate action:

- ◆ Establish marine sanctuaries to protect and rehabilitate critical coral reef areas
- ◆ Monitor and stop all shoreline development activities that threaten coral reefs through physical removal, siltation and other impacts

STATUS ALERT

Mangroves

The area of mangrove forests in the Philippines has declined significantly from an estimated 450,000 hectares at the beginning of the century to approximately 138,000 hectares in the mid-1990s. Major losses of mangrove areas occurred in the 1970s and 1980s, when the Philippine government, in an effort to boost fish production from aquaculture, encouraged the conversion of mangrove forests to shrimp and fish ponds. Unfortunately, the mangroves were converted to aquaculture without any analysis of the appropriate rent for such areas or the potential losses that might occur as a result of their destruction. Thus, when many fishponds were abandoned in the late 1980s because of disease outbreaks and declining economic returns, the country found itself losing not only the production of the fish ponds, but also natural fishery production from clear-cut mangrove areas.



Mangrove Resource Decline in the Philippines

Sources: ADB (Asian Development Bank). 1993. Fisheries sector profile in the Philippines. ADB, Manila.
 DENR (Department of Environment and Natural Resources). 1988. Mapping of the natural conditions of the Philippines, Final Report. Swedish Sapce Corporation, Solna, Sweden.
 World Bank. 1989. Philippines: environment and natural resources management study, The World Bank.

It is now well accepted that mangrove forests can support more than 600 kg per hectare per year of natural fish production in the nearshore waters. Even so, a new upsurge in the development of illegal fishponds threatens the remaining mangrove areas. In addition, increased population pressure in coastal areas is resulting in the destruction of mangrove forests from all types of uncontrolled shoreline development, including land reclamation and illegal construction of houses and other structures such as ports and harbors.

For immediate action:

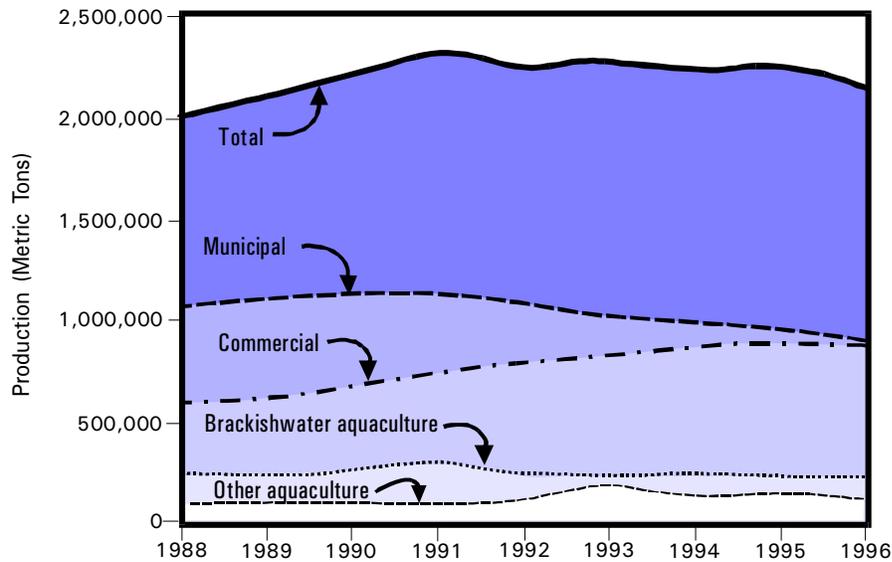
- ◆ Monitor and stop all shoreline development activities that threaten mangrove forests or convert them to other uses
- ◆ Protect all existing mangrove forest areas before they are damaged or destroyed

STATUS ALERT

Fisheries

The supply of fish throughout the world is becoming scarce. As the supply continues to decrease, it will become increasingly difficult to meet the food requirements of the world's population. More than 60 percent of the world's 200 major fish stocks are fully exploited, over-exploited, or depleted. The world catch of fish peaked in 1989 and has declined ever since despite increased numbers of, and more efficient, fishing vessels and gear. The answer to this decrease in the amount of fish available as food is not to increase pressure on the resource by allowing more fishing, but to reduce pressure and allow the stocks to recover.

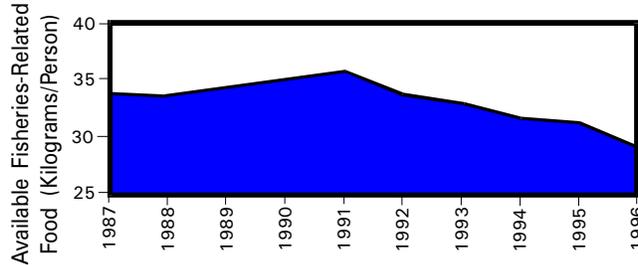
The Philippines is facing the beginning of a crisis in the security of food from coastal waters. The total amount of fish available as food from capture fisheries and aquaculture has remained relatively static since 1987, with dramatic declines in municipal fisheries catch. With population growing at approximately 2.5 percent per year, this translates to a net loss of locally derived fish protein to Filipinos.



Fisheries-Related Food Production for 1988-1996 (BFAR 1997)

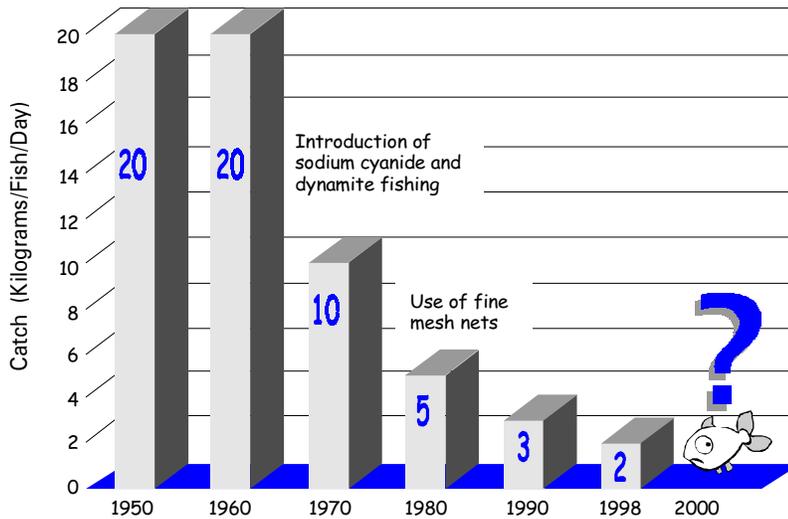
Note: Does not include seaweed production which primarily is used for industrial purposes.

Although fisheries-related food production has been relatively static for the 10-year period in question, a slow and continuous decline is apparent when total production is evaluated as kilograms of “fish” available per person per year as shown in the figure below (fish is defined here as all edible marine products and includes both animals and plants). This decline is driven by population growth, increased fishing pressure, destructive fishing practices, and unsustainable fisheries and aquaculture development.



Per Capita Fisheries-Related Food Available for Consumption for 1987-1996 (Based on production data from BEAR 1997 and population data from Bernascek 1994)

In small island communities, such as Olango Island, Cebu, the catch per fisherman is lower than national averages. Olango fishers have estimated that their current daily fish catch per fisher is 2 kg per person. A similar trend is reported by Katon et al. (1998). They report that fishers in Cogtong, Candijay, Bohol found their catch decreasing from 20 kg/day in the 1960s to around 3 kg/day in the 1990s.



Trend of Estimated Daily Fish Catch per Municipal fisher for One Barangay, Olango Island, Cebu (Result of community assessment of coastal resources conducted by the Coastal Resource Management Project 1998)

Factors contributing to the decline in fisheries-derived food:

- ◆ Open access to fishery resources
- ◆ Continued increases in commercial and municipal fishing effort resulting from increased number of fishers, fishing vessels, and overly efficient gear
- ◆ Increased population growth in and migration to coastal areas
- ◆ Slow economic development in coastal areas providing few alternatives to municipal fishers
- ◆ Use of fishing practices and gear destructive to habitats and fisheries
- ◆ Illegal commercial fishing in municipal waters
- ◆ Degradation of coastal habitats
- ◆ Loss of mangrove forests from conversion to fish and shrimp ponds and other uses
- ◆ Overall lack of implementation of coastal management programs at local and national levels

Signs of overfishing

- ◆ Decreasing catch per fisher per day
- ◆ Decreasing size of a fish species caught
- ◆ Change in types of fish caught to species composition low on the food chain

Other factors contributing to the decline of fisheries

- ◆ Pollution from land-based sources of industrial and agriculture waste dumped into rivers and carried to the coastal areas, including pesticides, fertilizer run-off, and sewage, oil from sea-based sources, toxic wastes, and excess nutrients from marine transportation operations or mariculture activities
- ◆ Habitat degradation resulting from siltation of coral reefs from deforested upland areas, conversion of mangrove areas for ports and harbors, fish ponds and other shoreline development
- ◆ Spatial conflict where coastal fisheries and aquaculture have insecure property rights and are gradually squeezed from their traditional areas by other coastal developments such as urban sprawl and tourism development

Overfishing is the single most devastating factor facing the management of fish stocks in the Philippines. The Philippines, like the rest of the world, must take a course of action that will reduce fishing pressure to enable fish stocks to rehabilitate.

For immediate action

- ◆ Say 'NO' to programs that encourage intensification of fishing effort by promoting more vessels and gear
- ◆ Preserve municipal waters for municipal fishers using low-impact fishing techniques
- ◆ Establish marine sanctuaries to enable fish stocks and coral reef habitat to regenerate and multiply
- ◆ Stop illegal commercial fishing intrusion into municipal waters

STATUS ALERT

Water quality

The trends in coastal and marine pollution in the Philippines are not encouraging, with the incidence of pollution-related problems increasing dramatically over 20 years ago. There are more records of ecosystem failure due to pollution in areas close to urban development or areas near human settlements of any size because of domestic waste. Algal blooms are occurring more frequently and causing red tide events that kill or make shellfish and some fish species toxic. Heavy metals are being implicated in fish and human poisoning in some bays where mining occurs now, or occurred in the past. We see increasing amounts of plastics on beaches. Endocrine-disrupting chemicals from aquaculture, agriculture and other land-based activities are increasingly being detected in marine sediments. These chemicals can affect the reproduction of certain marine organisms and can be passed on to humans. The result of all this will be an increasing drain from societal welfare and economies.

The types of pollution common in the Philippines are numerous, but there are a few which are pervasive and are causing increasing harm to coastal ecosystems and fisheries production. These are:

- a. Domestic sewage liquid/waste with high nutrient loads, pathogens and some toxic chemicals from coastal cities and municipalities, most of which go into the sea
- b. Domestic solid waste from coastal cities and municipalities, and ships, much of which is dumped into shoreline areas or rivers and ends up in the sea
- c. Sediments from upland and coastal erosion, construction sites, deforestation, poor agriculture practices which flow through rivers or directly into the sea
- d. Mine tailings and sediments from quarrying and mining both in the coastal and upland areas, much of which flows to the sea through stream and rivers
- e. Industrial organic and toxic wastes (heavy metals), which although often treated or restricted, end up being dumped into rivers and eventually the sea
- f. Agriculture chemicals such as nitrates, phosphorus and pesticides, which mostly pollute nearby rivers, streams and ground waters, some of which go to the coastal waters
- g. Aquaculture development which causes increasing acid levels in soil and water and releases nutrients from fertilizers and pesticides into nearby coastal waters
- h. Oil and fuel leaks, spills and dumping from ships

About 50% of the coastal and marine pollution in the Philippines comes from runoff and land-based discharges. A sizable but undetermined amount comes through the atmosphere from land-based sources. If world trends are reflected in the country, maritime transportation and dumping may account for about 20% of the pollution.

For immediate action

- a. Stop discharging untreated domestic waste into coastal waters to minimize the overfertilization of marine water, particularly in enclosed or restricted bays and lagoons and to control, to the extent possible, the introduction of human pathogens.
- b. Implement laws against dumping of wastes into the sea by ocean-going and other sea vessels.
- c. Site industries away from productive coastal ecosystems and concentrate them at one particular area so that less of the coast is disturbed.
- d. Implement all relevant anti-pollution laws.

NATIONAL LEGAL FRAMEWORK FOR CRM

CRM is built on a national legal framework founded on the Philippine Constitution itself, which provides, under Article 10, Section 2, for local autonomy and declares under Article 12:

Section 1. “The goals of the national economy are a more equitable distribution of opportunities, income and wealth...”

Section 2. “The State shall protect the nation’s marine wealth in its archipelagic waters, territorial sea, and exclusive economic zone, and reserve its use and enjoyment exclusively to Filipino citizens.”

as well as national laws and policies such as Republic Act No. 7160 or the Local Government Code of 1991, and Republic Act No. 8550 or the Philippine Fisheries Code of 1998, which assign the primary responsibility for managing municipal waters and associated coastal resources to the local government, and many other national laws which protect specific coastal areas and resources.

Local Government Code of 1991

The passage of the Local Government Code of 1991 (Republic Act 7160) is of a major significance in local governance in the country. It enhanced the governmental and corporate powers of the local government units, particularly on political autonomy and decentralization, and resource generation and mobilization.

The following are the salient features of the Code with regards to CRM:

1. The expansion of the scope of municipal waters to 15 km from 3 nautical miles (approximately 5.5 kilometers). This means that local government units have greater jurisdiction over the usage and conservation of the area.
2. The repeal of anti-conservation policy of the state, as established by Section 2 of PD 704, such as optimum utilization of fishery resources and exportation of fish and fishery products.
3. Devolution of some powers and functions of the Department of Agriculture, Department of Environment and Natural Resources, and other concerned national line agencies to the local government units.
4. Assigning to the municipality and cities the right to issue licenses, leases, or permits for the use of the municipal waters.
5. Preferential treatment to the municipal fishers in the grant of fishery licenses.

Philippine Fisheries Code of 1998

The Philippine Fisheries Code of 1998 (Republic Act 8550) repealed Fisheries Decree of 1975 (PD 704). Compared to the previous law, it is more consistent with the provisions of the Constitution and opens up hope for a more pro-municipal fishers, pro-local autonomy and pro-CRM law.

The overriding policies embodied in the Code are the following:

1. Food security as the primary goal and consideration in the utilization, management and conservation of the coastal and fisheries resources
2. Limiting access of the fisheries resources for the exclusive use and enjoyment of Filipino citizens

3. Rational and sustainable development, management and conservation of coastal and fishery resources
4. Protection of the rights of fishers, especially the coastal communities, with priority given to municipal fishers in the preferential use of the municipal waters. To operationalize this policy, coastal municipalities and cities are mandated to organize Fisheries and Aquatic Resources and Management Councils (FARMC).
5. Management of coastal and fisheries resources in light of the concept and principle of integrated coastal area management.

Other National Laws Related to CRM

Presidential Decree 705 (Forestry Decree of 1975) — governs the utilization, development and conservation of all forest lands and forestry products, including mangroves.

Presidential Decree 1067 (Water Code of the Philippines) — established the framework relating to the appropriation, control and conservation of the water resources to achieve optimum development and rational utilization of these resources.

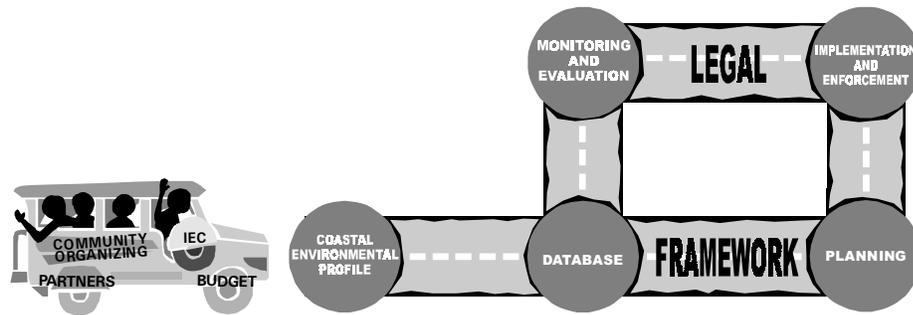
Presidential Decree 1586 (Establishment of Philippine Environmental Impact Assessment System) — mandates all government agencies, including government-owned and controlled corporations, as well as private corporations, firms and other entities to conduct environmental impact assessment before establishing or implementing projects that would affect the environment

Republic Act 6969 (Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990) – regulates the importation, manufacture, processing, sale, distribution, use and disposal of chemical substances and mixtures that present unreasonable risk and/or injury to health or the environment.

Republic Act 7586 (National Integrated Protected Area System) — governs the classification and administration of all designated protected areas to maintain essential ecological processes and life-support systems, preserve genetic diversity, ensure sustainable use of the resources found therein, and maintain their natural condition to the greatest extent possible.

THE CRM PROCESS

CRM Process Overview



Coastal resource management (CRM) is the process of planning, implementing, and monitoring sustainable resource use through sound decision-making and collective action. It is a coherent, multi-sectoral and multi-disciplinary process within a legal and institutional framework that assures equitable involvement and participation in the use and management of coastal and marine resources. It is a dynamic process that combines the bio-physical, socio-economic, cultural and political aspects of the coastal environment to develop and implement a coordinated strategy for the allocation of these resources to achieve the conservation and sustainable multiple use of the coastal zone.



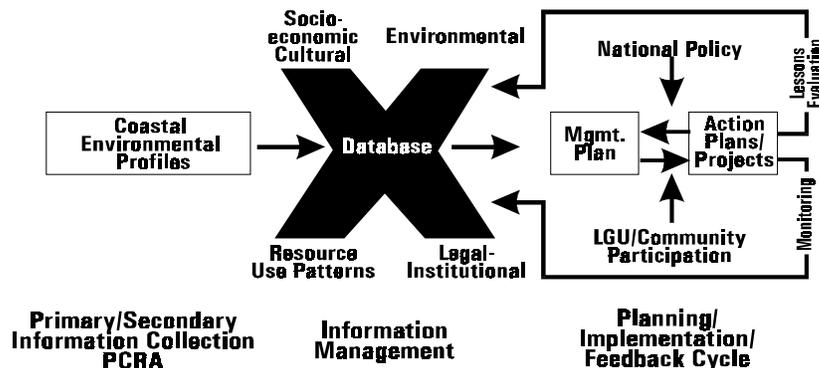
Increasing populations, along with rapidly advancing technologies, are making increasing demands on shrinking coastal and marine resources. An estimated 3.5 billion people, or about 63% of the total global population, live in the coastal region. Their sheer number and activities have resulted in increasing impacts on coastal ecosystems, thus impairing the ability of these ecosystems to replenish themselves and provide goods and services vital to sustaining human life. Already, a great number of coastal communities have been reduced to artisanal fishing and other subsistence activities, even as governments pursue development in the coastal zone to provide jobs and earn foreign exchange through mariculture, tourism, industrialization and mineral extraction. Clearly, there is a need to rationalize the use and development of coastal resources to ensure that not only are present human needs provided for, but also that coastal environments and habitats are adequately protected and managed so that development is sustainable and benefits the greatest possible number of people for the longest possible time. This is the primary goal of CRM.



The CRM process is facilitated by activities that promote community participation:

- Community Organizing
- Information, Education and Communication (IEC)
- Multi-sectoral Collaboration/Partnerships

A detailed diagram illustrating the CRM process is shown below:



CRM begins with the compilation of a coastal environmental profile for an area. This profile is used as a basis for planning and monitoring CRM interventions. After the profile is completed, the process moves on to a cycle of preparing and maintaining a database, planning, implementation, monitoring and evaluation. CRM involves a host of organizations from different sectors performing various roles, including:

Community

- Planning
- Project implementation
- Law enforcement
- Monitoring and evaluation

Non-government organizations

- Community organizing
- Training
- Research
- Education

Colleges and other academic institutions

- Education
- Research
- Networking
- Monitoring and evaluation

National government agencies

- Financing
- Technical assistance
- Training
- National policy reforms
- Research
- Monitoring and evaluation

Local government units

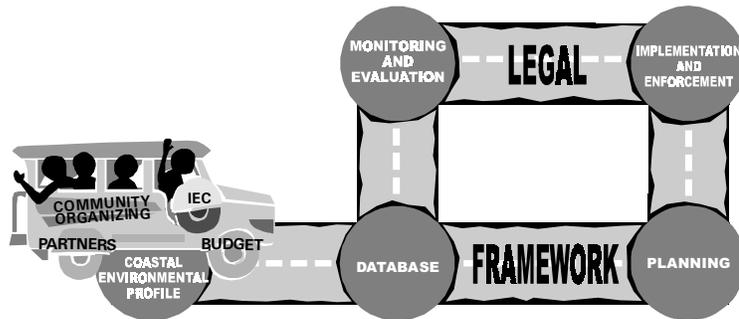
- Planning/local policy reform
- Law enforcement
- Infrastructure support
- Licensing
- Project implementation
- Linkaging
- Monitoring and evaluation

The CRM process is applied to space and time horizons appropriate to the area and resources that need to be managed. Spatial considerations include physical configuration of the shoreline and the presence of offshore inland and bays. Time horizons cover short-, medium-, and long-term planning goals.

To be effective, CRM must:

- ♦ be holistic, integrated and multi-sectoral in approach
- ♦ be consistent with, and integrated into, development plans
- ♦ be consistent with the national environmental and fisheries policies
- ♦ build on, and integrate into, existing institutionalized programs
- ♦ be participatory
- ♦ build on local/community capacity for sustained implementation
- ♦ build self-reliant financing mechanisms for sustained implementation
- ♦ address quality of life issues of local communities as well as conservation issues

THE CRM PROCESS
Coastal Environmental Profile
Overview



A coastal environmental profile is a document which presents secondary information as well as data gathered from the assessment of coastal resources in an organized and integrated form that can be used for CRM planning. The profile provides a baseline – that is, a starting point – for CRM planning and implementation, as well as for doing comparative analysis on “with” and “without” project scenarios. An outline for a comprehensive coastal environmental profile is shown below:

- List of Tables and Figures
- List of Acronyms and Abbreviations
- Acknowledgments
- I. Introduction
 - A. location
 - B. physiognomy or any short description of the area/geography
 - C. historical background
 - D. summary of issues
 - E. objectives
 - F. scope
 - G. general definitions, if any
- II. Physical Features (*data by municipality, with maps, tables and visuals*)
 - A. land area
 - B. topography
 - C. hydrology
 - D. soil
 - E. land uses
 - F. climate
- III. Natural Resources (*including species, area, condition, with tables, maps and other visuals*)
 - A. mineral resources
 - B. coastal resources (description and maps)
 - 1. mangrove
 - 2. seagrass
 - 3. coral
 - 4. seaweed (*if present; may also be included in fisheries*)
 - 5. fisheries
 - 6. others (*beaches, endangered species, etc.*)
 - C. forest resources
- IV. Socio-political Setting (*with tables, charts, graphs, etc.*)
 - A. political/administrative boundaries
 - B. demographics (*by municipality*)
 - 1. population size, density, distribution, growth rate
 - 2. household (*number, members/nuclear or extended*)
 - 3. age and gender composition
 - 4. urban and rural distribution
 - 5. education
 - 6. dialects
 - 7. labor and/or employment, income
 - 8. religion and/or ethnic groups
 - C. health, sanitation and medical care
 - D. settlements (*type and ownership*)
 - E. roads, transportation and communication, other related infrastructure or support systems (*e.g. cooperatives, fishing ports*)

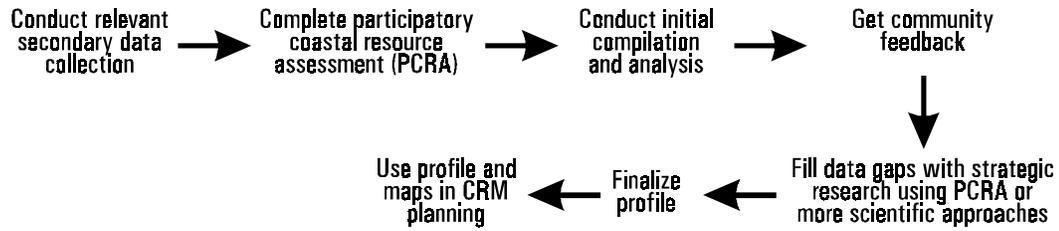
- V. Economic Sector (*by municipality or barangay*)
 - A. fisheries
 - 1. capture fisheries
 - a. capture methods (*fishing gear, type of boat and number, ownership*)
 - b. number of fishers
 - c. catch per unit effort
 - d. catch per species (*weight*) per gear
 - e. historical trends in catch levels and composition (*species caught, market value, production levels*)
 - 2. aquaculture
 - a. cadastral maps to depict fishpond areas by municipality/*barangay*
 - b. areas eligible for reversion
 - c. mariculture types and production levels by municipality/*barangay*
 - d. historical trends in production
 - B. tourism
 - 1. classification and location of existing and potential tourist areas
 - 2. number of employees per activity
 - 3. revenues generated
 - 4. description of environmental, social, cultural impacts
 - C. industry
 - 1. types of industry, location
 - 2. revenues generated
 - 3. number of employees by industry
 - 4. environmental, social, cultural impacts
 - D. others (*e.g. agriculture, forestry; similar parameters as above*)
- VI. Institutional and Legal Framework
 - A. introduction
 - B. current state of the Philippine Coastal Zone Law (*includes related policies/laws*)
 - C. local government (*provincial, municipal, barangay, other government organizations*)
 - 1. types, structures
 - 2. budget allocated for CRM
 - 3. development plans/activities or projects
 - D. non-governmental organizations involved in CRM
 - 1. names
 - 2. funding levels
 - 3. types of activities
 - 4. future plans
 - E. community organizations (*similar parameters as above*)
- VII. Management Issues and Opportunities (*include stakeholders and appropriate analyses*)
 - A. environmental
 - B. economic
 - C. political/institutional



Like any management process, CRM requires planning and decision-making, which must be based on correct and timely information. Done well, a coastal environmental profile greatly facilitates – and is in fact essential to – formulating a CRM plan and implementing it. The basic descriptive information provided by profiles is useful, but the value of a good profile lies also in the compilation and analysis of the information it provides. One kind of information – for example, decreased levels of live coral cover – must be considered in relation to other kinds of information — for instance, low fish harvest and high siltation rates – to help ensure that the process results in meaningful conclusions which point to problems and opportunities for CRM. Often, ecological and other environmental factors must also be considered in association with socio-economic variables, thus providing useful conclusions regarding such factors as the conditions of various habitats, potential for fisheries production, and social constraints that hinder the CRM process. A profile produced using participatory coastal resource assessment (PCRA) methods – that is, with the resource users’ participation — is particularly useful, since local resource users are more likely to consider in their planning decisions information that they helped generate than information that came from outside sources. If other stakeholders also had significant input, a profile can serve as the common reference for everyone involved in planning.



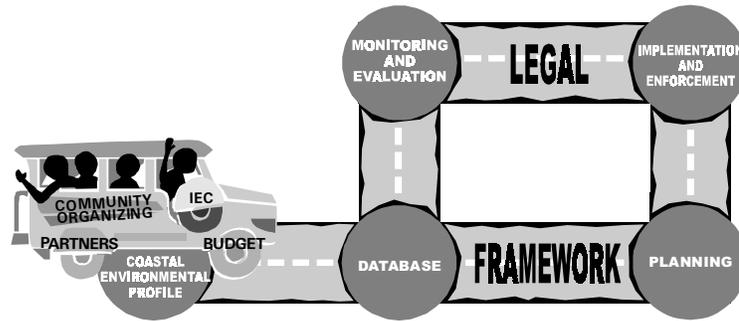
A profile should ideally be produced using a process that facilitates and encourages feedback from local resource users. A good general procedure is to conduct a preliminary analysis of the PCRA results and produce a draft profile for community review, feedback, verification and correction, as shown in the flow chart below:



Data and information collected for the coastal environmental profile should be entered in a database. The municipal coastal database can be used as a starting point for the coastal environmental profile.

Academic or research institutions can assist the community in gathering information on the biophysical status of the coastal environment.

THE CRM PROCESS
Coastal Environmental Profile
Secondary Data Compilation



“Secondary information” refers to information produced previously in some form of material medium – reports, planning documents, legal documents, maps, satellite images, photographs. Collecting such information is almost always the best way to start the production of a coastal environmental profile.

Documented information for CRM planning typically falls under two basic categories:

1. Government/institutional documents (ordinances, regulations, plans and other documents related to the legal CRM regime)
2. Scientific documents (studies in ecology and socio-economics; coastal environmental profiles)



Existing information materials are valuable. Often, a great deal of good quality information already exists, allowing the researcher to substantially reduce or redirect efforts in the preparation of the profile:

1. Government documents are important indicators of past and present government involvement or non-involvement in CRM. The information they provide is useful in identifying government management strategies and evaluating the success of previous and current government CRM activities.
2. Scientific studies provide information on the status of coastal ecosystems and the living and working conditions in coastal communities. For coastal resource assessment purposes, this information is considered “baseline,” that is, a starting point in determining the long-term impact of CRM efforts.

Plans for coastal resource assessment efforts in the field should therefore be kept open until after an appraisal of existing documented information has been completed.



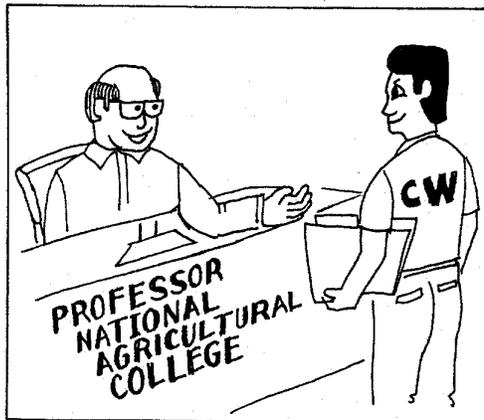
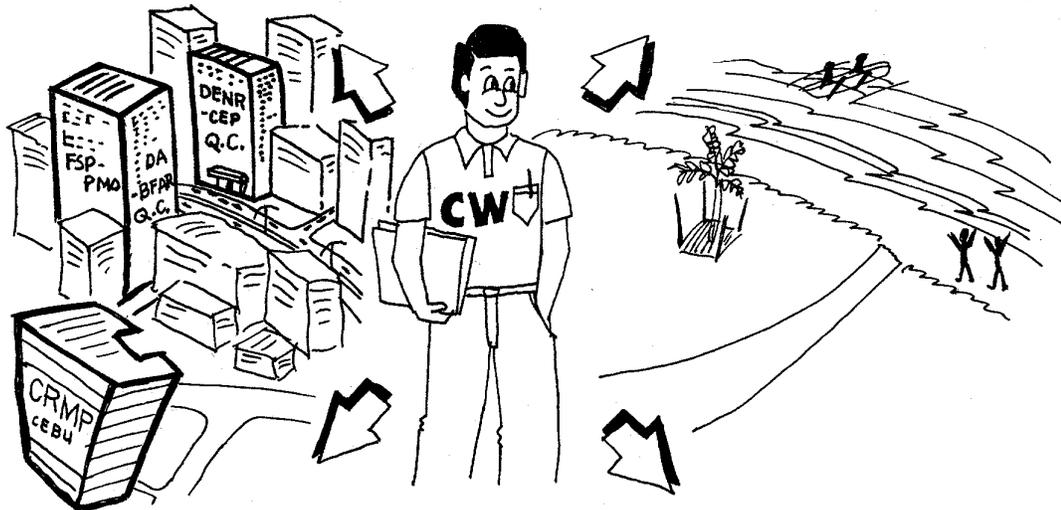
If a coastal environmental profile or similar document has not been produced previously, collecting existing documented information is usually not easy. Potential sources of information under general profile content headings are listed below:

General Project Indicator Type	General Profile Content Heading	Possible Information Sources
Environmental/ Ecological	Physical setting	DA, DENR, DPWH, universities, research institutions, NAMRIA,
	Climate	existing maps
	Oceanography	PAGASA, DA, DENR
	Important habitats	NAMRIA, PAGASA, MARINA, universities, research institutions
	Natural resources	DA, DENR, universities, research institutions
Socio-economic/ Institutional/ Legal, Resource Users, Issues	Fisheries	institutions
	Other coastal resource users (tourism, shipping, etc.)	DA, DENR, universities, research institutions, museums
	Local resource users	DA, DENR, DTI, universities, research institutions, NGOs
	Past and present CRM	DA, DENR, DTI, DSWD, universities, research institutions, NGOs
	Other stakeholders	institutions, NGOs
	Management issues and alternatives for development,	RDCs, all involved government agencies, NGOs, LGUs
	monitoring and mitigation	RDCs, all involved government agencies, NGOs, LGUs
	Recommendations	RDCs, all involved government agencies, NGOs, LGUs

There is no detailed methodology for gathering information, which is mostly a matter of writing letters, making telephone calls, visiting offices and libraries, interviewing officials, teachers, scientists and researchers. The best strategy is to use the table above as guide, “leave no stone unturned,” and always be vigilant for information from an unexpected source. Often, aid organizations sponsor planning, development and conservation projects and may be good sources of previous, ongoing or planned studies. Always keep a record of and reference the source of the secondary information. Although it may be difficult to track down all the existing information available, the mere effort is good for all concerned. In addition to gathering data, it allows the community worker to establish contact with other informants and experts who have something to offer the CRM process. The community worker might view the activity as contributing to the development of a broader definition of community, or institutional strengthening. In accomplishing this task, therefore, the community worker should have a twofold objective:

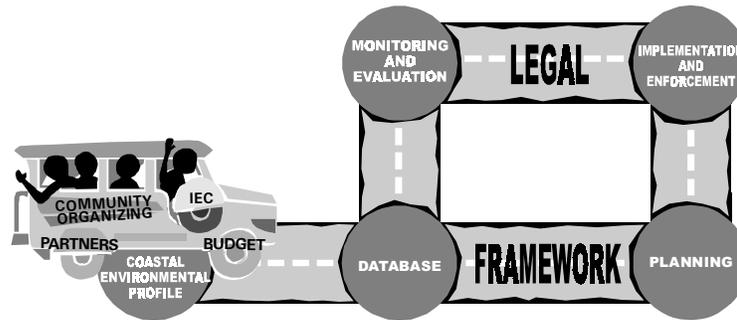
1. Gather extensive, good quality information (as practical – it is also critical to evaluate existing information and to use relevant and current but not obsolete reports or data).
2. Develop relationships with and between scientists, government and other stakeholders who can contribute to the CRM process.

(Adapted from: *Participatory Coastal Resource Assessment: A Handbook for Community Workers and Coastal Resource Managers*, By J.S. Watlers, J. Maragos, S. Siar and A.T. White. CRMP, 1998)



While gathering assessment information from a variety of sources, the community worker can simultaneously build professional relationships and facilitate institutional strengthening.
(Adapted from: *Participatory Coastal Resource Assessment: A Handbook for Community Workers and Coastal Resource Managers*, By J.S. Watlers, J. Maragos, S. Siar and A.T. White. CRMP, 1998)

THE CRM PROCESS
Coastal Environmental Profile
Participatory Coastal Resource Assessment



Resource assessment, also known as resource analysis or appraisal, involves gathering and analyzing environmental, ecological, social and economic information about the management areas. Participatory coastal resource assessment, or PCRA, focuses on resource assessment from the point of view of local coastal resource users and integrates local wisdom and knowledge with the technical expertise of other people or groups – NGOs, universities, research institutions and local government staff – involved in the management process.



Resource assessment is accomplished primarily to facilitate the numerous decisions that must be made in planning and implementing a CRM program. It is most useful in CRM when the information collected and analyzed helps managers to understand the past, present and potential usefulness of coastal resources, and identifies limits and opportunities for coastal resources to contribute to environmentally sustainable economic development in coastal areas. The rationale for the participatory approach to resource assessment is simple: coastal communities, because of their dependence on coastal resources, can offer important perspectives on which resources are important, the changes in resource availability and harvesting success, and the problems and issues that can deny the community the benefits of resource use. Through PCRA, local coastal resource users are assisted to arrive at a common understanding of environmental and ecological information concerning the coastal environment to be managed and the natural resources found there.

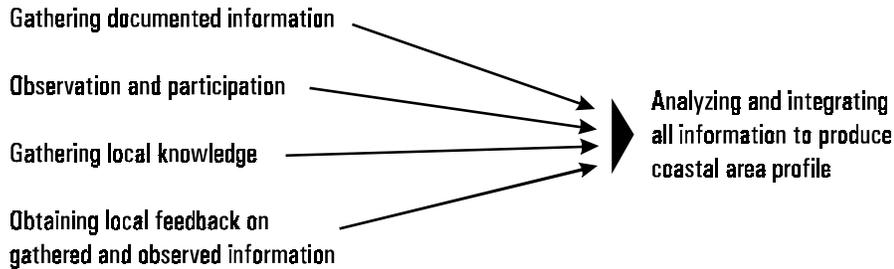
If done successfully, PCRA offers four beneficial outcomes:

1. Important information that would otherwise not be obtained and considered using traditional scientific approaches is made available for CRM planning purposes.
2. Resource assessment is made more participatory as local fishers and resource users are more intimately involved in an essential first phase of CRM.
3. Local users are more likely to participate actively in subsequent phases of the CRM process and contribute to decisions that will be supported by the community. PCRA thus helps empower local fishers and other resource users to productively participate in – and more likely benefit from – CRM projects.
4. PCRA demonstrates the relevance of information provided by the resource users and shows how the information is used for management needs. Such information includes:
 - ♦ spatial details about the coastal area, such as locations of small but productive reefs that are not usually shown in maps or revealed in assessments conducted by outside experts.
 - ♦ temporal details about important events, changed status of resources, and emerging issues that are almost impossible for outside assessment experts to discover independently

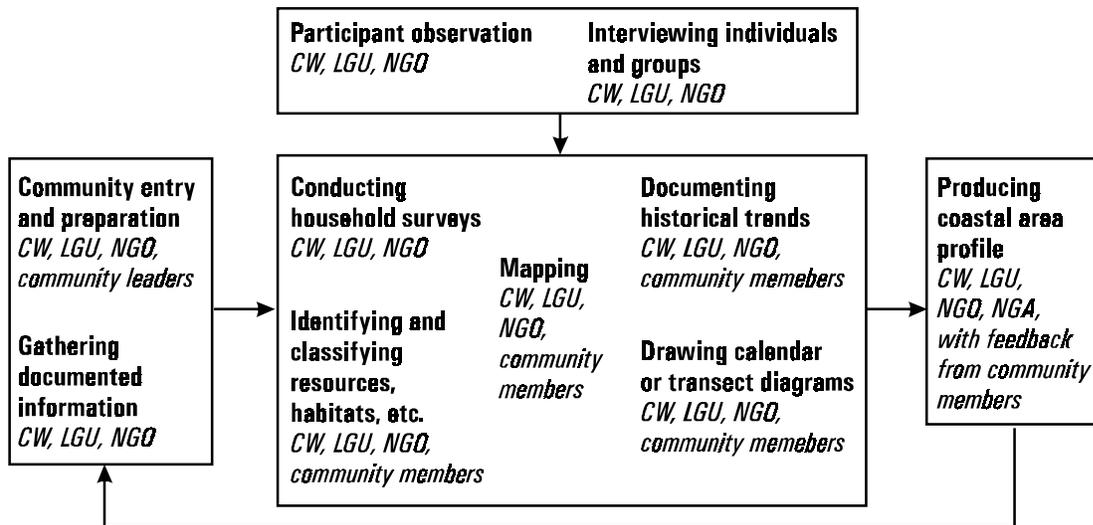
- ♦ specific details, such as information about the relative condition and cultural values of areas described by experts as only a single general category of mangrove
- ♦ gender-specific or age-class distinction in resource use, importance and other perceptions
- ♦ insights on trends in resource abundance and levels of exploitation that cannot be obtained from other sources



PCRA is a multifaceted process involving several interrelated components:

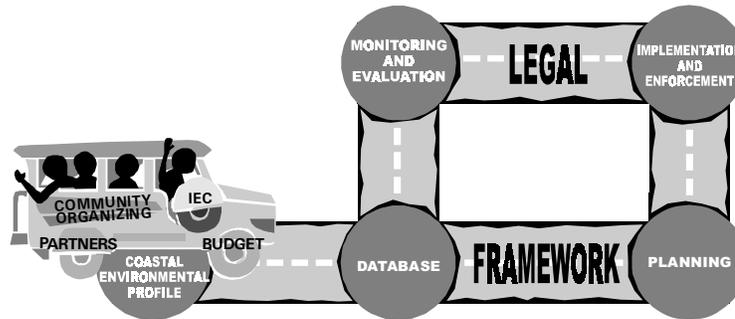


The interrelated methods of PCRA are shown in the diagram below (potential actors are shown in italics):



(Adapted from: *Participatory Coastal Resource Assessment: A Handbook for Community Workers and Coastal Resource Managers*, By J.S. Watlers, J. Maragos, S. Siar and A.T. White. CRMP, 1998)

THE CRM PROCESS
Coastal Environmental Profile
Developing and Using Maps for CRM Planning



Mapping is a method for collating and plotting information on the geographical and other features of a specific area to produce a visual representation of the area. Two types of map are generally used for CRM planning. These are:

1. Municipal boundary map, which shows the boundaries and extent of the area, both land and water, and delineation of areas or zones for specific uses, if any, under the jurisdiction of a municipality.
2. Resource map, which shows the occurrence, distribution and use of, and access to resources and associated habitats within the economic and cultural domain of a specific community.



Maps are some of the most important tools used in planning and implementing CRM projects. Without maps, it would be difficult to understand the many variables essential in planning. With maps, the extent and condition of resources and habitats can be represented and analyzed, zones for various uses can be plotted out, and infrastructure and other interventions can be spatially optimized and the localities for possible problems, issues and conflicts identified. Moreover, spatial patterns of settlement, income levels, and other social variables can reveal opportunities and obstacles for CRM. Participatory mapping, in particular, helps to point out spatial details and new information on features whose conditions vary over space and whose locations vary over time.

Maps showing municipal water boundaries are essential for enforcement. Maps are also important visual media, allowing more effective communication between the stakeholders involved in CRM. They often help when verbal communication is constrained by differences in language, background, education and worldview. Mapping, in fact, is one of the most appreciated and successful strategies for eliciting information from local resource users.



Three participatory methods are used in producing maps for a coastal environmental profile. These are:

1. Sketch Mapping. Sketch maps are freehand drawings of the coastal environment. These maps start as a blank piece of paper and thus represent the least biased view of how fishers perceive their surroundings.
2. Drawing on Base Maps. This method involves the addition of environmental elements to pre-drawn base maps. Base maps are maps showing selected features of an area, such as shorelines, roads and villages. They are often produced by government geological or

navigation agencies. If the precision and the scale used are adequate, these maps serve as the best medium for accurately representing a variety of environmental elements such as habitats, uses, resources, issues and conflicts.

3. Field mapping and ground truthing. This method is useful after at least some drawing over base maps has been accomplished. The basic idea is to move around the management area to verify and refine the various maps produced in earlier exercises. A great deal of useful information can be generated by field checking or ground truthing maps prepared by fishers and professional cartographers.

Maps are most useful when they can be compared to maps of other areas and to maps of different scales. When their format is consistent, comparisons can show important similarities and differences between different management areas. Also, with a standardized mapping format, maps of small areas can be combined or joined together to produce maps of a larger management area, such as an entire bay. One format that has been used successfully divides the elements to be drawn on a map into five basic categories:

Elements	Format
Habitats (estuaries and lagoons, coral reefs, mangroves, seagrass beds, beaches, etc.)	Various colors used to shade areas on maps when habitats are reported to exist
Resources (mammals, reptiles, finfish, invertebrates, seaweeds, etc.)	Arabic numerals (1,2,3...) placed over the location/s where the individual resources are reported to be found
Uses (gill net, spear fishing, reef gleaning, tourism and aquaculture, etc.)	Capital letter codes (T for traditional fishing, etc.) placed over the location/s where the specific uses are reported to take place
Issues (blast fishing, commercial fishing, pollution, mangrove clearing, etc.)	IS plus an Arabic numeral (1,2,3...) placed over the location/s where specific issues are reported to exist
Other features (boundaries of sanctuaries, use zones, municipal/barangay jurisdictional boundaries, roads, freshwater sources, river mouths, deep channels, etc.)	Various colors and line styles (dashed, dotted, solid, etc.) used to depict the location of other important features of the management area

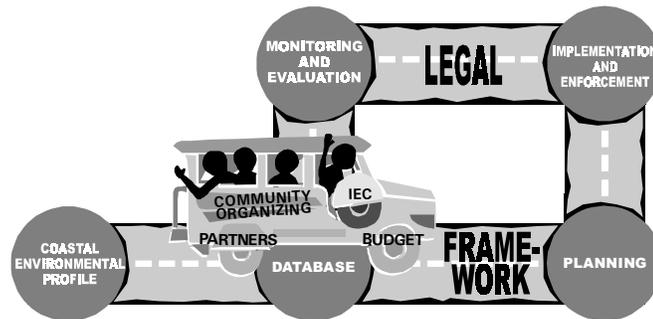
Mapping is best handled as a group exercise. Peer pressure and group consultation lead to a better understanding of terminology and more accurate location of map elements. When done, the maps can be compared with existing maps, such as National Mapping and Resource Information Authority (NAMRIA) maps. Since most fishers are good at mapping, comparing their maps to the NAMRIA maps is usually a positive experience as they see many similarities between their maps and the maps produced by experts. Much can also be gained from examining the difference between the local and expert maps. What usually result from this exercise are maps that are composites of expert and local perceptions and often more accurate and useful than either local or expert map considered separately. Expert maps can help with producing exact scales, overall distributions and consistent locations, while the locally drawn maps can add critical details and locally significant and relevant features that make them useful for CRM planning purposes.

For the purpose of producing a coastal environmental profile, it is often helpful to create new maps by combining and refining the various maps made by local resource users, and combining locally produced maps with maps produced by experts such as NAMRIA.

(Adapted from: *Participatory Coastal Resource Assessment: A Handbook for Community Workers and Coastal Resource Managers*, By J.S. Walters, J. Maragos, S. Siar and A.T. White. CRMP, 1998)

THE CRM PROCESS

Database Overview



“Database” as used in this primer refers to the data management tools employed for CRM planning, monitoring and evaluation. A database is used to manage spatial and non-spatial data as well as time and non-time dependent variables. Two specific tools are described in this section: Geographic Information Systems (GIS) and the Municipal Coastal Database (MCD). The MCD is a set of information extracted from the coastal environmental profile and updated periodically to reflect changes in the indicators used and provide a measure to evaluate plan implementation and enforcement. The GIS, a computerized data management system, is a tool for analyzing geographically spatial data and their corresponding attribute information. Such data include some of the information contained in the MCD (extent of coral reefs, mangroves, etc.); analysis of spatial data using GIS can be used to provide information in the MCD.

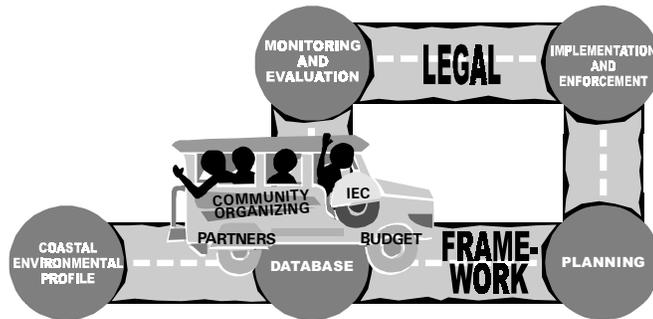


Like any management decision, CRM decisions must be based on accurate and timely information. Given the wide range of often complex issues it covers, CRM generates and uses a large of volume of data. To be of any use to CRM planners, these data must be systematically managed for easy processing and retrieval. A well-maintained database and the ability to easily retrieve, efficiently update and effectively analyze information are key to making sound CRM decisions. Data management tools such as the GIS and MCD can also facilitate the exchange of information among the various players involved in the CRM process and thus provide a quick-response mechanism for addressing gaps in plan implementation and enforcement. In addition, they also serve to preserve or retain institutional CRM knowledge through any number of changes in administration.



Databases can only be truly useful if they are accurate and easy to retrieve, and if they are updated regularly. For CRM purposes, reports based on information contained in the database must be generated at least once a year so that the environmental impacts/outcomes of the program (e.g., changes in the state of the environment and socio-economic impacts) are sufficiently considered during the annual plan review and revision. Database systems must also include “data checks” to ensure an acceptable level of accuracy.

THE CRM PROCESS
Database
Geographic Information Systems



Geographic information systems (GIS) are computerized information storage, processing and retrieval systems with hardware and software specifically designed to cope with geographically referenced spatial data and the corresponding attribute information (tables, charts and statistics).



GIS has its limitations: the bewildering variety of hardware and software that are on sale in the market may hamper the development of a format and standards for the national data banks, and there's a lack of personnel trained in its use. But it provides many benefits in resource management and planning, including:

- ♦ Ability to integrate data of various types from a variety of sources
- ♦ Greatly enhanced capacity for data exchange among various disciplines and departments concerned
- ♦ Ability to process and analyze data more efficiently and effectively than can be achieved manually
- ♦ Ability to model, test and compare alternative scenarios before the proposed strategy is imposed on the real-world system
- ♦ Facility for efficient updating of data, especially graphic
- ♦ Ability to handle large data volumes

Establishing a GIS involves a large commitment of funds and resources. GIS service providers in the Philippines can be found in private companies, academic institutions and NGOs. It is advisable to explore the availability of a GIS service provider before committing resources and funding to developing a GIS system.



GIS can perform several functions: data collection, storage, manipulation, analysis and graphical presentation. There are essentially two types of data used in a GIS: one, the specific characteristics of a location (e.g., its slope, soil type, rainfall, etc.); and the other, attribute data (e.g., statistics or written text, tables and list of data). Many different types of software are available to process these databases, but, generally, GIS involves the following steps:

1. Maps are converted into a computer-compatible format
2. Selected information from the two kinds of data are combined and compared. It then becomes possible for the resource planner to examine the interrelationships between various data and get answers to many "what if" situations. Model building becomes scientific and realistic
3. Computer-aided mapping and database management support the data analysis of GIS

The most important feature of GIS is its analytic function. Various kinds of spatial analysis can be carried out in GIS. These include analyzing the areal extent of map classes; “point operation” type analysis through algebraic and topological overlays of multiple map layers; “neighborhood operation” type analysis relating the properties of points on a map surface with their immediate surroundings; and “network operation” type analysis using linkages and flows among linear features. The tools for spatial analysis available in many commercial GIS are varied. It is left to the ingenuity of the user to employ them, alone or in combination, to address specific problems. Many GIS software available come with macroprogramming languages which can be used to string all kinds of GIS operations together, thereby providing a tool kit with which the user can tailor-make application routines to meet specific needs.

The output of GIS could be in the form of maps (colored or in shades of gray), tables, graphs, statistical summaries and reports.

In evaluating the suitability of GIS for CRM planning purposes, one has to recognize the special features of the coastal zone which might place specific requirements on GIS, in terms of data model, structure and algorithms, and database management techniques. A complex and dynamic geographic entity, the coastal zone can be perceived as having four main characteristics:

1. *Breadth* refers to the width of the maritime influence on the land, and of the terrestrial influence on the sea.
2. *Depth* relates to the volume of water, with variable vertical distribution of currents and nutrients that influences fish and coral assemblages, and sediment dispersal
3. Coastal areas have “fuzzy” boundaries, i.e., the demarcation line between land and sea, and what is coastal and not at both the sea and land limits, are not well defined.
4. A wide array of spatial scales and resolutions is needed to represent *different processes and phenomena* in coastal areas. These range from the microscopic scale of chemical processes acting on sand and rocks of the intertidal zone, to those measured in tens, hundreds and thousands of kilometers (e.g., fishery licensing zones, shoreline retreat and accretion, areas of operation and fishing gear).

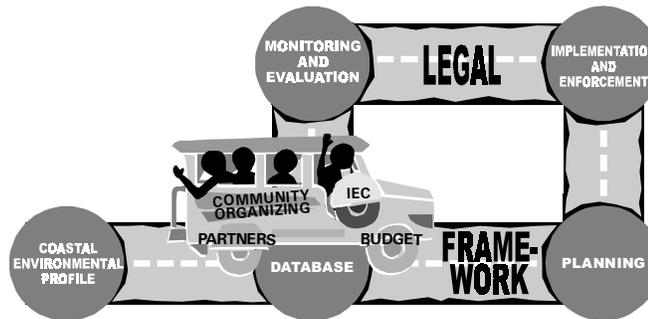
Ideally, selected GIS should be able to deal with these special features and complexities of the coastal zone.

(Adapted from:

Integrated Framework and Methods for Coastal Area Management. Edited by Chua Thia-Eng and Louise Fallon Scura, Asean/US Coastal Resources Management Project Conference Proceedings 12, ASEAN, ICLARM, USAID. 1992

Training Manual on Integrated Coastal Management: Philippines, Vol. 1. Published by DA-BEAR, DENR-CEP, DOST-PCAMRD, HARIBON, ICLARM, and IIRR)

THE CRM PROCESS
Database
Municipal Coastal Database



The Municipal Coastal Database (MCD) is a data management tool providing vital information for CRM planning, monitoring and evaluation. It was developed by the Department of Environment and Natural Resources (DENR) through its Coastal Resource Management Project (CRMP) which is funded by the United States Agency for International Development (USAID). The MCD is currently being implemented with assistance from CRMP in 40 municipalities and cities in Regions 4, 7 and 11.



The MCD was designed to help simplify and standardize the monitoring and evaluation of CRM activities at the LGU level for eventual widespread adoption by all municipalities and cities implementing CRM projects and activities. The overall purpose of the MCD is to:

1. Provide a common framework for LGU-based project monitoring and evaluation that can be jointly used by the LGU as well as assisting organizations and projects to monitor the status and evaluate the success of CRM-related interventions
2. Identify current status of CRM-related activities, including any information gaps
3. Facilitate the collection of information for use in CRM planning by LGUs and assisting organizations and projects



The MCD provides a measure to evaluate the progress and success of a CRM program based on “indicators” of key ingredients of successful and sustainable CRM programs. These indicators are summarized below

1. LGU budget allocated for CRM
2. CRM organizations formed and active
3. Best CRM practices (interventions) being implemented such as:
 - a. CRM plans adopted
 - b. Fisheries and coastal management ordinances implemented
 - c. Environment-friendly enterprises established for coastal community members
 - d. Coastal law enforcement units operational
 - e. Marine sanctuaries functional
 - f. Mangroves under community-based forest management agreements (CBFMA)
 - g. Municipal water boundaries enforced
 - h. Other habitat measures and open access restrictions in place

The MCD can be used by the LGU as a guide to implementing CRM programs as well as to report on progress made in managing municipal waters. It can also be used by assisting organizations and projects to plan, monitor, and evaluate technical assistance and training in CRM provided to an LGU.

General data collection and validation procedures. The information provided on the MCD form will be:

1. Completed and updated on an annual basis by the designated LGU Representative, assisted as needed by an assisting organization, project or national government agency site representatives. To the extent possible, available data will be collected for each year starting from at least one year prior to initiation of CRM-related project activities to establish “baseline” of pre-project conditions where applicable. This information packet contains a computer software that municipalities can use to make data management easier and faster.
2. Noted and submitted at the end of each year by the respective Municipal or City Mayor.
3. Validated by LGU offices (Municipal Agriculture Office or MAO) and Fisheries and Aquatic Resource Management Councils (FARMCs) and assisting organization or project staff.
4. Compiled and filed in an “LGU Blue Book,” a reference file for the municipalities’ CRM programs.

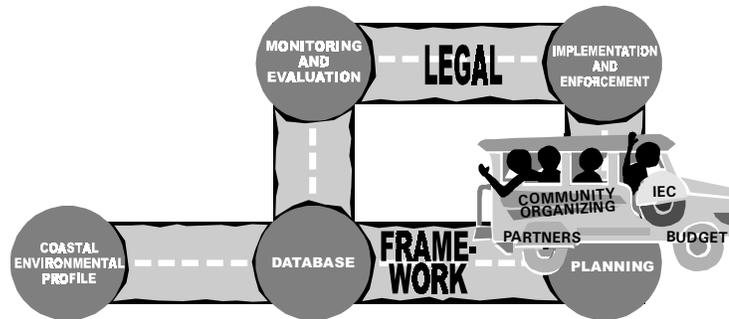
Please submit to CRMP for data processing and analysis a copy of the MCD, preferably the electronic file generated by the software provided in this packet, or, if this is not available, the original copy of the accomplished MCD form provided in this section. A copy should also be furnished to the municipality. Please send CD to:

The Coastal Resource Management Project-Philippines
5/F CIFIC Towers
J Luna cor. Humabon Sts., North Reclamation Area
Cebu City 6000, Philippines
Tel. (032) 232 1821 to 22; 412 0487 to 89
Fax (032) 232 1825
E-mail: prcebu@usc.edu.ph
Website: <http://www.oneocean.org>

THE CRM PROCESS

CRM Planning

Overview



Planning is the process of organizing ideas and resources to make things happen and achieve an objective. It involves arranging actions so that they add up to a desired result. A plan expresses a detailed program of action designed according to existing policies and using a set of strategies. It spells out programs for meeting goals and objectives, indicating what actions will be carried out, when they will be carried out and who will ensure that they are carried out. A plan is a prerequisite to any form of management.

CRM planning is an activity to effect changes in human behavior, the state of the coastal environment or other results. In other words, CRM does not necessarily mean managing fish and reefs directly, but rather managing the activities of people affecting those coastal resources. Plans for CRM are inherently variable depending on their overall intended purpose. A CRM plan can arrange actions to solve very specific problems such as the degradation of a small mangrove forest. Or it may organize all the required actions to manage the coastal resources in one municipality covering 100 kilometers or more of coastline. It can lay out a work schedule for a project team for 3 months. Or, it can set out a series of goals, objectives, policies, strategies and actions which involve hundreds of people and their work for over five years.



Because CRM includes many, often complex activities, it requires careful planning. Without good plans, CRM cannot easily move ahead. A good plan represents experience, testing and ongoing actions which are working in the field. It makes implementation easy. Without a plan, implementation may not be effective, even when the objectives are firmly set and laid out. Objectives must translate into actions, and actions, once decided, requires people, money, time, organization, communication – and more – to implement. Careful planning will identify these needs and determine the best strategies with which to address them.

CRM plans are implemented to accomplish a broad range of objectives and strategies:

1. Maintain a high quality coastal environment – The coast is a major national resource, providing commerce, food, recreation, spiritual refreshment, and security. These values will not last forever without conservation.
2. Protect valuable species – Many coastal species need special protection. CRM can preserve their breeding and feeding areas through protected reserves and the use of regulations.
3. Conserve fisheries and critical coastal habitats – Habitats of special importance to species and the functioning of coastal ecosystems – mangroves, seagrass meadows, coral reefs, beaches, lagoons, and certain tidal flats – would be protected in CRM programs.

4. Conserve critical ecological processes – Certain ecological processes are critical – supply of nutrients, penetration of light through the water, and water circulation – and need protection through regulation.
5. Control pollution – Pollution from point sources and from land runoff as well as accidental spills of pollutants which foul coastal waters (human health problems and ecological disruption) would be addressed by CRM programs.
6. Provide development guidance – Much of the ecological and scenic disruption of the coast is from inadvertent side effects of coastal development. A CRM program can provide advisory services to development entities to help reduce impacts.
7. Identify critical lands – Certain areas of the coast have coastal habitats for recreation, housing, nature protection, economic development, etc. The CRM program can identify lands optimum for development and for nature.
8. Restore damaged ecosystems – Many otherwise productive coastal habitats have been damaged but are restorable. CRM offers opportunities to identify and restore such habitats.
9. Public Awareness – CRM can play an important role in creating public awareness of coastal values and needs for conservation.



CRM planning is ideally community-based and participatory. Communities as direct users are involved in the daily management of coastal resources. Their participation in planning and program implementation will lead to a stronger commitment during implementation, sustainable resource use and a higher degree of compliance. It will also develop the community's capacity to improve their quality of life and overcome the problems confronting them through their own efforts. Moreover, the top-down approach has been proven ineffective, primarily because of lack of participation of the beneficiaries in the planning process.

The planning process is not simply a sequential process. It can follow a variable path and where some things can come before others. Moreover, it is not a linear process but rather a cycle; the basic planning cycle continues to formulate plans once good information is available. Nevertheless, it is helpful to present the cycle in "phases", not only for discussion purposes but for the reason that, for any first-time plan, certain pieces are essential, otherwise it is not a plan! Done right, the planning process will help coastal managers sort out the actions needed, their timing, their level of support and who will implement them.

Every phase in the planning cycle consists of a number of activities, as shown below:

1. Plan Formulation

- a. Necessary information and data on the physical, economic and social characteristics of the coastal zone are put together in a coastal environmental profile
- b. A plan for public participation in the CRM process is prepared
- c. Management problems (causes, effects and solutions) are analyzed and assessed
- d. Priorities to tackle problems are set according to technical, financial and manpower feasibility
- e. Feasibility of new economic development opportunities are analyzed
- f. Coastal zone management boundaries and formulation of recommendations are considered
- g. Institutional capacities are analyzed and assessed, and options for the interagency coordinating mechanism are developed
- h. Recommendations for policies, goals, and projects are developed
- i. Appropriate monitoring and evaluation systems are designed
- j. Timetable, approach and division of labor are established

2. Plan Adoption

- a. Policies, goals, new management measures and initial projects are adopted
- b. The interagency coordinating mechanism is established. Typically a Technical Working Group (TWG) is convened to conduct community consultations and finalize the plan
- c. Staffing and organizational changes that may be required are approved
- d. Funding allocation for the CRM program is approved

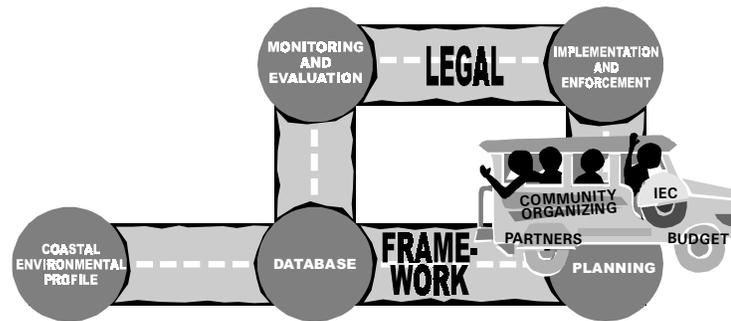
All plans and management evolve from an information base. The better quality the information, the more realistic the plan. Obtaining reliable information is thus the first step in planning.

Information and data of the following types are needed:

1. Coastal resource base
2. Social organization in the coastal zone
3. Existing environment and resource-related programs
4. Institutional, legal and financial capacity

The coastal environmental profile and municipal coastal database are important inputs to planning.

THE CRM PROCESS
CRM Planning
Forming CRM Organizations



Municipal-level CRM organizations, such as CRM councils and the legally mandated Municipal Fisheries and Aquatic Resources Management Council (MFARMC), are groups formed to serve in an advisory capacity to the LGUs. They assist in policy-making as well as CRM planning, implementation and the enforcement of fishery laws, rules and regulations in municipal waters. The MFARMC, in particular, also helps prepare the Municipal Fishery Development Plan, which forms part of an overall CRM plan, and submits such plan to the Municipal Development Council; recommends the enactment of municipal fishery ordinances to the Sangguniang Bayan (SB) through its Committee on Fisheries; and advises the SB on fishery matters through its Committee on Fisheries, if this has been organized.

CRM organizations must represent the direct stakeholders of coastal resources, and, ideally, the different sectors affected by or can contribute to the CRM process as well. These include:

1. government agencies, both national and local
2. non-government organizations (NGOs)
3. government-owned and controlled corporations
4. academic institutions
5. private sector (business and industry)
6. people's organizations
7. community

For example, as provided by law (RA 8550 or the Philippine Fisheries Code), the MFARMC is composed of:

- a. Municipal Planning and Development Coordinator
- b. Chairperson, Agriculture/Fishery Committee of the SB
- c. representative from the accredited non-governmental organization
- d. representative from the private sector
- e. representative from the Department of Agriculture
- f. at least 11 fisherfolk representatives – 7 municipal fishers, 1 fish worker, and 3 commercial fishers – including representatives from the youth and women sector.

The formation of CRM organizations is part of the institutional arrangements that define the decision-making processes and bodies and the responsibility and accountability of individuals and organizations in implementing the CRM plan. Such institutional arrangements also provide the mechanism for CRM implementation.



As has already been said, CRM must be participatory and multi-disciplinary, and this is largely a function of the complex nature of the coastal environment itself. Functionally, the coastal zone is a broad interface between land and water where production, consumption and exchange processes occur at high rates of intensity. The varied economic activities in the coastal area makes managing coastal resources difficult. Also, management of economic activities is often sectoral in nature, so a host of institutions have jurisdiction over coastal resources and no single entity manages the coastal zone in an integrated and holistic manner.

Institutional arrangements for CRM, including the FARMCs, are therefore designed to integrate development among sectors, anticipate and avoid negative impacts, establish cooperative working relationships among the sectors, promote equitable sharing of resources and create implementable policies, plans and projects.



The following guide questions should be considered in designing institutional arrangements and, in particular, forming CRM organizations:

1. Who are the players and what are their roles?
2. Are the priority issues, main objectives and key strategies and techniques clear? Do the players have a consensus on these points and are they committed to plan?
3. How will the plan be implemented?
4. What will the composition of the highest decision-making body be? What are its powers and limitations of those powers? What are its responsibilities and accountability?
5. Who will be the lead organization and what are its competencies and responsibilities?
6. What are the competencies and responsibilities of other participating organizations?
7. What are the mechanisms for monitoring, enforcement and what are the sanctions?
8. Who will undertake the identified functions?
9. Who is accountable to whom?
10. What implementing structure will best suit the community's CRM requirements?

Other factors to consider are:

1. Implementability of the chosen strategies as these relate to the proposed implementing structure
2. moral, legal and administrative authority of the participating sectors or organizations to manage the program
3. representation of the primary players in the area
4. decision-making powers of representatives of the sector or agency; size and manageability of the structure
5. customs and traditions of the affected community; past lessons in effectiveness of implementing structures
6. commitment and capabilities of the sectors or groups involved
7. past local experiences that may impair the effectiveness of the structure.

Theoretically, anyone can initiate a multi-sectoral CRM organization. A memorandum of agreement by all interested parties formalizes its establishment. What is important is that the organization:

1. includes all agencies which have jurisdictional responsibilities over the resources, resource users which produce impacts on the resources, and others who are legitimately concerned with protecting coastal resources;
2. a consensus is reached about the use of resources, so conflicts can be resolved;

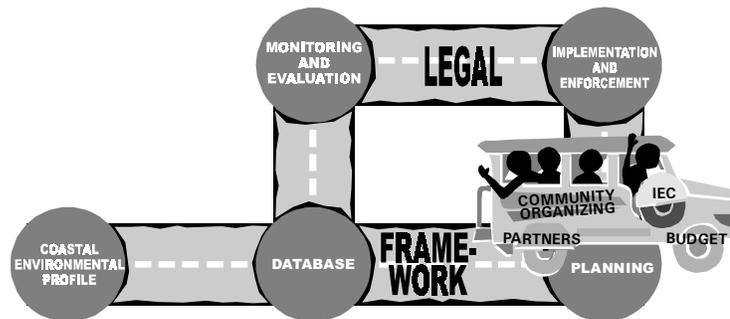
3. there is coordination, information-sharing and participation in planning (both sectoral and cross-sectoral), environmental impact assessment review of proposed development projects, construction permit review, and legislative hearings.

This way, rights are recognized, accountability is clear, measures are widely supported, compliance is secured and errors in decisions minimized or avoided.

THE CRM PROCESS

CRM Planning

Water and Land Use Zones



Water and land use zones refer to those areas or zones delineated for specific uses. Nine types of zones are defined in the Implementing Rules and Regulations of the National Integrated Protected Area System Act (Republic Act 7586). These zoning types can also be used in municipal waters outside NIPAs sites. These are:

- (a) *Strict Protection Zone.* - Areas with high biodiversity value which shall be closed to an human activity except for scientific studies and/or ceremonial or religious use by indigenous communities.
- (b) *Sustainable Use Zone.* - Natural areas where the habitat and its associated biodiversity shall be conserved but where consistent with the management plan and with PAMB approval; (i) indigenous community members and/or tenured migrants and/or buffer zone residents may be allowed to collect and utilize natural resources using traditional sustainable methods that are not in conflict with biodiversity conservation requirements; (ii) research, including the reintroduction of indigenous species, may be undertaken; and (iii) park visitors may be allowed limited use. Provided, no clearing, fanning, settlement, commercial utilization or other activities detrimental to biodiversity conservation shall be undertaken. The level of allowable activity can be expected to vary from one situation to another.
- (c) *Restoration Zone.* - Areas of degraded habitat where the long term goal will be to restore natural habitat with its associated biodiversity and to rezone the area to a more strict protection level. Initially, natural regeneration will be assisted through such human interventions as fire control, cogon suppression and the planting of native species including indigenous pioneer tree species as well as climax specie. Exotic species (not native to the site) shall not be used in the restoration process. Existing houses and agricultural developments may be allowed to remain initially but would be phased out eventually.
- (d) *Habitat Management Zones.* - Areas with significant habitat and species values where management practices are required periodically to maintain specific non-climax habitat types or conditions required by rare, threatened or endangered species. Examples would be forest openings for the tamaraw or brushy forest for the Philippine tarsier. Human habitation and sustainable use may be allowed if they play a habitat management role.
- (e) *Multiple-Use Zones.* - Areas where settlement, traditional and/or sustainable land use, including agriculture, agroforestry, extraction activities and other income generating or livelihood activities, may be allowed to the extent prescribed in the management plan. Land tenure may be granted to tenured residents, whether indigenous cultural community members or migrants.

- (f) *Buffer Zone.* - Areas outside the protected area but adjoining it that are established by law (Section 8 of the Act) and under the control of the DENR through Park Area Management Board. These are effectively multiple-use zones that are to be managed to provide a social fence to prevent encroachment into the protected area by outsiders. Land tenure may be granted to occupants who qualify. Buffer zones should be treated as an integral part of the protected area in management planning.
- (g) *Cultural Zones.* - Areas with significant cultural, religious, spiritual or anthropologic values where traditional rights exist and ceremonies and/or cultural practices take place.
- (h) *Recreational Zones.* - Areas of high recreational, tourism, educational, or environmental awareness values where sustainable eco-tourism, recreational, conservation education or public awareness activities may be allowed as prescribed in the management plan.
- (i) *Special Use Zones.* - Areas containing existing installations of national significance such as telecommunication facilities, irrigation canals or electric power lines. Such installations may be retained subject to mutual agreements among the concerned parties, provided such installation will not violate any of the prohibitions contained in Section 20 of the Act.

Water and land use zones are based on the features and importance of the ecosystems found in the area as well as the concerns and recommendations of the different sectors affected by the zoning plan. The zoning plan should form an integral part of an overall multi-year CRM plan.



The delineation of areas or zones in the coastal environment for specific uses addresses the issue of conflicting interests among resource users. Coastal zoning allows different sectors who use the coastal area to reach a consensus on coastal use. It provides a chance for dialogue and cooperation among fishing communities, business interests, non-governmental organizations (NGOs) and the local government.



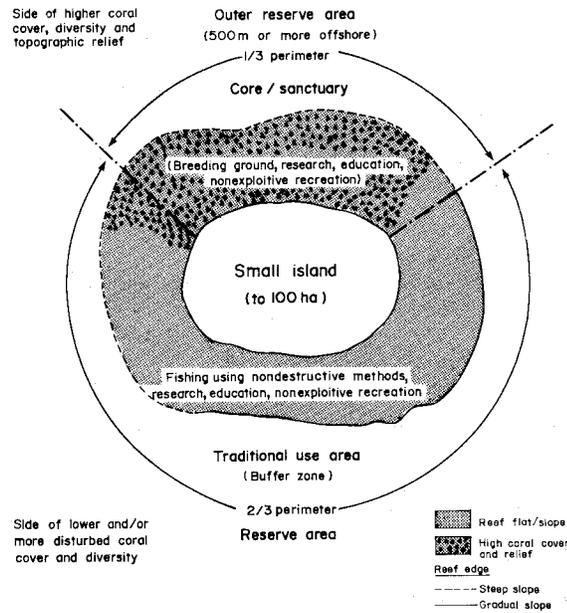
Coastal zoning requires communities sharing a common resource (e.g., a bay or gulf) to be well-organized and willing to work with each other in a lengthy process that requires patience and flexibility. It would be more effective if community-based organizations (CBOs) have skills in:

1. basic marine ecology
2. conflict management and resolution
3. knowledge of local and national laws
4. leadership, negotiation and planning skills
5. advocacy skills
6. management, monitoring and evaluation skills

Reserve/Park Zones

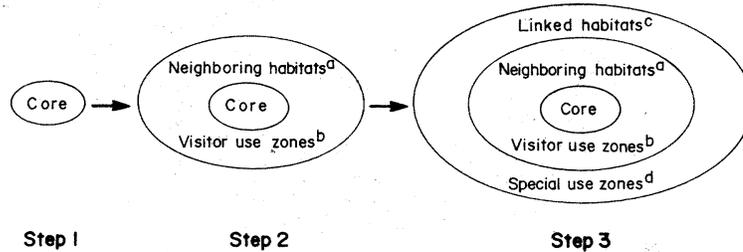
Many options exist for management regimes using a combination of techniques to regulate human impact on coastal resources and areas. Examples include limited fishing effort, mangrove harvesting or tourist boat operators by issuing a limited number of licenses; regulating fishing gear; enforcing anti-pollution laws governing industries and shipping; or monitoring trade in marine endangered species. The reserve is an area management technique which limits use within a defined space. What uses are limited, to what extent they are limited and by what means may be defined by different zones within a reserve or park.

A zoning plan provides the basis for management of an area sufficiently large for sub-areas or zones to justify different forms of management and use. By providing for a gradation of restriction, a zoned management scheme can be easier to establish and police, since it can satisfy the requirements of a range of resource uses.



Sample reserve system with core and buffer areas

There is no definitive list of zones and what they may or may not achieve. Rather, the particular mix of zones appropriate for a given reserve varies. Some possibilities may be gleaned directly from the reserve types already discussed. Consistent with those above is a summary of zones based on the concept of “core” and “buffer” areas shown below.



Principal steps in the design of a coral reef protected area: (1) The core boundary is defined after determining the critical minimum core area. (2) The protected area boundary is defined to maintain ecological processes and support systems and to regulate visitor use. (3) The buffer zone boundary is determined in light of potentially damaging activities in linked habitats.

The core area represents a strictly protected area for one or more of the following reasons:

1. Sanctuary/preservation zone where ecosystems, habitat, species, processes and genetic diversity are protected;
2. Research and education zone where ecologically sound, nondisturbing research and education activities are permitted; and
3. Cultural zone where cultural activities or monuments are preserved.

The buffer area represents a transition space between the inner core and the outside area where no management is applied and might include the:

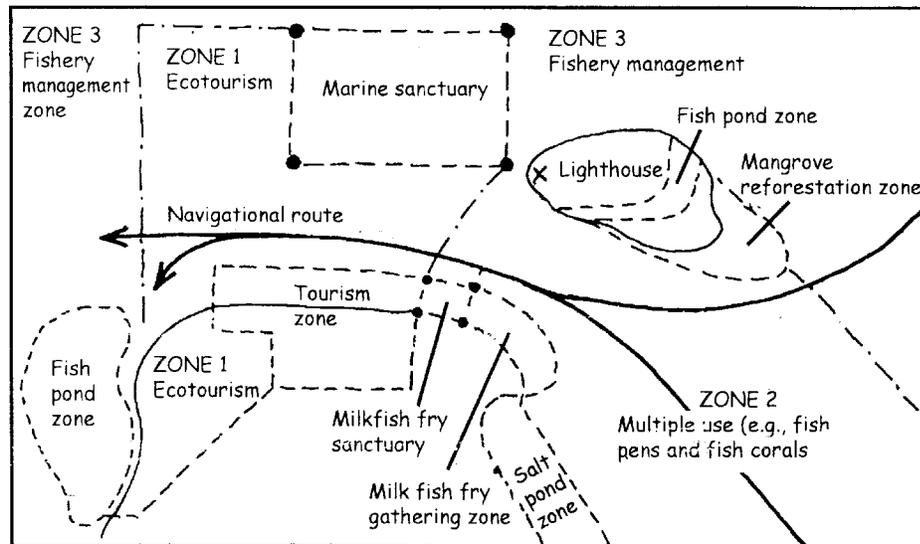
1. Traditional use zone where exploitation is allowed and monitored at sustainable level using ecologically sound methods;
2. Visitor use zone where appropriate recreation and general education activities are allowed;

3. Neighboring habitat zone where ecosystems, habitat, species and processes adjacent to and important for maintenance of the core area are at least maintained; and
4. Sustained yield/fishery management zone where breeding and spawning, sites of concentrated fish stocks or a particular species are closed or regulated for use and access.

Legislation and field management can include zoning so that a reserve/park is divided into different units with different levels of protection and use. These zones depend upon the aims and needs of the people using an area and those setting the management and conservation objectives.

The approach to zoning depends on the specific needs of the community. The participatory approach is recommended. Although it is time-consuming and sometimes difficult to implement because of the different interests involved, it is in the long run more sustainable, as it involves forging collaboration among the various resource users. One possible approach is described below:

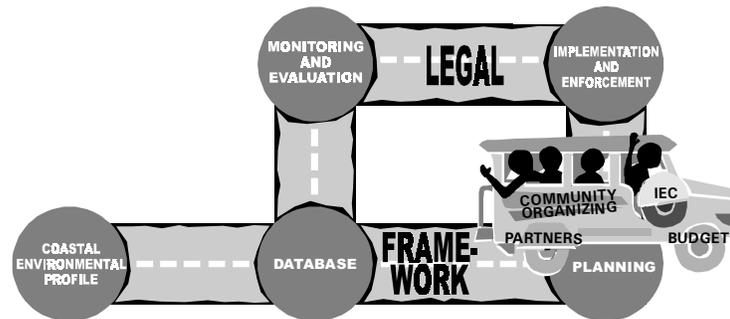
1. Let each CBO identify resources, how they are used and what resource use conflicts exist. The resource map produced through PCRA (see *Secondary Data Compilation: Participatory Coastal Resource Assessment*) is a useful tool for this process.
2. Ask each CBO to show on the map the current use of resources in their area and locate where the conflicts are.
3. Ask each CBO to produce a second map that in their view resolves these conflicts through zoning.
4. Gather together the CBOs in the municipality that are committed to the zoning project to discuss their respective zoning plans. Let them produce a joint map suggesting how the area could be zoned.
5. Ask the CBO to carry out an information campaign about the proposed plan to community members of neighboring coastal areas within the municipality to gain the support of coastal communities who are not yet organized.
6. Encourage the CBO to work with the local government in setting up a multi-sectoral forum on coastal zoning. Invite all stakeholders – CBOs, small-scale fishers, fry gatherers, gleaners, commercial fishers, business community, NGOs and religious organizations, local officials, the police, media, national government agencies — so that they can give their input on how the area could be zoned. Encourage all coastal villages to attend.
7. Ask the CBOs to present their proposed zonation plan at the multi-sectoral forum and hear the views of other sectors. Do not expect to arrive at a consensus at this early stage of the consultation process.
8. Form a multi-sectoral committee for coastal zoning from among the sectoral representatives. Ask the committee to meet regularly to decide the finer details in producing a zoning plan that takes into account all the views of the forum. The committee should report regularly to the whole forum. All the sectors should be represented in the committee. It is essential to have a strong CBO presence in the forum, and particularly the committee. The output of the committee is the final zoning map and an implementation plan.
9. Submit the plan to the appropriate legislative body for legislation and discussion on how the zoning laws can be enforced.
10. Implement the coastal zoning plan. This will involve:
 - ♦ working directly with different sectors in transferring activities to designated zones
 - ♦ setting up environmental projects, such as mangrove reforestation
 - ♦ tapping funding from local government, business sponsors and donor agencies



Sample coastal zonation plan (Bolinao, Pangasinan)

(Adapted from:
Participatory Methods in Community-based Coastal Resource Management, International Institute of Rural Reconstruction, 1998
Marine Parks and Reserves, Management for Coastal Environments in Southeast Asia, By A.T. White, ICLARM 1988.)

THE CRM PROCESS
CRM Planning
Preparation of a Multi-year Plan



Plan preparation is the process of putting on paper in an organized and easy-to-follow format the results of the planning exercise, that is, the specific actions selected for implementation in pursuit of an overall long-term objective.

Plan adoption refers to the stage preparatory to implementation, when policies, legal mechanisms, goals, new management measures and initial projects are taken up and set down. During plan adoption, an inter-agency coordinating mechanism is also put in place, and staffing and organizational changes that may be required, as well as funding allocation for the CRM program, are approved.



Putting action plans in writing helps clarify goals, objectives and strategies and also provides a written, organized record that facilitates implementation, monitoring and evaluation. A written plan allows implementors to review actions that have already been taken and make changes in management strategies or even implement specific projects as necessary. It also helps promote communication and understanding among implementors about where the program stands and where it needs to go.

Plan adoption paves the way for more effective and more efficient plan implementation. By identifying and setting in place all the mechanisms, policies and resources required for implementation, it allows the program to start smoothly and move forward more quickly.



A CRM plan (typically a 3-5 year plan) is prepared first. This plan should reflect in operational terms the community's vision and goals and contain its strategic objectives and targets. It is then translated into specific action plans that describe the different activities to be undertaken over shorter periods of time. The CRM plan must state clearly the following:

Implementing agency/ies

Description of CRM Issues and their Causes

Goals – broad results that an organization seeks to achieve in pursuing its basic mission. They are broadly worded and timeless statements about what the program wants to achieve in the long run. Example: *Ensure the continuation of sustainable fisheries in the bay to benefit the human inhabitants that depend on them.*

Objectives – short-term specific milestones that programs must achieve in attaining goals. They are specific statements of measurable, realistic end results, the achievement of which is contemplated in a specific time period. They answer the question of *what* is to be done. Example: *To maintain fish population and reduce fishing pressure.*

Policies – are statements which guide the choices of decision makers over coastal resource uses and set the direction for management.

Strategies – are statements of how available resources will be applied to achieve the objectives. They are combinations of specific management measures or actions, applied individually or as a combination of several management instruments. They generally answer the question *how* an objective will be achieved.

Implementing Actions (Techniques) – specific actions that taken together will achieve management objectives. Action statements must be specific enough so they answer “who, what, when, how much” questions. They should include a description of resource considerations, such as financing, manpower, and authority; profile of available resources and opportunities; costs and returns; effects of institutional cultures, structures and stakeholders. Implementing actions or techniques may be regulatory or non-regulatory.

Institutional Structure for Implementation

Monitoring and Evaluation

1. Responsible Person or Group
2. Action or Program Component to Be Monitored/Evaluated
3. Monitoring/Evaluation Method/s and Criteria
4. Monitoring/Evaluation Calendar

The action plan may be presented in a chart as follows:

Goals/ Strategies	Strategy/ Activities	Goals/ Strategies	Unit of Measure (indicator)	Expected Output	Time Frame	Lead Agency/ Institution	Target Participants	Goals/ Strategies

As detailed and specific a plan may be, however, it is not written in stone. A good plan is flexible to changes in the environment that may require changes in action or strategies. A CRM plan varies in scope according to level of implementation (national, regional, provincial, municipal, etc.).

When completed, the plan is presented to the appropriate agency/ies for adoption. At this stage, the mechanisms, policies and resources for implementation are set in place, and initial projects are undertaken. Terms of reference or more formal instruments such as a memorandum of agreement are issued, defining the functions and responsibilities of implementing agency/ies. The program budget is approved and goes into the program pipeline. If necessary, organizational changes are made and additional staff are hired. The following must be considered when adopting the CRM plan:

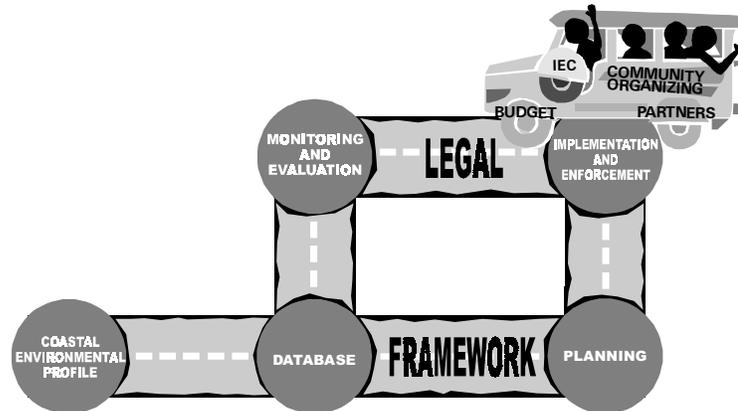
1. Is the plan coherent? Does it fill in the gaps?
2. Is the participation of the various stakeholders maximized? Are their interests considered?
3. Is the plan flexible?
4. Is the plan clearly written and appropriately packaged?

Tips for Plan Presentation

1. Bear the audience in mind.
2. Include a brief of the plan in the management plan document
3. Identify the selling points of the plan
4. Include facts and figures to support the concept and design of the plan
5. Furnish each key decision maker with the complete management plan
6. Be familiar with the content
7. Prepare appropriate visual aids
8. Be courteous
9. Relate to the audience
10. Be open to possible amendments

THE CRM PROCESS

CRM Implementation and Enforcement Overview



what?

Implementation and enforcement refers to the execution of a plan according to the set of measures (or strategies) and in pursuit of the goals and objectives specified in the plan. This process involves the detailed design of measures, the installation of selected measures, operation, maintenance and adaptation of implemented measures, and monitoring and evaluation. It can include community capability building activities, environmental education, resource and ecosystem initiatives and sustainable livelihood development projects. Identified appropriate strategies are researched, developed, tested, and when successful, adopted and replicated.

why?

A plan is only a piece of document or an idea until it is implemented. The only way that the goals of CRM can be achieved is to implement the CRM plan, and implement it well.

how?

Ideally, implementation is participatory, that is, the community members themselves are involved in the execution of plans. The following characteristics of the implementation environment must be considered:

1. Consistency — institutional mechanisms to ensure consistency, accountability and communication of policies
2. Capacity – expertise of staff, disposition of implementors, transformation costs, transaction costs, financial resources, existing goals and objectives of implementing organization
3. Ecologic capacity – political constraints, socio-cultural constraints, economic constraints, situational capacity

In general, the adaptive approach to implementation is recommended. This approach is distinguished from the program approach by the following characteristics:

1. less defined policy
2. high flexibility among implementing officials
3. broad scope of policy change
4. high conflict over policy goals and objectives
5. loosely structured institutional setting
6. unstable policy environment

The implementation phase covers the following:

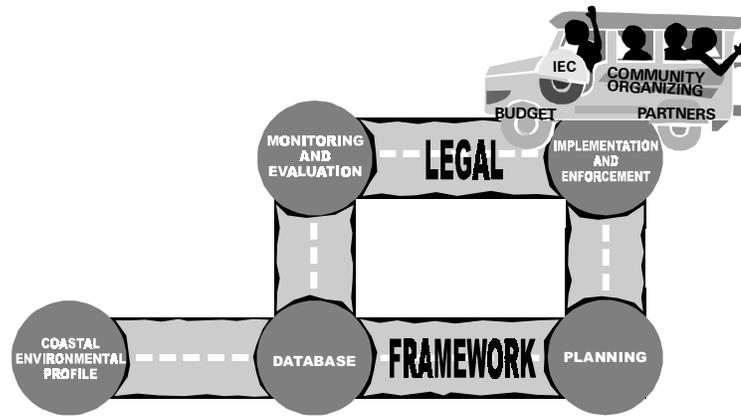
1. Ordinance formulation and adoption
2. Registration and licensing of fishers

3. Marine sanctuary establishment
4. Mangrove management
5. Alternative economic development for fishers
6. Revenue generation from municipal water use zones
7. Enforcement of municipal waters

THE CRM PROCESS

CRM Implementation and Enforcement

Ordinance Formulation and Adoption



Ordinances are laws emanating from the LGU. They are of a general and permanent character, and must be consistent with higher laws (the Constitution, national laws, international treaties which have been ratified by Congress, etc.).

In the community-based CRM setting, the process of formulating and adopting ordinances is often participatory, that is, it involves stakeholders or organizations recognized by the stakeholders as representing their interests.



The successful implementation of CRM depends not only on the participation and acceptance of the community, but also on ordinances and other legislation that form the basis for regulation. Because of the complexity of the issues and the many interests involved and affected by CRM interventions, regulation is a key measure for implementing CRM, and it must be supported by legislation. National laws may be adequate to address certain issues, but in most instances, ordinances issued by the LGU strengthens the legal framework for CRM implementation. Indeed, in some cases where there is no national law that explicitly addresses a CRM issue, local ordinances may be indispensable.



Ordinance formulation and adoption involves the following processes:

1. Drafting a village resolution by the CRM organization or barangay council – the resolution is a recommendation or an expression of intent, and is a temporary instrument. To have the force of law, it must be approved, in the form of an ordinance, at the municipal level. If the barangay council refuses to pass the resolution, the sponsoring organization has the option to submit it directly to the municipal council.
2. Public Hearing. The resolution is submitted by the village council or sponsoring organization to the municipal council for passage into law, specifically a municipal ordinance. Before the municipal council convenes to decide on the issue, it calls a public hearing to determine the social acceptability of the sanctuary. The level of social acceptability often drives the municipal council to reject the resolution or pass it in its entirety or with modifications. The community is expected to participate in drafting the ordinance by giving inputs on any issue that can be addressed by the proposed law. Moreover, if the municipal council fails or refuses to enact the law, they can invoke their power of initiative by filing with the provincial election registrar a petition signed by at least 10% of the registered voters in the municipality, with every village represented by at least 3% of its registered voters. The Commission on Elections can then call for initiative through which the proposition is submitted to the registered voters in the LGU concerned for approval.

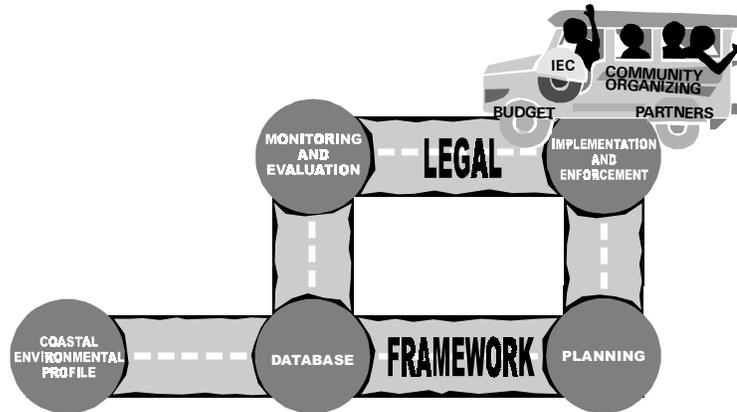
3. Approval and Announcement of the Ordinance. After approval by the council, the ordinance is submitted to the mayor, who must act on the ordinance within 10 days, or the ordinance is considered approved. If the mayor vetoes the ordinance, the municipal council may override the veto by a vote of 2/3 of all its members. The ordinance is then submitted to the provincial board for review within three days. If no action is taken by the provincial board within 30 days, the ordinance is presumed consistent with law and therefore valid and enforceable. The ordinance should be posted for 3 consecutive weeks in places easily accessible to and frequented by the public.
4. Monitoring, Control and Surveillance. The process of legislation does not end when the ordinance is passed. Changes can be expected in the requirements of CRM and these may necessitate new legislation or modifications in existing laws. The law is not a guarantee of the success of CRM; it is only one way to instill discipline in those people who are presumed to benefit from it or be affected by it. These are the same people who will spell the difference between the enforcement and the non-enforcement of the laws – the community. Continuous monitoring, control and surveillance by the members of the community are therefore necessary to ensure compliance with the laws. Law enforcement is both more cost-efficient and more effective when the community itself actively helps enforce sanctuary laws.

For an ordinance to be valid, it must conform to the following substantive requirements:

1. It must not contravene the Constitution or any other statute
2. It must not be unfair or oppressive
3. It must not be partial or discriminatory
4. It must not prohibit but may regulate trade
5. It must be general and consistent with public policy
6. It must not be unreasonable

Furthermore, the ordinance must not contradict or run in conflict with administrative orders and local budget circulars issued by the Department of Budget and Management.

THE CRM PROCESS
CRM Implementation and Enforcement
Registration and Licensing for Fishers



Registration and licensing for fishers are essentially an administrative technique for regulating fisheries. Under the Philippine Fisheries Code of 1998 (RA 8550), the LGU is mandated to maintain a registry of municipal fisherfolk who are fishing or may desire to fish in municipal waters as well as a registry of municipal fishing vessels by type of gear and other boat particulars, while the Department of Agriculture is responsible for issuing commercial fishing vessel and other licenses.



Registration and licensing are undertaken to:

1. determine priorities among fishers
2. limit use and entry into municipal waters
3. monitor fishing activities and/or other related purposes

If introduced early in the development of fisheries, licensing is an effective way to control effort and ensure stock conservation.

Registration of fishers, gears and boats is required by the Fisheries Code (Sections 19 and 86) for the purpose of licensing and granting preferential use rights to resident (at least six months) fishers. Registration information is also useful in drafting the basic municipal fisheries ordinance as it identifies passive, active, destructive and deleterious gears. Combined with information about fishery product market prices and investment (fixed and operational) costs, it gives an estimate of license fees and a rough indication of total fishery production.



The LGU undertakes the registration of fishers and fisherfolk organizations or cooperatives and their fishing gears and boats, with the assistance of the FARMC, which has the mandate to recommend priorities to the LGU. The list or registry is updated annually or as may be necessary. It is posted in barangay halls or other strategic locations where it is made available for public inspection to allow validation of the correctness and completeness of the list. A sample registry of municipal capture fishers, gears and boats is shown below:

1. Fisher
 - 1.1. Name
 - 1.2. Birth date
 - 1.3. No. of years fisher has spent fishing or year fisher started fishing
 - 1.4. Previous occupation
 - 1.5. Present address

- 1.6. Length of residence in the barangay: no. of months _____ or years _____
 - 1.7. No. of months spent in fishing per year _____
 - 1.8. Civil Status: single__ married __ separated__ widow/er__
 - 1.9. No. of children _____
 - 1.10. Educational attainment (level):
 - a. elementary b. high school c. college (indicate course) d. college graduate
 - 1.11. Other sources of income or livelihood _____
 - 1.12. Birthplace (barangay, municipality, province) _____
 - 1.13. If wife is also engaged in fishing:
 - 1.13.1 Wife's name _____
 - 1.13.2 Wife's age (years) _____
 - 1.13.3 No. of years wife has spent fishing or year she started fishing _____
 - 1.13.4 Educational attainment (level):
 - a. elementary b. high school c. college (indicate course)
 - d. college graduate
2. Gears, including accessories (use specific local names)
- a. owned:

	no. of units	
	no. of units	
	no. of units	
 - b. co-owned

	no. of units	
	no. of units	
	no. of units	
 - c. rented or borrowed

	no. of units	owner	
	no. of units	owner	
	no. of units	owner	
3. Boats (use specific local names)
- 3.1. non-motorized
 - a. owned:

	no. of units	
	no. of units	
	no. of units	
 - b. co-owned

	no. of units	
	no. of units	
	no. of units	
 - c. rented or borrowed

	no. of units	owner	
	no. of units	owner	
	no. of units	owner	
 - 3.2. motorized
 - a. owned:

	no. of units	
	no. of units	
	no. of units	
 - b. co-owned

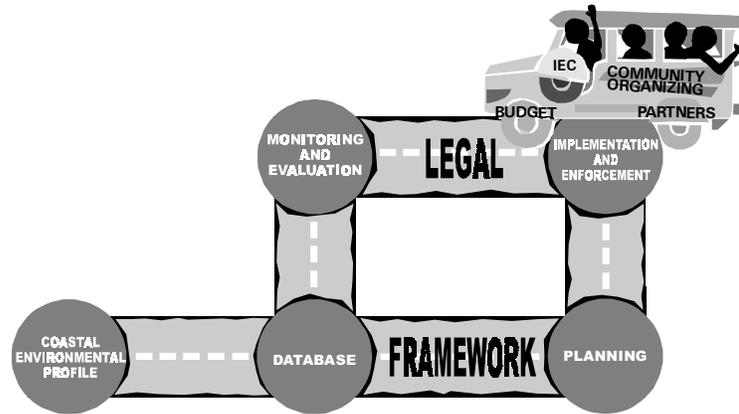
	no. of units	
	no. of units	
	no. of units	
 - c. rented or borrowed

	no. of units	owner	
	no. of units	owner	
	no. of units	owner	

4. Membership in organizations
 - 4.1. Name/s of organizations and activities

The LGU, in consultation with the FARMC, formulates the necessary mechanisms for the inclusion or exclusion procedures most beneficial to the resident municipal fisherfolk. The FARMCs may recommend such mechanisms.

THE CRM PROCESS
CRM Implementation and Enforcement
Marine Sanctuaries



A marine sanctuary is a protected area or zone within the marine and coastal environment where resource extraction is strictly regulated or entirely prohibited and human access may be restricted. Characterized by high productivity and high biodiversity, it is delineated for the rehabilitation and replenishment of fishery and coastal resources because of its ecological function as a spawning and/or feeding ground for one or more marine species. Sanctuaries are established legally by at least a municipal ordinance.



Marine sanctuaries are an effective way to protect breeding and juvenile fish, guard against overfishing and ensure a sustainable supply of fish stock. According to studies, a square kilometer of protected reefs can produce up to 30 metric tons of fish per year. Marine sanctuaries are particularly effective as a management tool directed at promoting the long-term productivity of shallow-water fisheries, especially in the Philippines, where about 10-15% of marine fish production is supplied by coral reefs. They work in a number of ways:

1. By restricting exploitation of fish stocks, marine sanctuaries give different species the chance to freely reproduce. Species like grouper, parrotfish and snappers do not breed until they are 4-6 years old. Without protection, these species are usually caught when they are only 2-3 years old and thus unable to breed and are at high risk of extinction.
2. Marine sanctuaries promote the rehabilitation and recovery of degraded coral reefs.
3. Because of the protection accorded marine species in the sanctuary, fish inside the reserve area (where fishing is strictly prohibited) grow faster and multiply easily. This leads to a faster turn-over of fish from the reserve to the non-reserve (where passive, non-destructive fishing is allowed) area, which increases fish yield for the fishermen. By providing a safe refuge for breeders and juveniles, marine sanctuaries allow fish stocks increase rapidly and spill over into the surrounding reefs where they become available to fishermen.



The community-based approach to establishing marine sanctuaries is recommended for the following reasons:

1. Sharing of economic benefits from the marine sanctuary can increase income for local people, for example, from user fees (e.g. tour operators and entrance fees) and visitor facilities (accommodation, transport, food, guides, etc.).
2. Improved employment opportunities may arise, both in and outside the marine sanctuary, through the growth of services such as hotels and restaurants.
3. A successful marine sanctuary may result in improved yields in local fisheries.

4. Community involvement can facilitate enforcement of regulations, as local people will understand and accept their purpose more readily.
5. The community can assist or even be responsible for enforcement, thus reducing costs to government agencies.
6. Where there are financial constraints, local people can be mobilized to help develop interpretive programs and assist with education.

In order for a marine sanctuary to become self-sustaining in the long term, local fishers must be able to see the connection between their efforts and some improvement in their livelihoods and the marine and coastal habitats that they depend on. Communities must know how a managed area will function and how they will benefit from it if they are to support its establishment.

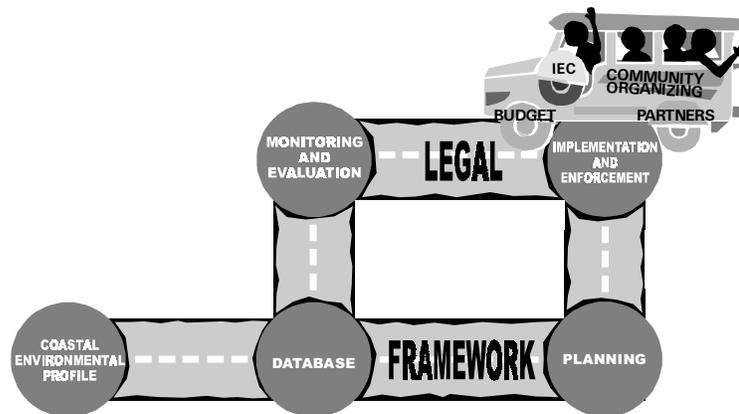
The delineation of the marine sanctuary is best done by experts with the participation of the community. There are three broad steps in the establishment of a marine sanctuary:

1. **Site Identification.** There are five important criteria to be considered in site selection:
 - ◆ *Social Criteria.* The *acceptability* and *accessibility* of the area should be considered.
 - ◆ *Economic Criteria.* The site – be it an abundant fishing ground or a potential tourist attraction — should nurture the livelihood of the community.
 - ◆ *Ecological Criteria.* The ecological criteria take into consideration the importance of the ecosystem being proposed for protection.
 - ◆ *Regional Criteria.* Marine sanctuaries can be used as a tool to encourage other communities to include CRM in their development agenda.
 - ◆ *Practical Criteria.* These include urgency; size; effectiveness.
2. **Zoning.** The Fisheries Code of 1998 (R.A. 8550) recommends that the size of the marine sanctuary should be about 10-15% of the total coastal area. It is therefore important to think about partitioning the sanctuary into several zones for core/sanctuary/preservation, buffer/ neighboring habitats, visitor use, traditional use, research/education, fishery management. Zoning is done after the community has agreed on where the marine sanctuary will be and the sanctuary is legislated through a municipal ordinance.
3. **Organizing the Bantay Dagat or Coastal Resource Management Committee.** A committee, composed of fishers and other members of the community, will take charge of the day-to-day management of the sanctuary. This committee is organized when the sanctuary's boundaries have been set and the markers and signs are put up. It is typically composed of fishers' representatives, women leaders, community elders and other key persons in the community.

THE CRM PROCESS

CRM Implementation and Enforcement

Mangrove Management



Community-based mangrove management is a process designed to assure equitable involvement and participation of community members in the use and management of mangroves. It is, in a nutshell, a CRM program focused on achieving sustainable use and management of mangroves. In the Philippines, community-based mangrove management is a major program of the Department of Environment and Natural Resources' (DENR) Community-Based Forest Management (CBFM), a program for people's organizations (POs) to help ensure the protection of existing mangrove stands through sustainable utilization.



Mangroves are a unique life-support system of coastal ecosystems that provide many services to coastal communities:

1. Serve as nursery for fry and juvenile fishes
2. Serve as feeding ground for adult fish
3. Protect shoreline from strong winds and waves
4. Check soil erosion that may damage sea grass and corals
5. Serve as a sanctuary for wildlife
6. Provide opportunities for ecotourism industry

Regrettably, the Philippines' "Blue Revolution", which started in 1974, converted more than 200,000 hectares of mangroves to fishpond. There was no analysis of the potential losses that might occur as a result of the destruction of the mangrove forests, nor was there an analysis of the appropriate economic rent for such areas. The result: the rapid depletion of mangrove resources. From 450,000 hectares in the early 1920s, the country's total mangrove area shrank to less than 150,000 hectares today. A new upsurge in the development of illegal fishponds threatens the remaining mangrove areas. In addition, increased population pressure in coastal areas is resulting in the illegal construction of houses and other structures, and consequently the destruction of mangrove forests. Without the implementation of CBFM, it is quite possible that, within 70 years, all of the remaining mangrove habitats will be lost, having been converted to fishponds and other uses.

Community-based mangrove management is undertaken for the following purposes:

1. To improve the mangrove forest in areas previously cleared for other purposes
2. To enhance habitat of ecologically and socio-economically important marine organisms that are biologically dependent on the mangrove ecosystem
3. To ensure sustainable harvest of mangrove trees

4. In the long term, to provide supplemental income from marine products for coastal communities through mangrove-friendly aquaculture (MFA)
5. To ensure tenurial rights, access and management control of the community over the mangrove resource.



Under the CBFM, POs are given the preferential privilege to manage a mangrove area. CBFM Agreements are covered by a 25-year contract, which may be renewed for another 25 years.

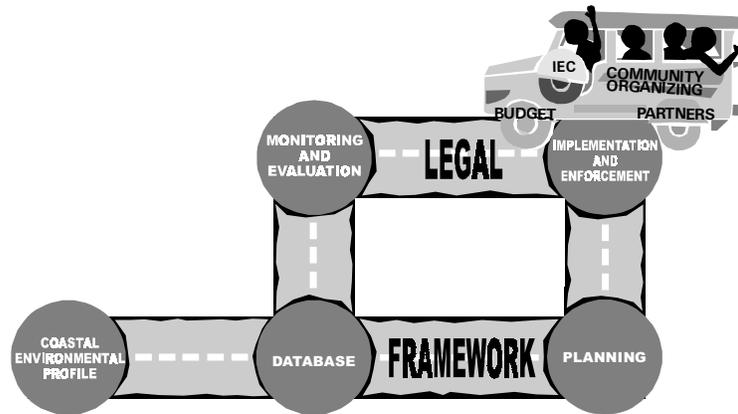
Like any community-based resource management process, CBFM for mangroves follows a cycle of planning, implementation, monitoring and evaluation and focuses heavily on people participation. It is essential that the community is given some basic working knowledge on mangrove ecosystem dynamics and that local tenure/utilization issues related to mangroves are identified and understood. The participation of the local government is also crucial to ensure the sustainability of the project.

Areas that qualify for CBFM include timberland (natural stand, plantation, plantable areas or a combination of any of these) and abandoned areas under a fishpond lease agreement (FLA), provided these have been reverted to timberland. A mangrove within a protected area can also be placed under CBFM, as long as the area is within a multiple use zone, sustainable use zone or buffer zone and endorsed by the Protected Area Management Board (PAMB).

To qualify for CBFM, a PO, which must be registered with the Securities and Exchange Commission (SEC) or the Department of Labor and Employment (DOLE) and have at least 10 members, submits a request to the DENR to identify the mangrove area. It then submits to the DENR a resolution signifying interest in CBFM. This resolution must have the endorsement of the Barangay Captain and Mayor. The PO is also required to formulate, with help from DENR and the LGU, a Community Resources Management Framework (CRMF) for the CBFM area.

Planted mangroves under a CBFMA can be harvested as long as replanting is done after each harvest to ensure that the productivity and protection value of the area are sustained.

THE CRM PROCESS
CRM Implementation and Enforcement
Alternative Economic Development for Coastal Communities



Alternative economic development in CRM is a management option designed to reduce human pressure on coastal resources. It can be classified under four broad categories: industrial siting, water resource development, coastal recreation and tourism, and enterprise development. In the context of enterprise development, it is often referred to as “sustainable livelihood,” which is defined as “a balance between economic efficiency, ecological integrity, and human well-being, including equity considerations, ... derived from people’s capacity to access options and resources and use them to make a living in such a way as not to foreclose options for others to make a living, either now or in the future” (N. Singh).



Economic development projects often exact a heavy toll on the coastal environment – the disruption of natural patterns of surface-water flow and tidal inundation, pollution, depletion of resources, and destruction of natural habitats are just some of its well-documented impacts. CRM does not mean, however, that economic development should stop. In many cases, in fact, the success of a CRM program is dependent on a carefully planned and managed economic development program which reduces human impact on the environment. Often, CRM requires resource users to withdraw from using a particular resource to conserve that resource or allow time for regeneration and ultimately greater and more sustainable yields. For those to whom the resource in question appears to be the only source of living available, short-term needs will always come before the promise of long-term gains – unless alternative economic opportunities become available.



The following guidelines must be considered when weighing alternatives for economic development:

1. **Enterprise development** (for municipal resource users/fishers)
 The choice of enterprise projects will depend on the needs of the community and the characteristics of the coastal environment. The cost:benefit ratio of an economic development project may be weighed according to its advantages, disadvantages and requirements. A promising field in those rural areas characterized by highly degraded coastal resources is the development and provision of alternative livelihood systems designed to provide the “grace period” within which to initiate conservation and resource rehabilitation. When improved, the natural resource base (e.g., mangrove lagoon, barrier reef) can be used to support a sustainable system of resource utilization.
 Mariculture, i.e., marine fish farming, is one enterprise project that is to start up in the coastal environment. It requires a relatively low capital investment and low technology input,

payback period is relatively short, and properly managed, the project has a relatively low impact on the environment, and sometimes even helps enhance the environment. Also, lack of access to arable land means agriculture is not an option for most fishers.

2. Industrial siting

- a. Environment Impact Assessment (EIA) must be undertaken to determine potential impacts on the coastal environment.
- b. The chosen site should contain the fewest sensitive or valuable habitats or living resources. Factories/plants with high pollution discharge should not be located along the coast.
- c. If heavy industry is going to be sited at the coast, it should be concentrated at one particular area rather than being spread out along the coastline. This way, less of the coast is disturbed, and cooperative efforts between industries, and with government, can address water pollution problems.
- d. The industrial site should provide a wide buffer of natural land along the shoreline, except where water access requires piers and roads.
- e. Before construction, attention should be paid to the natural patterns of surface-water flow and tidal inundation. The disruption of these flows should be minimized.
- f. Industries producing quantities of waste should be aware of the available variety of ways to control nearshore pollution.
- g. Heated water should be cooled before being discharged into coastal waters.
- h. Industries prone to accidental spillage of toxic materials should have realistic contingency plans, equipment, and trained personnel for spill containment and cleanup.

3. Water resource development

Special attention should be paid to the downstream effects in the coastal and nearshore marine environment.

- a. Boundaries of the coastal and marine areas should specifically include the zone influenced by fresh water, by river-borne pollutants, and terrestrial sediment run-off.
- b. Present and future socio-economic importance of coastal and marine resources, the degree to which they can sustain probable impacts caused by inland sources, and their present status must be considered.
- c. Baseline studies must be carried out within this zone, including resource surveys, status assessments, and descriptions of the physical environment and the processes which shape it.
- d. A monitoring program of important water inputs influencing the zone must be implemented.
- e. Threshold levels required to maintain the coastal/marine resources and processes identified above should be established.
- f. The source and upstream location of harmful inputs entering the coastal area should be identified.
- g. Whenever possible, impacts of downstream sedimentation should be considered.
- h. Systematic procedures to evaluate coastal implications of proposed water development and other activities in the catchment area should be established.
- i. Where important inputs may be altered by water development projects and pose a threat to the threshold limits of coastal resources, appropriate modifications in the design phase should be made.

4. Coastal recreation and tourism

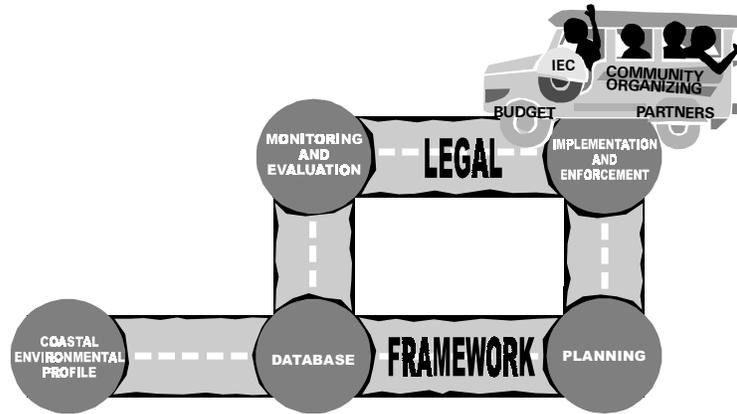
The following guidelines are important in preventing or minimizing potential problems caused by tourism development:

- a. Coastal tourism development should be conceived within the framework of national, regional, and local socioeconomic development plans which assure proper integration of environmental objectives in development strategies. In particular, coastal tourism development should be approached within a national strategy for coastal area development and management, which will identify the zones most suitable for tourism.

- b. Coastal areas reserved for tourism development should be covered by zoning plans which take into account the natural geographic and socioeconomic condition of the area. To achieve optimal exploitation of tourist resources, an inventory should first be conducted in the region of the proposed site(s) to include the physical environment; the man-made environment; the socio-cultural environment; and the existence of endemic or temporary communicable diseases.
- c. The “carrying capacity” of the area should be defined for the purpose of determining the total population the tourism area can sustain without over-burdening existing infrastructure and causing degradation of the natural resources.
- d. Clearing, where required, should be controlled to ensure minimal impact on the natural coastal ecosystems.
- e. Means of access must be properly designed to take into account minimization of traffic congestion, noise, solid and liquid waste pollution, and other impacts on the surrounding areas.
- f. The development of accommodation facilities should be concentrated, leaving as much of the natural resource in an as undisturbed a state as possible. The scale, size, and type of infrastructure should be appropriate. Structures must be set back at least 60 meters from the high water mark, but greater set-back distances, e.g. 100-300 meters, are preferred.
- g. Construction of shoreline structures such as sea walls, jetties or other physical structures in the water should be minimized as these structures cause erosion and destruction of coastal habitats.
- h. Allowances must be made for adequate waste disposal measures. Where possible, waste disposal should use existing municipal or regional collection and disposal of waste systems. Liquid waste should not be discharged onto beaches, coral reefs, or other sensitive areas.

(Some parts of this section were adapted from Coasts. Coastal Publication No. 2, Renewable Resources Information Series. S.C. Snedaker, C.G. Getter, Research Planning Institute Inc. in cooperation with National Park Service-United States Department of Interior and United States Agency for International Development)

THE CRM PROCESS
CRM Implementation and Enforcement
Revenue Generation for Water Use Zones and Other Financing Mechanisms for CRM



Revenue generation from municipal water use zones refers to the strategies and activities employed by local government to derive economic benefits from the sustainable use of the various zones delineated within municipal waters. An administrative function or a function of market demand, it is one mechanism that the LGU can tap to finance CRM activities. A combination of other revenue-generating mechanisms are also discussed below.



The generation of revenues serves the following purposes:

1. To set tangible and easily measurable values on municipal water use zones and the resources found in the coastal zone
2. To provide the community with an obvious economic incentive to protect and manage their coastal waters and resources
3. To regulate and limit the extraction of resources
4. To generate funds for the continued implementation of CRM



The financing mechanisms available to LGUs for coastal resource management include:

1. Internal Revenue Allotment – Section 6, Article VI of the Philippine Constitution provides that local governments shall be entitled to a just share in national taxes. At present, local governments are entitled to 40% of internal revenue taxes (Section 284 of the Local Government Code). Of the current 40%, all provinces and all cities are entitled to 23% each; all municipalities, 34%, and all barangays, 20%. For particular local government units, the sharing is determined by applying this formula: 50% based on population, 25% on land area, and 25% on equal sharing (Section 285 of the Local Government Code).
2. Share in Fishery Charges – Local government units shall, in addition to the internal revenue allotment, have a share of 40% of the gross collection derived by the national government from the preceding fiscal year from fishery charges (Section 290 and 291 of the Local Government Code).
3. Grants and Donations – Section 23 of the Local Government Code states that the “local chief executive may, upon authority of the Sanggunian, negotiate and secure financial grants or donations in kind, in support of the basic services or facilities enumerated under Section 17 hereof, from local and foreign assistance agencies without necessity of securing clearance or approval therefor from any department, agency, or office of the national government or from any higher local government unit.” Grants may be sourced from local and foreign sources to

- support water resource utilization and conservation projects and enforcement of fishery laws in municipal waters including the conservation of mangroves (Section 17b21 of the Local Government Code). Sources of these funds are, however, only recently being developed and are not available to all LGUs.
4. Domestic Loans – Section 297 of the Local Government Code provides that a local government unit may contract loans, credits, and other forms of indebtedness with any government or domestic private bank and other lending institution to finance the construction, installation, improvement, expansion, operation or maintenance of public facilities, infrastructure facilities, and the implementation of other capital investment projects. Thus, domestic loans may be contracted by municipalities for infrastructure facilities and capital investment project necessary in the management of coastal resources.
 5. Credit Financing Schemes –
 - a. Bond Flotation. Section 299 of the Local Government Code authorizes municipalities to issue bonds, debentures, securities, collateral, notes and other obligations to finance self-liquidating, income-producing development or livelihood projects pursuant to the priorities established in the approved local development plan or the public investment program. LGUs may avail of this scheme to finance self-liquidating, income-producing development or livelihood projects on CRM. These projects must be incorporated in the municipal development plan and public investment program.
 - b. Public Infrastructure Projects by the Private Sector. Section 302 of the Local Government Code permits municipalities to enter into contracts with any duly prequalified individual contractor, for the financing, construction, operation and maintenance of any financially viable infrastructure facilities, under the build-operate-transfer agreement including infrastructure facilities needed for the effective management of coastal resources.
 6. Income from Development Enterprises and Inter-LGU Cooperation –
 - a. Development Enterprises. Local governments may incorporate development enterprises. These corporations (where income from investments may be derived) may be created to assume projects and programs on the management of coastal resources. These enterprises may be referred to as quasi-municipal corporation or those corporations created by local governments for a specific governmental or proprietary purpose. Even if there is no law specifically authorizing local governments to incorporate enterprises, local governments may still do so pursuant to their broad revenue-raising powers.
 - b. Inter-LGU Cooperation. LGUs may, through appropriate ordinances, group themselves, consolidate or coordinate their efforts, services and resources for purposes commonly beneficial to them (Section 33 of the Local Government Code). In support of such undertakings, the LGUs involved may, upon approval by the Sanggunian concerned after a public hearing conducted for the purpose, contribute funds, real estate, equipment, and other kinds of property and appoint or assign personnel under such terms and conditions as may be agreed upon by the participating local units through Memoranda of Agreement. Income may be derived from such undertakings. Participating or contracting municipalities may undertake joint projects on CRM and derive income from such projects.

Such undertakings may be recognized by the State or the President, which may legally entitle LGUs to some form of national support. In the case of Metro Naga Development Council, an executive order was issued by then President Fidel Ramos recognizing the Council. As a consequence of this recognition, national funds were transferred to finance the Council's projects. From a quasi-municipal corporation, Metro Naga was transformed to a quasi-corporation (created by the State to perform a governmental purpose).
 7. Revenue Generation from Water Use Zones — Local governments may apply taxes, fees or other charges for the use of municipal waters. These include:

- a. Fees for registration of municipal fishers
- b. Fees for license to fish
- c. Fees for license to operate municipal fishing boats
- d. Fees for license for municipal fishing gears
- e. Fees for the management, utilization and exploitation of coastal resources, including marine sanctuary entrance fees, dive fees, etc.
- f. Fines imposed on violators of fisheries and related laws
- g. Fishery charges such as rentals for mariculture.
- h. Taxes on income derived from sustainable use of resources in the multiple use zones.

As in land use zones, municipal water use plans must be developed identifying zones for strict protection (no take zones), sustainable use (limited harvest), and multiple use zones. An appropriate system of taxes, fees, and other charges must be developed depending on the use designated for each zone. The Philippine Fisheries Code of 1998 provides that fees for fishery activity in municipal waters should be determined by the LGU in consultation with the Fisheries and Aquatic Resources Management Councils (FARMCs). Primary uses of municipal waters that may serve as a source of revenue for CRM programs of the LGU may include fishing, mariculture and tourism. The FARMCs may also recommend the appropriate license fees to be imposed.

Few LGUs currently apply taxes, fees or other charges to the use of municipal waters. This is due to the lack of an established CRM plan that zones municipal water use and a tax or fee structure that can apply the relevant economic rent. Generally, the computation of fees is based on the cost of administering the procedure and the cost of conducting surveillance to ensure compliance. Taxes are computed according to the formula prescribed by the Local Government Code. Subsistence fishers (those earning P50,000 and below or the poverty line defined by the National and Economic Development Authority (NEDA), whichever is higher) are tax-exempt.

Rentals should be computed based not only on the socio-political context in which the fishery is operating but also on the total rent generated and the profitability of the fishery. In considering the relative proportion of rent which accrues to the LGU and that which is retained by operators of fishery as profit, an important consideration is to ensure that the fishery remains sufficiently profitable for the operators to encourage reinvestment of profits when required.

Admittedly, it is not easy to assign a measurable, monetary value to a particular resource, product or activity. This is because the “value” of natural resources includes not only the market goods they produce, but also the services and benefits they provide, which are often difficult to measure economically. There are, however, some resource valuation techniques that planners can use to determine how much fees, taxes or rentals should be charged for the use of coastal resources. The most important of these techniques are described below:

1. Conventional or direct valuation methods – these are used when changes in production or productive capacity of a certain good or service can be measured. Here, WTP is taken to equal market price. Surrogate prices and opportunity costs are used in lieu of market prices when non-competitive markets exist.
2. Indirect or hedonic market methods – these involve estimation of environmental functions and indirect economic goods using surrogate prices and construction of hypothetical markets. This technique is often called surrogate price technique because the price of market commodities is “borrowed.”
3. Contingent valuation or methods using surveys to determine potential expenditures or WTP – these determine WTP or willingness-to-accept of individuals for certain environmental goods/services which are not priced. These techniques are also categorized under “constructed or hypothetical” markets, because questions posed regarding some environmental attributes presume that such a market exists.

The annual revenues of coastal resources in a hypothetical bay and the associated costs of management are shown in the table below. The amounts assume a healthy, natural system without major destruction or polluting influences.. The analysis also assumes that all revenues are derived from “management”, which means that without management, revenues would be significantly less or zero. In reality, management is not responsible for all revenues but only an incremental portion dependent on management efforts that prevent degradation and destruction. But this assumption does not make a large difference in the result since without any management, revenues will eventually approach zero.

Annual revenues (values) of coastal resources in a hypothetical bay* and the associated costs of management.		
ANNUAL REVENUES		
Resources	Area (km²)	Potential annual revenue* * (in US\$)
Coral reefs	5	250,000
Fisheries		90,000
Tourism		75,000
Shoreline protection		60,000
Biodiversity		25,000
Mangrove forest	1	120,000
Fisheries		50,000
Wood		10,000
Shoreline protection and other contributions* * *		60,000
Open-water fisheries not dependent on either reefs or mangroves	10	10,000
Total		380,000 (P15.2 million)
ANNUAL COST OF MANAGEMENT		
Staff for community level work (2 persons)		9,000
Training		5,000
Sanctuary maintenance		6,000
Patrol boat and operation		10,000
Information dissemination		2,000
Other		2,000
Total		US\$34,000 (P1.36 million ^a)

^aUS\$1 = 40 pesos in 1998

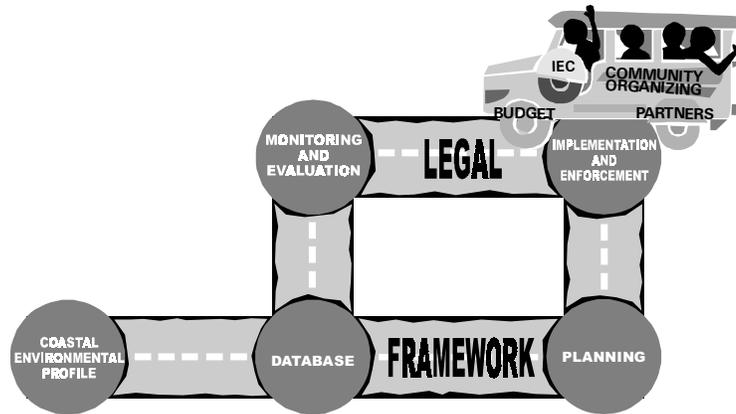
* Assumes a healthy, natural system without major destructive or polluting influences as shown in Figure 6.1.

* * This analysis assumes that all revenues are derived from “management” which means that without management revenues would be significantly less or zero. In reality, management is not responsible for all revenues but only an incremental portion dependent on management efforts that prevent degradation and destruction. But this assumption does not make a large difference in the result since without any management, revenues will eventually approach zero.

* * * This figure is a small portion of the estimates by Costanza et al.³⁵ for shoreline protection, recreation and habitat which has not been estimated for Philippine mangroves.

Source: The Values of Philippine Coastal Resources: Why Protection and Management are Critical. A.T. White and A.C. Trinidad

THE CRM PROCESS
CRM Implementation and Enforcement
Coastal Law Enforcement



The enforcement of laws protecting coastal resources and waters refers mainly to regulation strategies and activities undertaken to ensure that coastal resources and waters are protected and the boundaries of municipal waters are applied as prescribed by law.



To regulate fishing and prevent overfishing, access to fishery resources must be regulated. In the order of priorities prescribed by law, municipal fishers are given the exclusive right to fish in the 0-10 km zone, and preferential if not the exclusive right to fish within 10.1-15 km from the shore in the waters of the municipality where they reside. To protect the right of these fishers, it is important for municipal LGUs to have the capability of enforcing, and to consistently enforce, its municipal water boundaries and protect its coastal resources.



There are several agencies responsible for coastal law enforcement. These are:

1. Philippine National Police-Maritime Command – a maritime police unit within the Philippine National Police which has the authority to perform all police functions “over Philippine territorial waters and rivers, coastal areas from the shoreline to one mile inland to include ports and harbors and small islands of two miles in length or diameter with less than 1,000 population.”
2. Philippine Coast Guard – a civilian agency under the Department of Transportation and Communication mandated to promote safety at sea, assist in the implementation of laws in the high seas and waters under Philippine jurisdiction, safeguard marine resources and environment, and enforce pollution laws. The Philippine Coast Guard is also mandated to enforce coastal and fisheries law under the Philippine Fisheries Code.
3. Department of Agriculture-Bureau of Fisheries and Aquatic Resources – mandated to “enforce all laws, formulate and enforce all rules and regulations governing the conservation and management of fishery resources, except in municipal waters, and to settle conflicts of resource use and allocation in consultation with the NFARMC, LGUs and local FARMCs.”
4. Department of Environment and Natural Resources – exercises jurisdiction over protected areas and has the authority to enforce relevant laws in these areas.
5. Philippine Navy – a major unit of the Department of National Defense mandated to promote maritime security as an armed force as well as assist in the enforcement of fishery laws and laws in the high seas and waters under Philippine jurisdiction.
6. Bantay Dagat – a citizens’ sea patrol organized to deputized by LGUs to monitor fishing activities and enforce coastal laws within their municipal waters. The Bantay Dagat’s

authority to apprehend violators without prior consent or knowledge of the Philippine Coast Guard is based on a provision on citizen's arrest under the Rules on Criminal Procedure.

Boundaries of the municipal waters should be delineated by municipal ordinance according to the definition provided by the Philippine Fisheries Code of 1998:

“Municipal waters include not only streams, lakes, inland bodies of water and tidal waters within the municipality which are not included within the protected areas defined under Republic Act No. 7586 (The NIPAS Law), public forest, timber lands, forest reserves or fishery reserves, but also marine waters included between two (2) lines drawn perpendicular to the general coastline from points where the boundary lines of the municipality touch the sea at low tide and a third line parallel with the general coastline including offshore islands and fifteen (15) kilometers from such coastline. Where two (2) municipalities are so situated on opposite shores that there is less than thirty (30) kilometers of marine waters between them, the third line shall be equally distant from opposite shores of the respective municipalities.”

If the LGU does not have the expertise to determine the exact coordinates bordering its municipal waters, it can seek assistance from the Department of Environment and Natural Resources (DENR), National Mapping and Resource Information Authority (NAMRIA), Philippine Coast Guard, Philippine Navy, private companies engaged in survey and mapping services, or universities.

The Fisheries Code also states that the “municipal/city government, in consultation with the FARMC, shall be responsible for the management, conservation, development, protection, utilization, and disposition of all fish and fishery/aquatic resources within their respective municipal waters.” To accomplish this task, the “municipal/city government may, in consultation with the FARMC, enact appropriate ordinances... in accordance with the National Fisheries Policy.” Such ordinances should be reviewed by the Sangguniang Panlalawigan of the province which has jurisdiction over the municipality or city.

Ordinances enacted by the municipal/city council should be enforced by the LGUs in the municipality/city with jurisdiction over the waters covered by such ordinances. It is the responsibility of the LGU to establish functional mechanisms, such as the Bantay Dagat, for law enforcement.

In the case of bays which straddle several municipalities, cities or provinces, however, management should be undertaken in an integrated manner and should not be based on political subdivision of municipal waters. This will facilitate the management of these bays as single resource systems. The Fisheries Code states that “LGUs which share or border such resources may group themselves and coordinate with each other to achieve the objectives of integrated fishery resource management.”

All fishery-related activities in municipal waters should be utilized by municipal fishers who are listed in the registry of municipal fisherfolk of the municipality with jurisdiction over such waters. Through the enactment of an ordinance, however, the municipal or city government may authorize and permit small and medium commercial fishing vessels to operate within the 10.1-15 km area from the shoreline in municipal waters, on the following conditions:

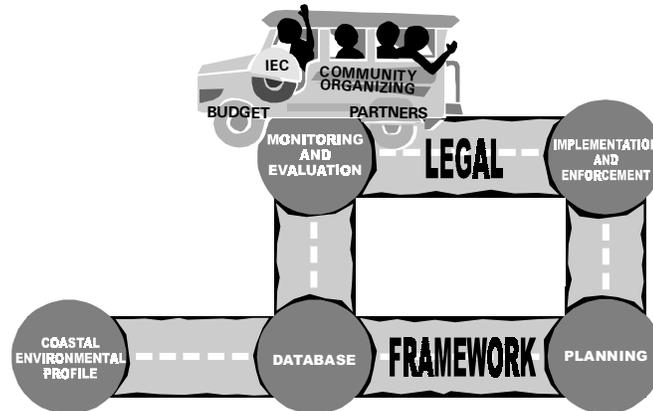
1. no commercial fishing in municipal waters less than 7 fathoms deep as certified by an appropriate agency
2. fishing activities utilizing methods and gears that are determined to be consistent with national policies set by the Department of Agriculture
3. prior consultation, through public hearing, with the M/CFARMC has been conducted
4. applicant vessel as well as the shipowner, employer, captain and crew have been certified by the appropriate agency as not having violated the Fisheries Code, environmental laws and related laws

Such authorization or permit cannot be granted for fishing in bays determined to be in an environmentally critical condition and during a closed season.

Boundary disputes between coastal municipalities should be resolved at the provincial level by the Sangguniang Panlalawigan; the decision of the Sangguniang Panlalawigan may be elevated to the Regional Trial Court.

THE CRM PROCESS

Monitoring and Evaluation Overview



Monitoring is a surveillance system, used by those responsible for a project, to see that everything goes as nearly as possible according to plan, and that resources are not wasted. For CRM purposes, this system provides necessary information about the coastal systems, socio-economic and legal environment in the management area to determine the progress and success of, and identify potential gaps in, CRM plan implementation. The goal for a monitoring program is to detect, with some assurance of reliability, whether significant, environmental, social or economic changes have occurred after intervention.

Basic performance measurement data provided by the monitoring process does not tell CRM planners and implementors why certain results are being achieved or not. To get this information, which is often crucial for decision-making, evaluations must be conducted so that assumptions, cause-and-effect linkages in the CRM program and the emergence of new constraints can be tested. Evaluation involves the review of past conditions prior to plan implementation, assessment of the current situation during implementation and making recommendations to influence future scenarios based on actual experience and conditions. All evaluation studies seek to assess program performance, although they differ markedly in the evaluative criteria used. Two basic types of evaluation can be distinguished: one type focuses on policy-making processes (such as the number of permits issued) and the other type focuses on the eventual outcomes (such as improvement in water quality). Of course, the evaluation may measure both processes and outcomes.



Monitoring and evaluation provide the following:

1. valuable information on program performance
2. analysis of the factors affecting success or failure
3. evaluation of the relevance of concepts, models or assumptions
4. management tool to improve implementors' efficiency and effectiveness
5. an educational process for implementors' self-awareness and understanding of the development process
6. a review process for the revision of the CRM plan



CRM monitoring and evaluation consider implementation at three levels:

1. Operation and performance – the execution of the CRM plan
2. Effects – the outcome of projects and other activities
3. Impacts – the influence on community development

Monitoring is accomplished based on the following basic outline:

1. Identification of expected performance
2. Assessment and/or measurement of the actual performance of the program
3. Establishment of performance variances (e.g. shortcomings or excesses)
4. Procedure for communicating variances that exceed pre-established limits to the appropriate management or enforcing and implementing authorities

Evaluation requires that the following conditions are met before the implementation of the CRM program:

1. an adequate post-implementation time period to allow the program to reach maturity
2. the creation of a set of indicators for measuring performance

A monitoring and evaluation plan must be developed and included in the overall CRM plan. The first step in developing such plan is to seek appropriate indicators for the CRM program's particular objectives. The following guidelines may be used for choosing indicators:

1. Indicators must measure results.
2. Direct indicators should be used whenever possible. Proxy indicators may however be used when it is not practical to gather data for a direct indicator on a regular and timely basis, or when the proxy indicator is a more reliable and valid indicator than an available but flawed direct measure.
3. The indicator should be defined in precise and objective terms so it is easily understood by a wide audience and is not open to varying interpretations.
4. An indicator should measure only one phenomenon so it can be clearly understood and useful for decision-makers.
5. In most cases, quantitative indicators are preferred for performance monitoring, but sometimes, qualitative indicators are acceptable or even preferred.
6. Indicators should be disaggregated whenever disaggregated information is necessary to track an adjust project performance.
7. Indicators should be identified for which data are regularly available and/or permit cost-effective collection.
8. The data should be understandable by its target audience, and it should be possible to establish criteria to distinguish acceptable from unacceptable progress.

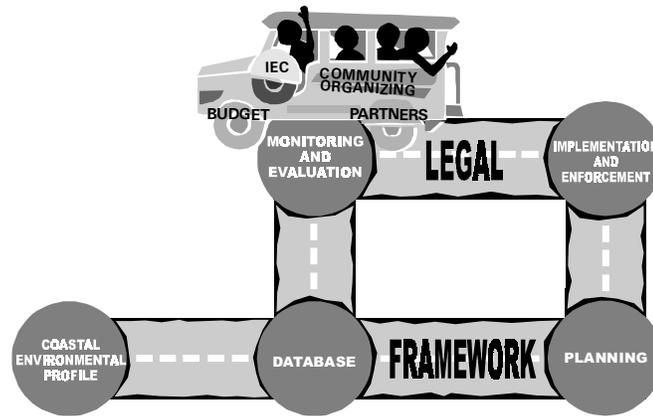
A monitoring and evaluation plan may be implemented as follows:

1. Encourage everyone to participate. Use active rather than passive, practical rather than theoretical methods. Begin with an activity which is of interest to all. Use small groups. Provide meaningful data and information. Facilitate access to more information. Conscientize the group. Engage effective group organizers, leaders, teachers and facilitators.
2. Collect baseline information on the situation in the coastal area before the project starts. The baseline measure establishes the reference point for the start of the plan implementation period. In some cases, planners may have to go back several years to correctly portray the context in which progress will be made.
3. Build on participatory experience.
4. Initiate participatory monitoring and evaluation with a trained field worker for eventual turnover to project implementors. The field worker must exchange ideas and information with group members about the elements of the monitoring and evaluation system, how this can be done, who should be responsible for each part, to whom data might be available, how the data will be used, where the system will be physically based, and when to begin and end the process.
5. Use various tools for collecting information. The main sources of information should be identified and data extracted through surveys, visual checking, accurate measurements, discussion and meetings, questionnaire.
6. Record information on what was agreed and what was done. To be useful, records should be short but informative, and may take the form of minutes of meetings, activities record,

personal diaries, survey forms, accounts, financial reports, timesheets, back-to-office report, summary tables.

7. Record all monitoring data in a database, such as the Municipal Coastal Database (see *Database – Municipal Coastal Database*), to help in evaluation and reporting.
8. Prepare reports for implementors' and external use using the following guidelines:
 - a. Group members are the rightful owners and primary users of the data
 - b. Group members may need help at first in the preparation of reports
 - c. Type of presentation will depend on intended users; for the group, simple tables and schematic presentations may be the most useful
 - d. Use of a series of charts, graphs, numbers or pictures may be needed to show trends over time.
9. Measure program performance against the specific targets identified in the plan for each measurement interval (typically one year) of the program.

THE CRM PROCESS
Monitoring and Evaluation
CRM Plan Review and Revision



The review and revision of a CRM plan is a specific activity under the monitoring and evaluation phase of the CRM process. Plan review is an analytical activity that scrutinizes whether the program and projects embodied in the plan delivered the expected outcomes, both effects and impacts. It makes use of the information generated in monitoring by comparing the information obtained during and after plan implementation with the baseline data. It essentially answers the question: Is what was expected to happen happening?



Reviewing the plan is essential after a year or so of implementation. It helps the implementor see if the programs, projects and strategies embodied in the plan are still relevant and applicable and can still address the issues and problems in the area. It also helps the implementor determine if there is a need to revise the plan to meet the current needs of the locality.



Listed below are some guidelines for revising and reviewing CRM plans:

1. Encourage the participation of the coastal community (stakeholders) in the review and revision of the plan.
 - ◆ Use active rather than passive, and practical rather than theoretical methods. Involve all stakeholders and assign tasks which ensure that everyone is given the opportunity to take part in the process.
 - ◆ Begin with an activity which is of interest to all
 - ◆ Use small groups for focus discussions
 - ◆ Provide meaningful data and information
 - ◆ Facilitate access to additional information
2. Baseline information on the coastal area is needed to compare what the situation was before the implementation of the plan and how it has developed since the plan was implemented.
3. Build on participatory experience to meet the groups' needs, monitoring and evaluating the relevance, efficiency, effectiveness and impact of their inputs and activities.
4. Different tools and methodologies can be used in reviewing the plan. These include:
 - ◆ surveys
 - ◆ visual checking
 - ◆ accurate measurements
 - ◆ discussions and meetings
 - ◆ questionnaire

5. A technical working group, composed of representatives of major stakeholders, can be formed to conduct community consultations to ensure that suggestions and insights of the people are properly addressed. The working group shall prepare the revised plan and submit to the Local Chief Executive, Local Development Council and Local Legislative Council for appropriate action.

ACTIVITIES TO SUPPORT CRM

Overview



CRM is implemented in a continuum of inter-related and interlinked activities, some of which do not necessarily directly address but nonetheless contribute significantly to and support the promotion of sustainable use and management of coastal resources. Activities implemented to support CRM include community organizing;; information, education and communication (IEC); building partnerships for CRM; and cost-benefit analysis for coastal management activities.

It has been said often enough that CRM is not just about managing coastal resources, but also about managing those elements that directly affect the coastal environment. The most crucial of these elements is the human element. More than anything, it is humans that impact our coastal environment, humans who decide how our coastal resources are going to be utilized, humans who benefit from these resources, and humans who stand to lose if these resources are dissipated. It is for this reason that CRM requires community organizing, IEC, partnerships and financing for coastal management activities to not only increase the stakeholders' and the general public's awareness and understanding of coastal issues but also to equip them with decision-making know-how and tools and thus empower them to actively participate in CRM and seek, identify and apply appropriate solutions to problems related to coastal resource use and management.

ACTIVITIES TO SUPPORT CRM

Community Organizing



Community organizing is a process by which a community empowers itself by working to identify its needs and to resolve its problems in a collective manner. This process develops the confidence and capability of community members to organize themselves. By “community” we mean all members of the different sectors with interest in the coastal environment, including subsistence fishers, commercial fishers, farmers, the local government and others such as those in the shipping and tourism industries. Often, however, subsistence-level fishers are the most affected by CRM issues and need the greatest assistance. Generally, therefore, it is the subsistence-level fishers who are the main focus of community organizing efforts.



Community organizing is undertaken to achieve the following:

- ♦ Increase the coastal community’s awareness of the condition of their environment and resources and their collective responsibility to manage the environment at a sustainable level.
- ♦ Develop in people a sense of ownership over the resources, and help the community recognize their part in the problem and take collective responsibility for managing and protecting these resources.
- ♦ Provide opportunities for local participation that involves men and women making decisions and taking action using the CRM process of problem identification, planning, implementation and monitoring.
- ♦ Strengthen the community’s capability to access funds to support viable and sustainable socio-economic projects.
- ♦ Enable the community to form alliances for advocacy and sharing of resources and technologies
- ♦ Build and sustain organizational structures for coastal resource management
- ♦ Provide the social preparation required by other CRM participatory tools



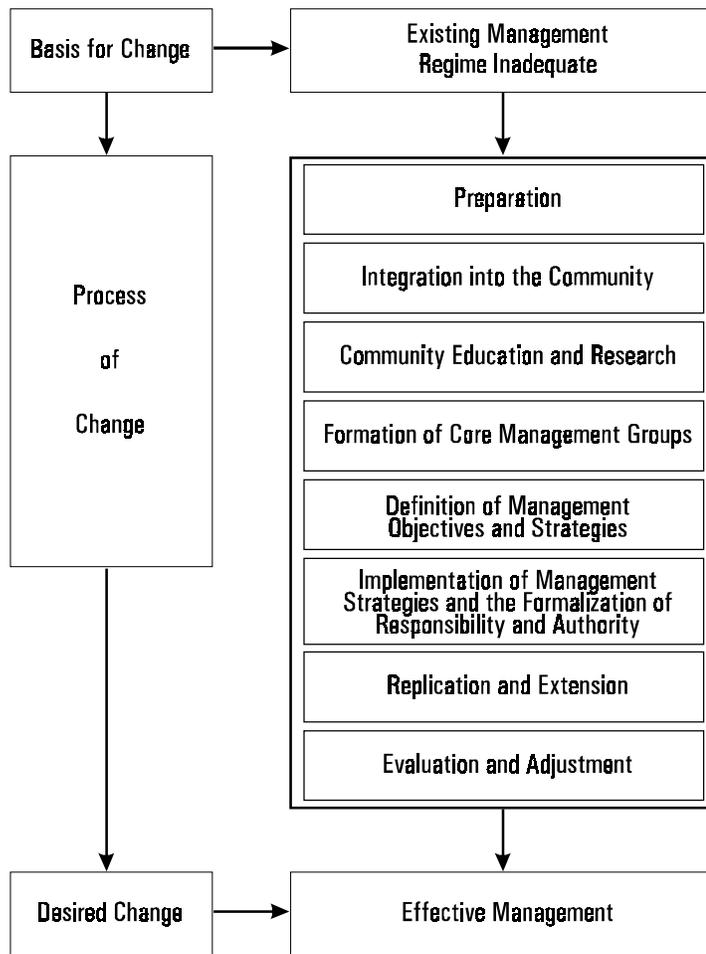
The CRM process is best facilitated through effective community organizing. Though community organizing is primarily the responsibility of the community worker or organizer (CO), it is in the end a collaborative effort among all members of the community. The ultimate aim is to “upskill” and empower the community so that they are able to manage and protect their coastal environment on their own.

As the key player in the community organizing process, the CO serves as a “bridge” between the community and those who want to help that community. He or she should have the following:

- ♦ A clear grasp and understanding of the different theories of development
- ♦ Familiarity with the concept and processes of community organizing
- ♦ Social and community relationship skills
- ♦ In the context of organizing for CRM, the ability to work with other teams of professionals involved in the management of marine and coastal resources.

There are six major stages in the community organizing process. These are:

1. Social Preparation — involves building awareness in the community about the importance of CRM. It includes activities which are undertaken *before* the entry of the CO into the management area:
 - ♦ Training of the community organizer in CRM principles
 - ♦ Establishment of criteria for site selection
 - ♦ Gathering of secondary data
 - ♦ Logistics and administrative preparations
2. Integration — the CO moves into the area and immerses himself or herself in community life in order to gather, from community members themselves, the information he or she needs to organize the community. Activities include:
 - ♦ Courtesy calls on community leaders to seek support for CRM
 - ♦ Data gathering using participatory approaches
 - ♦ Identification of existing and potential leaders
 - ♦ Formation of a CRM core group
 - ♦ Evaluation of the activities of CRM core group.
3. Mobilization — includes:
 - ♦ Community planning and implementation (organizing fishers associations or cooperatives)
 - ♦ Leadership formation training and team building
 - ♦ Cross-visits to successful CRM areas
 - ♦ Economic and livelihood generation projects
 - ♦ Conflict resolution and problem-solving
 - ♦ Skills training and development in CRM
 - ♦ Establishment of resource management structures to serve as a framework for the implementation of the management area
 - ♦ Advocacy and social mobilization to rally support for CRM
 - ♦ Formalizing the CRM organization to pave the way for legislation for CRM
4. Organizational Strengthening — involves:
 - ♦ Training of leaders and trainers in community organizing
 - ♦ Networking and building alliances with other organizations
 - ♦ Strengthening socio-economic services and organizations
5. Evaluation and Monitoring — Evaluation involves the review of past conditions prior to plan implementation, assessment of the current situation during implementation and making recommendations to influence future scenarios based on actual experience and conditions. Monitoring is a surveillance system, used by those responsible for a project, to see that everything goes as nearly as possible according to plan, and that resources are not wasted. Results are used for planning and decision-making.
6. Phase-out/Termination Phase — that stage when the goals set by the community and the CO have been achieved and the CO starts to withdraw from the community. A formal community turn-over may highlight the “phasing out” of the CO from the community.



Framework for Community-Based Marine Resource Management

(Adapted from: Collaborative and Community-Based Management of Coral Reefs Lessons from Experience. A.T. White, L.Z. Hale, Y. Renard, and L. Cortesi (editors). Kumarian Press, Inc. 1994)

ACTIVITIES TO SUPPORT CRM

Information, Education and Communication



Information, Education and Communication – IEC – is a process through which knowledge is imparted to coastal communities to increase their awareness, understanding and appreciation of the coastal environment and its importance. It introduces various ecological concepts and principles as they relate to environmental issues experienced by the community. It enables the community to further explore these issues and take the appropriate action to address them.

IEC is ideally a transformative and normative process, one built around those activities designed to help create an environment conducive to the transformation of social norms, a crucial step to changing individual behavior in favor of the objectives of CRM. It is focused on building a constituency for CRM, a critical mass – 10-30% of the population – that is environmentally literate, imbued with environmental ethics, and prone to environmental advocacy and action.

By its very nature and objectives, the IEC process must be highly participatory, inclusive, and “connective” – it must connect constituents to leaders, constituents to other constituents, and leaders to other leaders, so that they not only share information and knowledge but, more importantly, form a community of shared values, shared responsibilities, and shared actions.



IEC is an important component of CRM and must be a continuing process throughout the program cycle. It promotes the participation of community members by providing them with the information, knowledge and understanding to make sound decisions and formulate effective strategies for CRM. It allows the ventilation of issues and provides concerned citizens the opportunity to advocate policy and structural reforms for CRM to local and national officials and other people in and outside their community. At the early stage of the CRM process, IEC can help build consensus that a set of problems needs special attention and an integrated approach; clarify perspectives and local interests that have to be considered in resolving specific coastal issues; and generate a receptive political and social context for changes in policy. Over the long term, IEC supports the CRM process by:

1. Creating positive change in the values and behavior of individuals and the community, particularly in their perception and relationship toward the natural environment
2. Maintaining behaviors which are “friendly” to the environment
3. Moving the community to actively participate in conservation and resource management and resource management programs
4. Enabling the community to assert their right to use and manage their resources and the benefits that can be derived from these resources.



Four major interlinked approaches may be used to implement IEC. These are:

1. **Social Marketing** – This approach focuses primarily on getting the community and their leaders to buy into the idea of participating in and supporting the CRM process. Using common social marketing tools –special events, advertising, media advocacy, school programs, public relations techniques, celebrity endorsements, etc. – the key strategy is to grab people’s attention first and then deliver a message that will hold their attention, gain their support for CRM, and even move them to action. This is more imperative now than ever, when CRM issues must compete against countless other burning social, economic and even other environmental issues fighting for public notice.
2. **Social and Community Mobilization** – This approach uses public participation techniques to inform and educate the community about CRM and communicate to them its principles and importance. Through participation, people not only learn about CRM but are also exposed to CRM and other environmental issues and get the opportunity to interact with others involved in the process. This way, IEC fosters cooperation among the various coastal stakeholders, a crucial ingredient for success in CRM. Among the public participation vehicles commonly used for IEC purposes are study tours, workshops, public hearings and meetings, advocacy campaigns, committees, community patrols, citizen monitoring/watchdog groups, special projects (mangrove tree planting, cleanups, etc.), and school programs.
3. **Development and Program Support Communication.** This refers to the development, production and dissemination of IEC materials (print, video and other media) for use in the CRM process. Materials commonly produced for CRM purposes are brochures, short publications, audio/visual materials, posters, materials for use by mass media (press, radio, TV), and newsletters. Ideally, the communication is two-way, that is, information is both provided to and by the community. The community should be taught and encouraged to keep a logbook, which can provide chronological records that may be useful for establishing trends, documenting violations of local ordinances, or substantiating advocacy campaign. Other sources of local information for use in the production of IEC materials would be the coastal environmental profile, case studies and process documentation reports.
4. **Institutionalization** – This approach directly addresses the need for ensuring the sustainability of the CRM process. Using the different approaches just described, an IEC program can, in a deliberate manner, push for the adoption by social, economic and political institutions of the principles and systems that will ensure the continuous, long-term implementation of CRM. Through advocacy, for example, IEC can help in the campaign for policy, educational and legal reforms at both the national and local levels to create an environment conducive to CRM. Through public education, it can help catalyze social transformation by establishing a new set of “environment-friendly” values and norms for the most basic and yet most important of all social institutions: the family.

ACTIVITIES TO SUPPORT CRM

Building Partnerships



Building partnerships in CRM is a process that seeks to mobilize the resources and energies of various players and sectors toward achieving a common goal of CRM, that is, to empower coastal communities in managing and sustainably developing their resources. The process is integrative and cuts across the different sectors, bringing together various groups with diverse roles to work for a common goal.

A partnership can be forged between two or more parties and, depending on the partnership's basis of unity, could extend membership to other stakeholders.



The process of building partnerships in CRM offers the following benefits:

1. It can create a development environment that is supportive of the principles and processes of CRM. The partnership can be a venue to scale-up programs and push for local policy reform.
2. It fosters dialogue and understanding among various sectors of the community and brings them to a consensus on certain principles, issues and resolutions relating to a particular resource or the coastal environment in general.
3. It builds on the unique strengths of various organizations toward the achievement of a common goal.
4. It mobilizes resources and funding for implementing CRM programs and activities



Partnerships can be built around a single activity or issue or around strategic concerns like managing and developing a whole coastal zone. They can be short-term, or they can be developed and nurtured for a long period of time, for as long as the principles and/or programs that unite the partners hold true. The nature of the partnerships can evolve and change over time. In the Philippines, partnership building is usually initiated by a non-governmental organization or a community-based organization.

The approaches to building partnerships in CRM are as diverse as the development environment in a particular area. They can also be as flexible as the creativity and sensitivity of the people initiating the partnerships would allow. The life that the partnerships will take on will largely depend on the partners themselves.

The basic steps in initiating a partnership are as follows:

1. Identification of key development players or stakeholders in the community. These are persons or institutions whose interests and actions can significantly affect a particular resource. They may include members of the fishing community, local government, national government agencies, business community, academe, religious organizations, and other organizations present in the area.

2. Gathering background information on identified potential partners. A cultural analysis and identification of the interests, agenda, strategies, key persons, strengths and weaknesses of potential partners and their relationship to other players can provide an insight into the dynamics and relationships of these groups.
3. Dialogue with each of the potential partners. This is done to explain the vision, goals, strategies, and processes of the organization undertaking the CRM process. The dialogue is a good opportunity to discuss the prospect of getting other institutions involved in the program and assess how receptive the potential partners are to the proposed program.
4. Initial consultation-workshop with key players. This can be a way to introduce the organizations and their programs and projects in the community and get feedback from the participants about their interest in joining the partnership. A matrix of programs and efforts showing who does what in the area can be developed to help partners identify common programs and projects.
5. Strategic planning workshop. This can start with an environmental scanning or an assessment of the local environment, with the participants themselves identifying and analyzing issues and problems. It is important that participants agree on a common framework or set of principles with which to analyze common issues and eventually agree on the solutions.
6. Establishment of a coordination mechanism. One possible setup is a council where representatives from each partner organization is represented. The council serves as the policy and decision-making body of the partnership. The Fisheries and Aquatic Resources Management Council (FARMC), the creation of which is mandated by the Philippine Fisheries Code of 1998, is a good example of such setup. The FARMC is composed of representatives from the local government unit, non-governmental organization, private sector, the Department of Agriculture, and fishing sector.
7. Commitment-sharing ritual. The consultation workshop can close with a ritual of commitment sharing and signing of memorandum of agreement or terms of reference defining the partnership's basis of unity and the roles and commitment of each partner.

(Adapted from Building Partnerships in CRM, Participatory Methods in Community-based Coastal Resource Management, International Institute of Rural Reconstruction, 1998)

ACTIVITIES TO SUPPORT CRM

Investing in CRM



LGUs must allocate a specific and adequate budget to finance CRM. The budget for CRM provides for personnel, capital outlay, maintenance and operations, and projects. The amount of investment by the LGU that is necessary will depend on the area and resources to be managed.



As in any activity, business or operation, investment is required to sustain economic benefits. The same is true for coastal resources.

One way to encourage investment in improved management, protection and support for natural coastal ecosystems is to place economic values on their presence, products and uses. As a society, we tend to value money and we understand costs and benefits in monetary terms. Resource valuation is thus an essential component of sustainable development. To assess options for resource management, the decision maker needs to be provided with complete and accurate information on the potential impacts of these decisions. The traditional approach was to conduct financial and economic cost-benefit analysis of “priced” goods and services. Natural resource inputs were ignored because scarcity was not an issue and because of the difficulty of assigning values to these services and functions.

Resource valuation provides an interface between economics and the physical sciences such as ecology, engineering or agronomy. While the hard sciences provide the physical relationships, economics provides the concepts and methods behind the valuation process. This enables biophysical goods and services to be reduced to a common unit understood by all stakeholders: money.

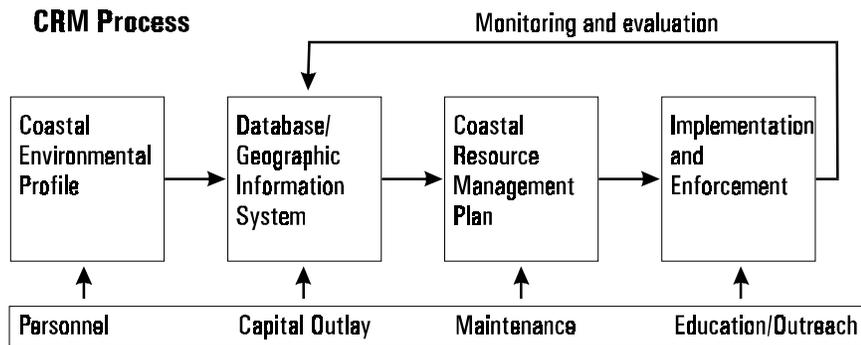
One of the main reasons for valuing benefits of coastal resources is that once we are able to quantify the benefits derived from the resources, we can perform a benefit-cost analysis of the intervention being proposed to manage or protect the resource. Cost:benefit analysis can give valuable insights into the economic efficiency of management and regulatory actions. The more benefit exceed the costs, the better off society is in economic terms as a result of the activity. The tradeoff of protecting and managing coastal resources with the alternative of not managing the resources and allowing them to be destroyed can also be evaluated using cost:benefit analysis.



The question to be answered in drawing up a budget for CRM is what level of investment in management and protection of natural coastal resources is warranted given the value of these resources to local resource users. Indeed, why should we invest in CRM? There are at least three very important reasons for investing in CRM:

- Biodiversity conservation – the Philippines harbors some of the richest tropical marine biodiversity in the world
- Food security – 50% of the Filipino’s dietary comes from the sea; in some rural coastal communities, up to 80% of the animal protein may be supplied by fish caught in municipal waters
- Economic benefits – the Philippines derives estimated annual benefits amounting to more than Php 140 billion from coastal resources.

What is the investment used for?



How much investment is needed?

The estimated budget requirements associated with managing municipal waters is provided by the example of a hypothetical municipality at Php1.36 million per year. With an average length of shoreline of 22 kms, the unitized management costs would be approximately Php63,000 per km of shoreline per year.

Alternatively, assuming that the municipal water boundary of the hypothetical municipality extended the full 15 km distance from the shoreline, the area of municipal waters would be approximately 330 sq km and the management costs could be unitized at Php4,121 per sq km of municipal waters per year as shown in the table below.

Economic basis	Est. Annual Benefits (Php)	Est. Annual Mgt Costs (Php)	MW Area (km ²)	Mgt Cost/km ² MW/year
Municipal (hypothetical)	15.2 million	1.36 million	330	4,121
National (1996)	140.56 billion	2.8 billion	287,521	9,777

Some of the financing mechanisms applicable to CRM are presented in the section on “CRM Implementation and Enforcement – Revenue Generation from Water Use Zones and other Financing Mechanisms for CRM.”

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