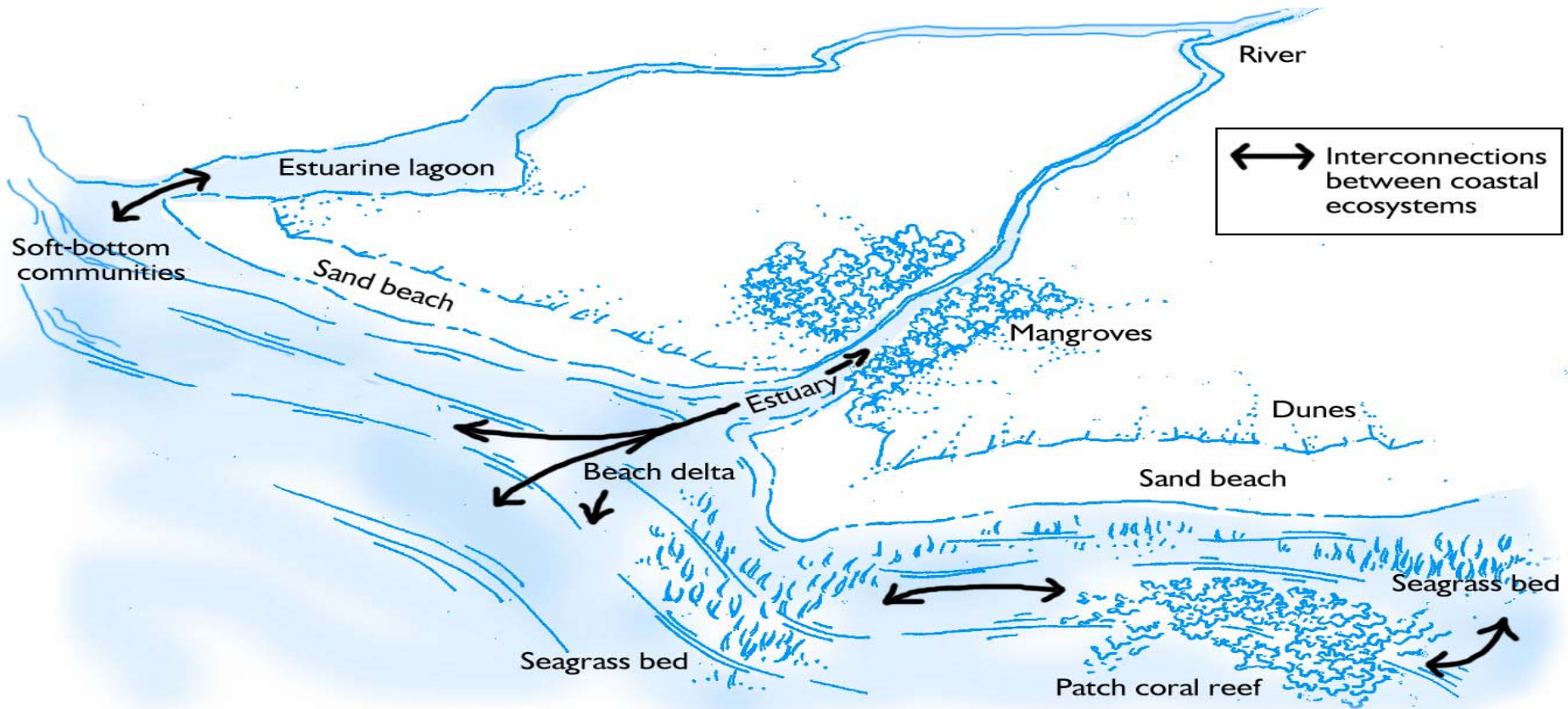


# Introduction to Coastal Ecosystems and Reef Fisheries



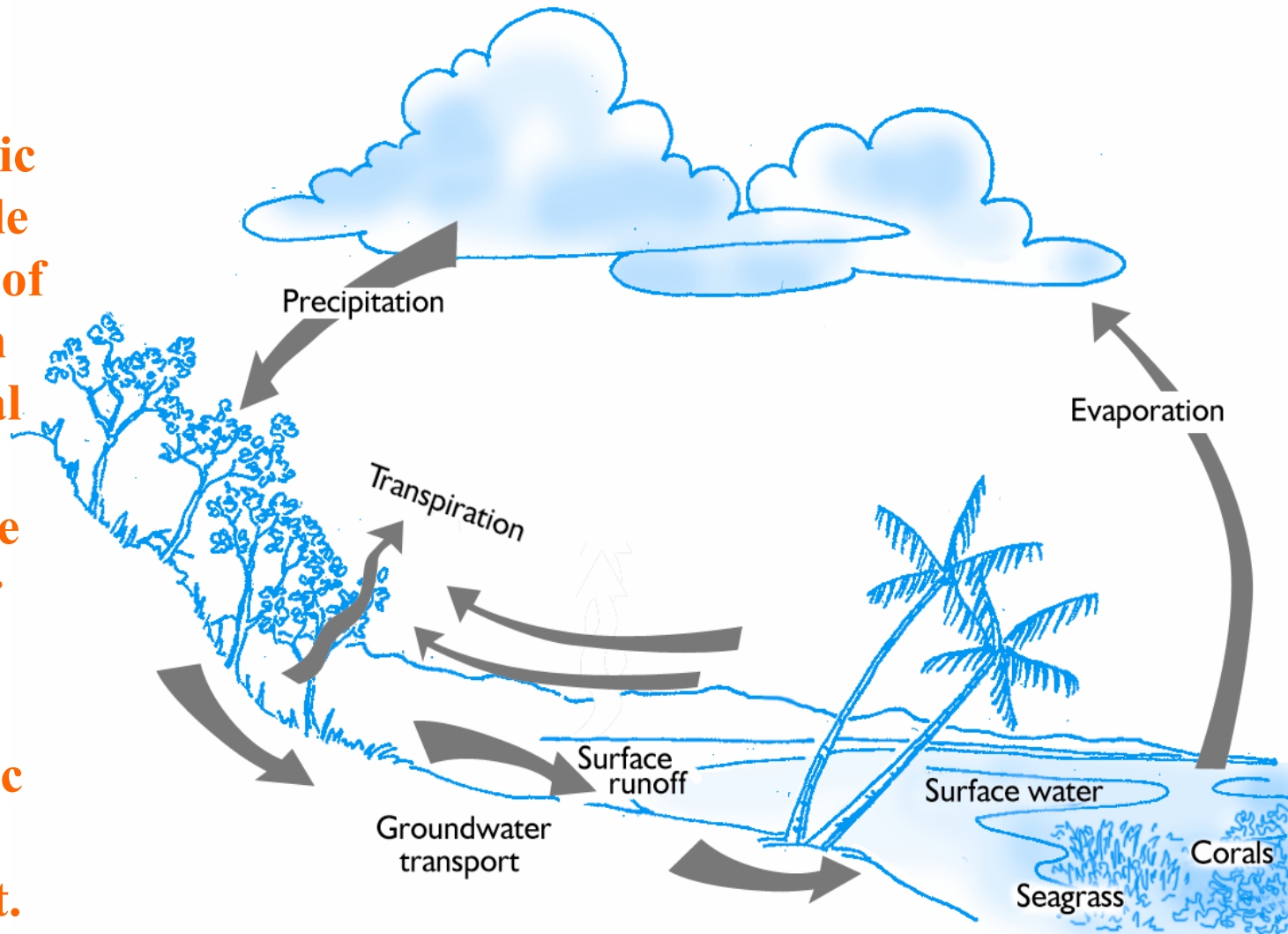
# Important coastal ecosystems and habitats



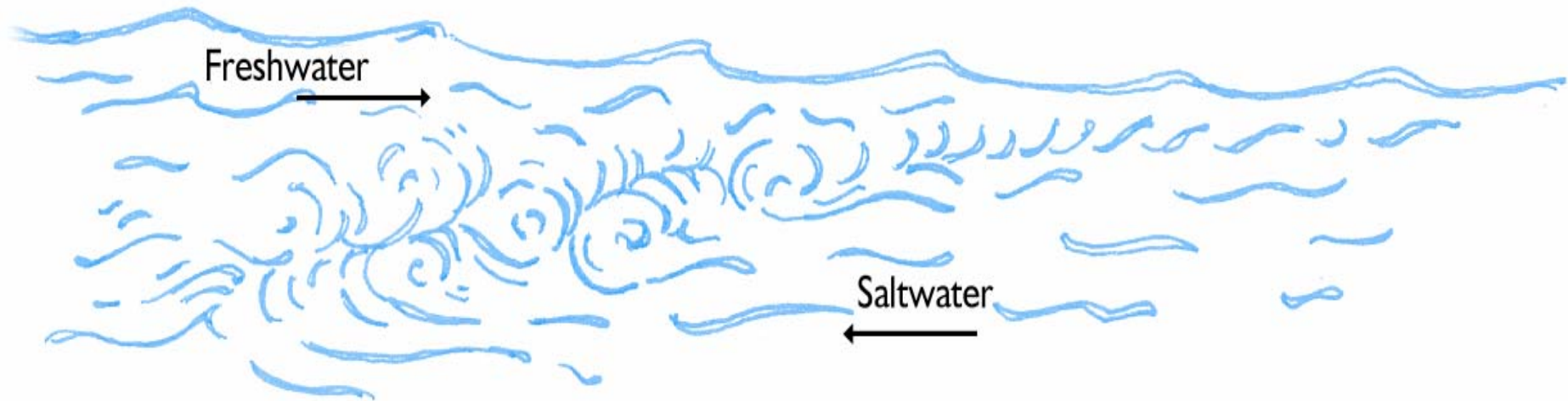
The various ecosystems are interconnected, each plays a critical role in maintaining the viability and health of the entire coastal zone as the other ecosystems.

# The hydrologic cycle

The Hydrologic or Water Cycle is the passage of water through earth's natural systems. As it passes over the ground, water collect sediments, nutrients, toxic compounds, trash and heat.

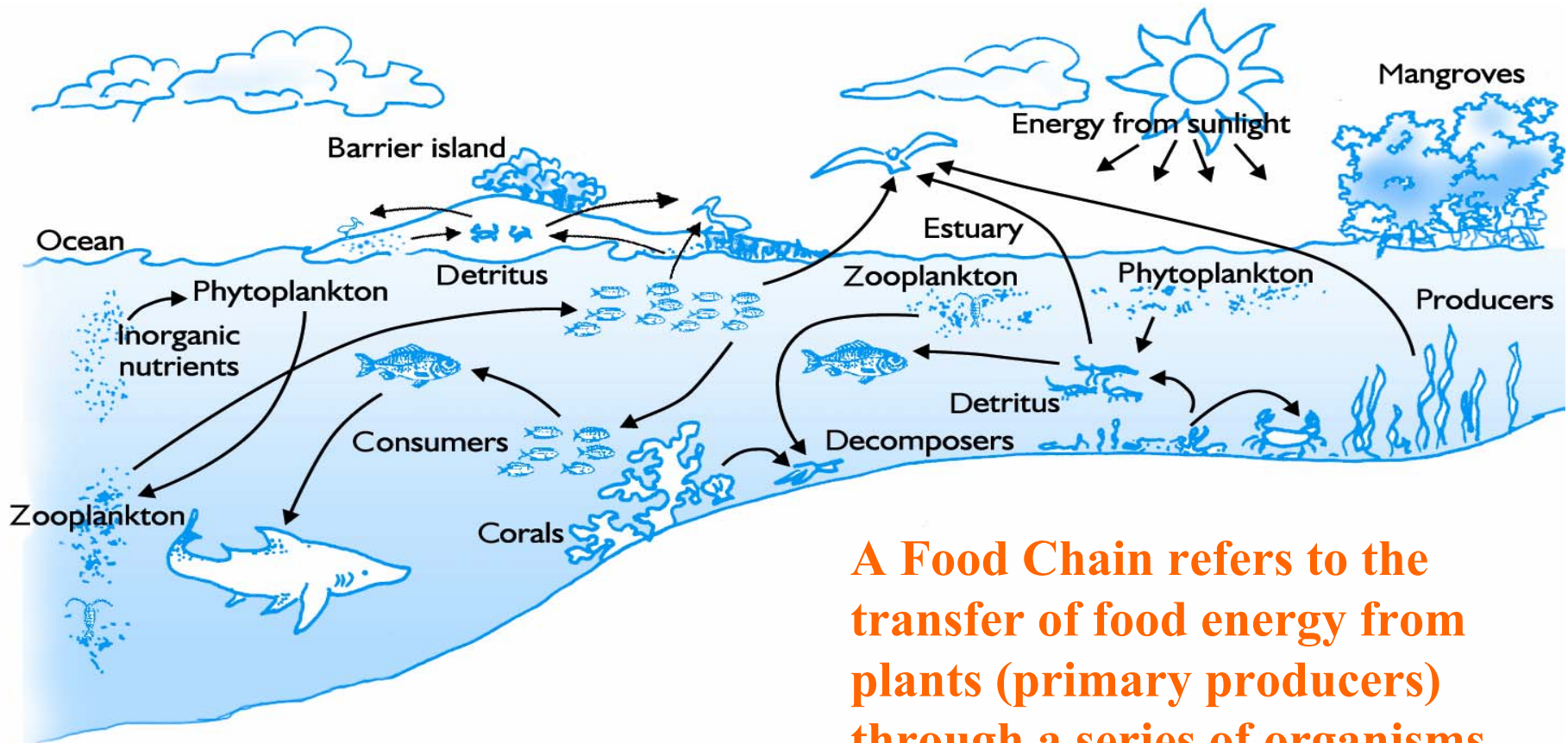


# Freshwater entrains saltwater to enhance mixing in an estuary



The mixing of freshwater and saltwater provides a inward flow of nutrients-rich water that promotes growth of estuarine primary producers.

# The food chain or food web of the coastal ecosystem



**A Food Chain refers to the transfer of food energy from plants (primary producers) through a series of organisms eating one another.**

# Relationship of mangrove, seagrass and coral reef ecosystems

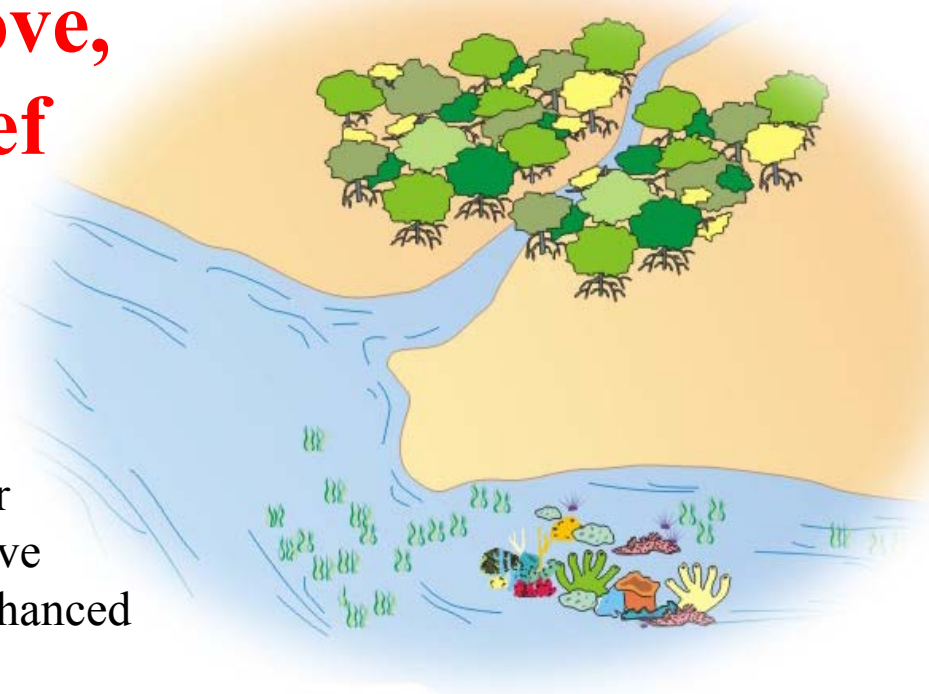
## 1. *Physical interactions*

Seagrasses and mangroves are highly dependent on the hydrodynamic barrier created by coral reef, which reduce wave energy. The growth of seagrasses is enhanced when these barrier are present

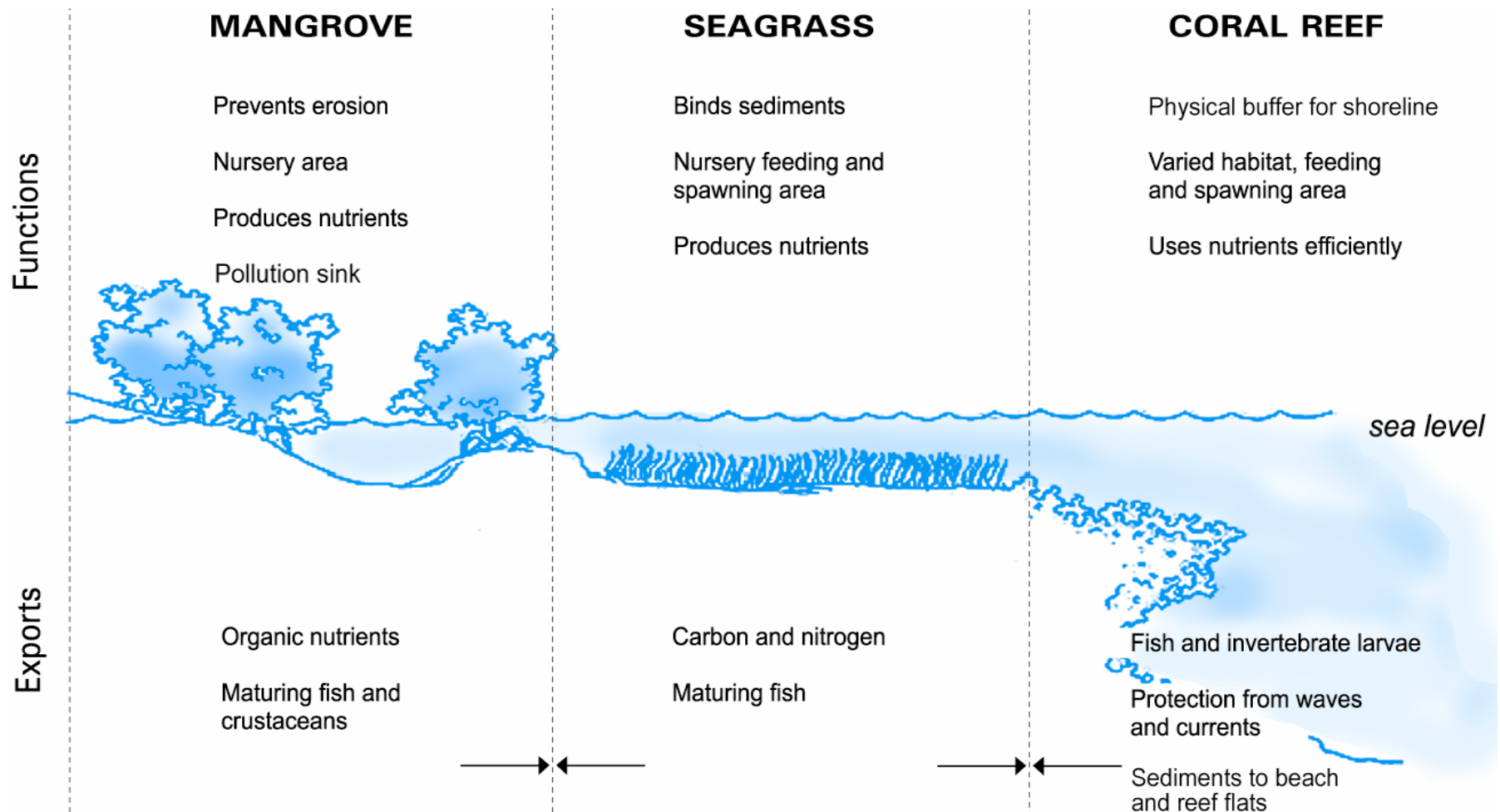
Coral reefs are active producers of carbonate materials. Large amounts of this materials are broken down and washed ashore. These materials form shoals, and islands that may be eventually colonized by seagrasses and mangroves.

Seagrasses on the other hand, trap and stabilize sediments, which is important to coral reefs. Trapping and stabilizing sediments reduces sediment load that could cover the reefs particularly when there is typhoon.

Mangroves act as a depositional basin and are effective binders of sediments. As a result, the sediment load into the coastal waters is reduced. They also reduce the freshwater inflow into the marine environment.

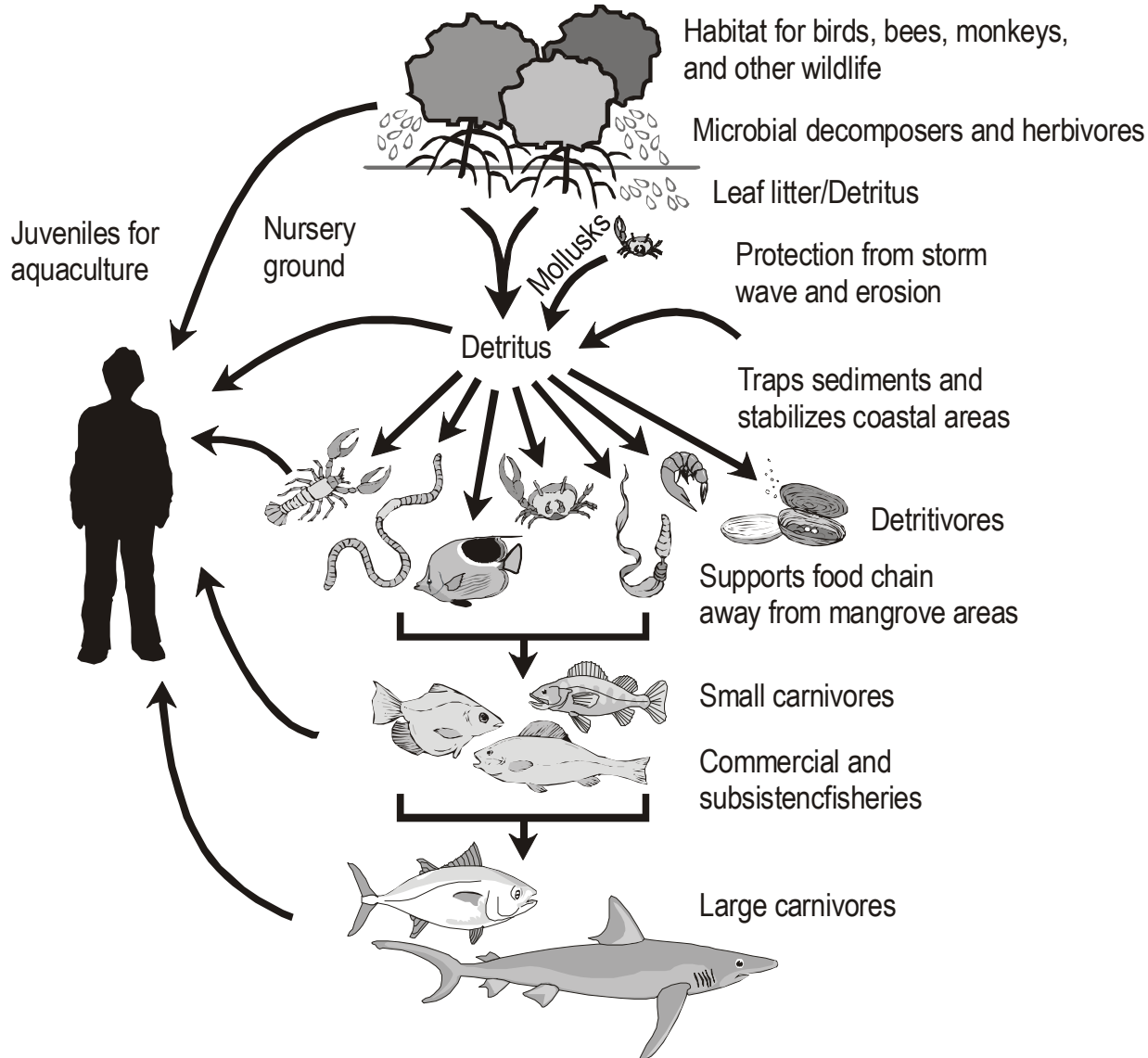


# Exchange of mutual benefits among mangrove, seagrass, and coral reef ecosystems





# Mangroves and their ecological and economic benefits



## Benefits to humans:

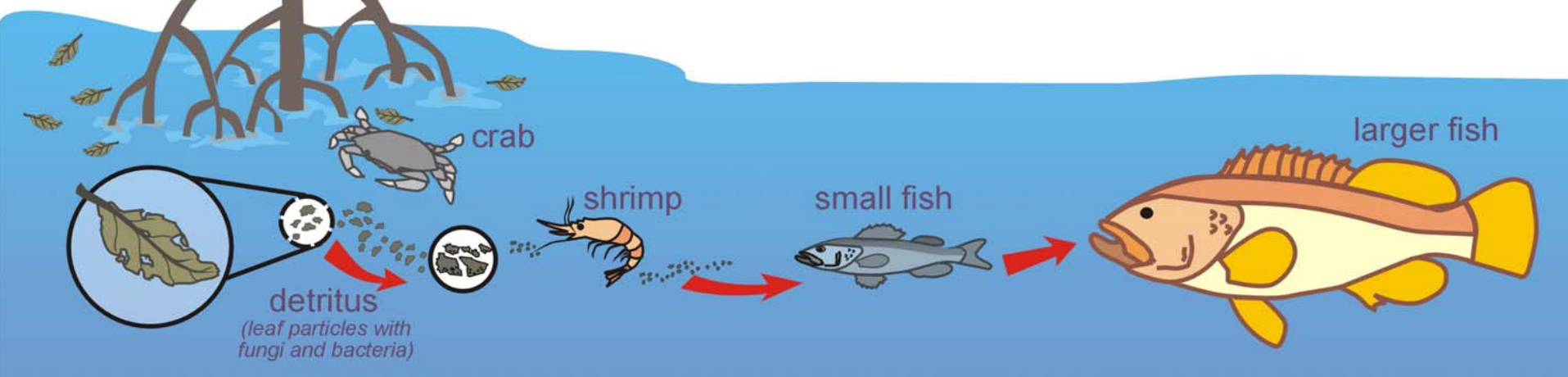
- Clean water
- Fish, shellfish, mollusks, etc.
- Medicines
- Tannins
- Wood (fuel and construction)
- Honey
- Alcohol
- Shore protection
- Research data
- Education
- Recreation/tourism
- Biodiversity



falling leaves

- ❖ One hectare of mangrove trees produces up to 3.6 tons of litterfall annually
- ❖ One hectare of healthy mangrove ecosystem produces about 1.08 tons of fish per year

(Schatz 1991)



detritus  
(leaf particles with fungi and bacteria)

crab

shrimp

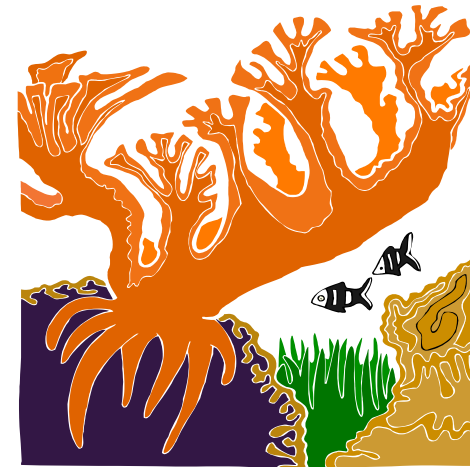
small fish

larger fish

## 2. *Nutrient transport*

Inorganic nutrients particularly phosphorus and nitrogen are essential to the primary producers in the three ecosystems. However, their requirement varies. Mangrove can tolerate high nutrient input. Seagrasses tolerate high rates of eutrophication. Coral reefs recycle nutrients and do not tolerate large inflows from other sources. Corals grow best in low nutrient areas.

Mangrove and seagrass ecosystems export nutrients as dissolved and particulate organic matter that nourish some of the coral reef organisms.



## 3. *Animal migration*

Two types of migration that exist in these ecosystems.

- Short term feeding migration - this is exhibited by animals such as turtles, grunt, and snappers that feed on seagrasses and mangroves during the day and return to coral reefs during the night for shelter.
- Life history migration between systems as exhibited by lobster. After spawning, lobster larvae are carried by currents and waves into the shore. The larvae settle among the roots of mangroves and in seagrass beds. As juveniles grow, they move back to coral reefs, where they generally hide during the day and emerge at night to feed.

## 4. *Human impact*

### **Mangrove**

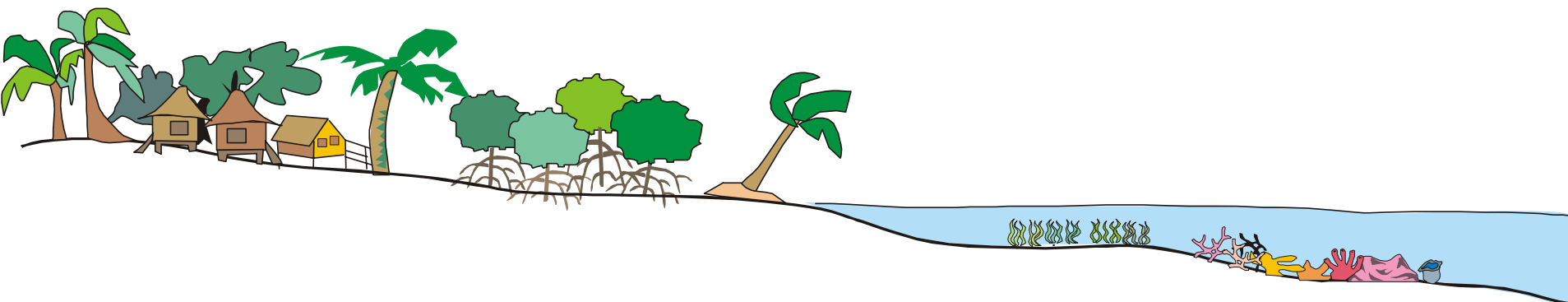
In case of riverine mangroves, destruction will allow terrigenous sediments to flow onto seagrass beds and coral reefs. There will be an excessive outflow of sediments that will cause shading and eutrophication.

### **Seagrass**

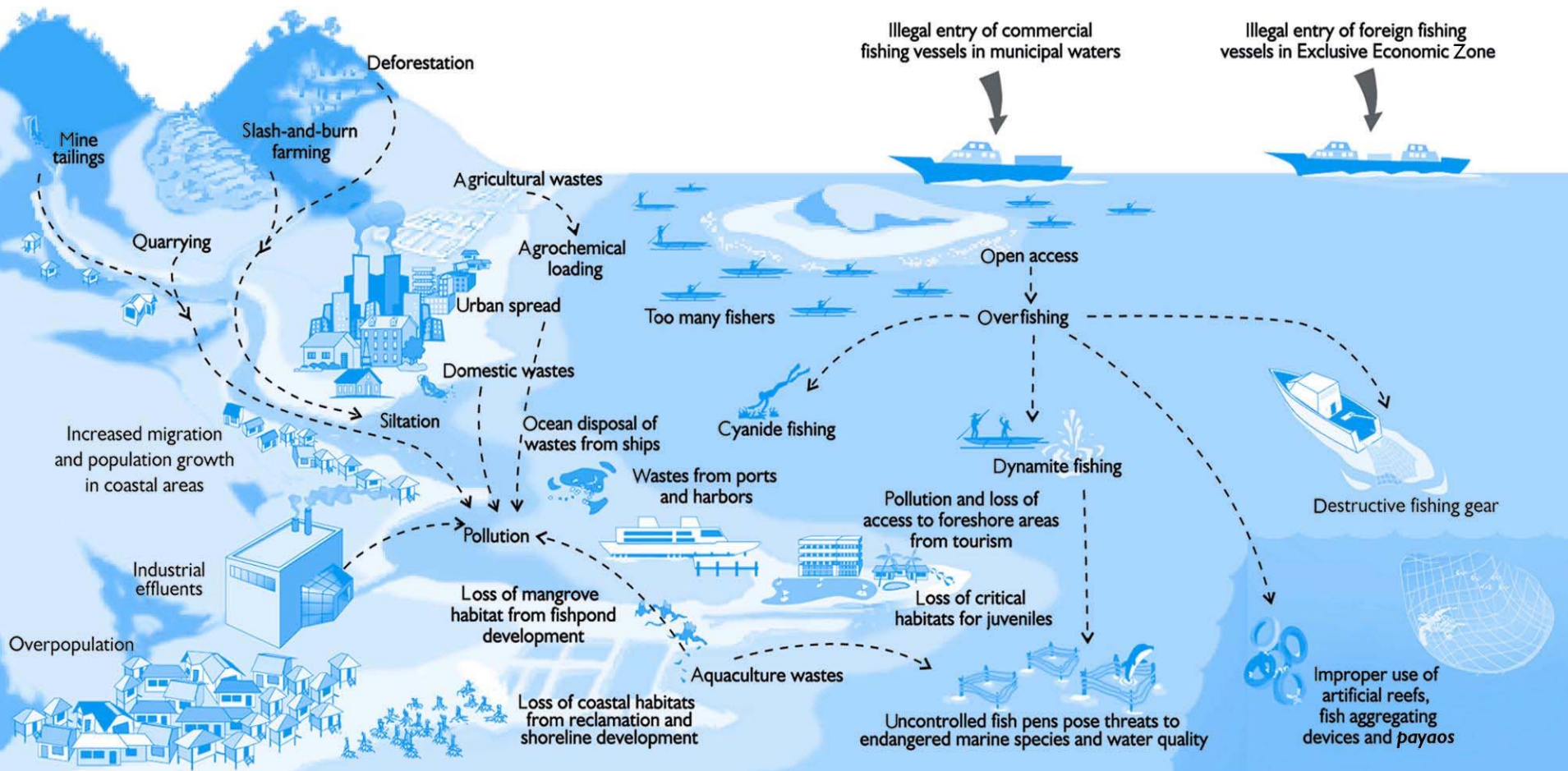
Sediments may become unstable with removal of seagrasses. This has deleterious effects on coral reefs, mangroves and adjacent seagrass beds.

### **Coral reefs**

Actual removal of the reef framework will lower protection from wave energy and allow erosion of sediments from the coastal zones.



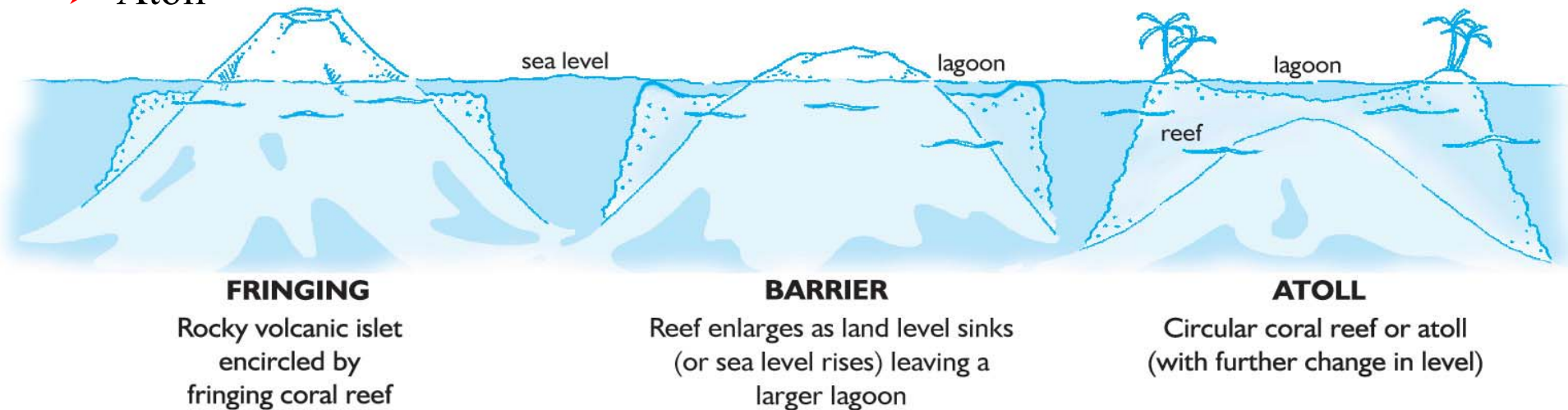
# Varied economic activities and their associated impacts that occur in the coastal zone



# Biology of corals

## Reef types

- Fringing Reef
- Barrier Reef
- Atoll



## Food

- Organic nutrient excreted by zooxanthellae and from their prey. (Algae supply 98% of the food consumed by corals)
- Inorganic nutrients absorbed from the sea and food captured by coral polyps and zooxanthellae (phosphates, nitrates, iron)

## Growth

- Massive reef structures are built over thousands of years by tiny coral polyps aided by minute dinoflagellate algae (zooxanthellae) that live their tissues, calcifying algae, and other organisms that secrete calcium carbonate and adhesives. This process of reef formation is heavily dependent upon photosynthesis by these reef-building organisms.
- Acropora (*A. hyacinthus*) can grow 10 cm/yr.; Branching colonies of staghorn, 15c cm/yr. Massive colonies (8 m in height, nearly 1000 years old).
- Corals thrive best in depths 0-20 m, rarely found > 40 m; maximum 35° C water temp.



## Reproduction

- Asexual duplication or sexual reproduction
- Individual polyp bail-out and develop into new colony
- Daughter polyp develop when stress (in *Fungia*)
- Corals having gonads of both sexes may fertilize themselves
- Male release sperm to females for internal fertilization
- Male and female gonads are released for external fertilization

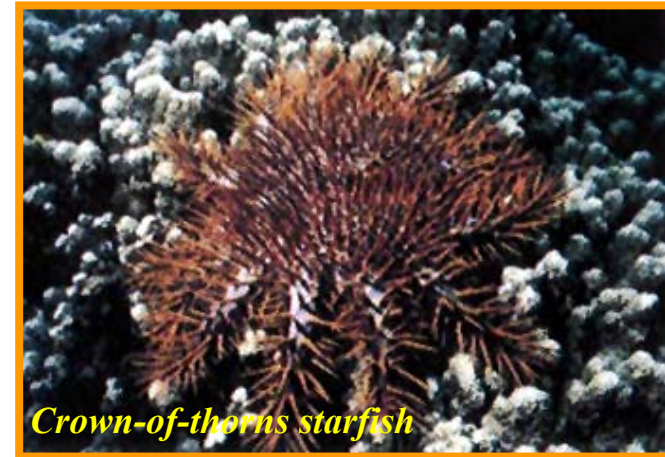


## Territoriality and aggression

- Corals attack one another during nighttime when tentacles are extended.
- Other corals are fast growing but vulnerable to the effects of storms or boring organisms – branching, soft corals

## Enemies of coral

- Crown-of-thorns starfish, avoids massive colonies (*Porites*, *Diploastrea*)
- Gastropod (*Drupella*, etc.)
- Boring organisms, mussel and peacock worm.
- Fishes are greatest predator, scraping and biting off. 1/3 of annual growth of coral colony consumed by fishes.
- Coral fishes: parrot fish, scrapping and biting off coral; butterfly fish eat coral polyps; and puffer fish, boxfish, gobies, and some damsel fishes eat invertebrates.
- Human activities: sedimentation, coral collection, dynamite fishing, anchoring, gleaning, tourism, cyanide fishing, etc.
- Disease called coral bleaching, algae being expelled or die off, turning corals into white.





# Coral community

## Competition within the community

- Sessile coral-reef organism must compete for space.
- corals compete for space by overgrowing or directly attacking their neighbors. Sweeper tentacles are used to sting neighboring colonies
- Soft corals are important competitors for space on reefs. They can grow rapidly and are resistant to predators and can occasionally move about.
- Competition on fish species. They have similar diets on corals, algae, and carnivore.
- Corals and seaweed compete for light as well.

## Predation

- The Crown-of-thorns
  - most prominent predator
  - increases in numbers of larvae have been correlated with rainfall and increases in nutrients from rivers during floods
  - human induced activity may be the collection of predator shells, forest clearing and, fertilizing crops
  - periodically attack some Philippine reefs

## Grazing

- Grazers help prevent fast-growing seaweeds from overgrowing other sessile organism on the reef.

## Living together

- Symbiotic relationships are very important in coral reef communities. Coral reefs have more examples of symbiosis than any other biological communities:
  - corals and zooxanthellae
  - giant clams, sea anemones and snails also have zooxanthellae
  - sponges and cyanobacteria
  - parasites, commensals and mutualists
  - commensalism between corals and crabs, shrimps (40 species), shells, fishes
  - sea anemone and anemone/clownfish



# Patterns of fish movement and dispersal

## 1. Fish habitats, coastal region

- By far 80% of the 10,000 or so fish species in the shallow seas live in warm temperate or tropical waters most associated with coral reefs and atolls, where water temperature don't fall below 18°C. Coral reefs are distributed between latitudes 30°C N and 30°C S.
- At night, squirrelfishes, luminescent pempherids emerge from daytime hiding places, while parrotfish retires to sleep in mucous cocoon.
- Camouflage ambush predators also exist in the coral reefs.



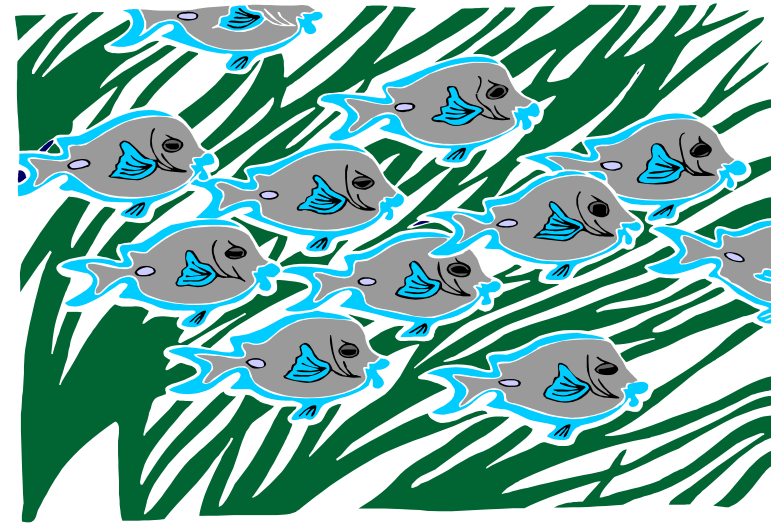
## 2. Temporal patterns of fish movement

### a. Diel Cycle

- Shallow warm water with photoperiods in which the length of day and night are similar and
- The transition between the two is rapid. This transition is accompanied by change in assemblage of active species.
- Daytime colored species (damselfish, parrot) stay close to the reef. Herbivores are generally diurnal species.
- Squirrel fishes and sweepers are nocturnal feeding on zooplankton.
- As sunset approaches diurnal fishes make vertical or horizontal movement from feeding areas to shelter.
- 20 minutes transition period before nocturnal species swim to their feeding areas.
- Piscivore has visual advantage.

### b. Tidal Cycle

- Photoperiod of high activity coincide with the predicted times of high tide.
- Adaptation to an intertidal life is the ability to find shelter



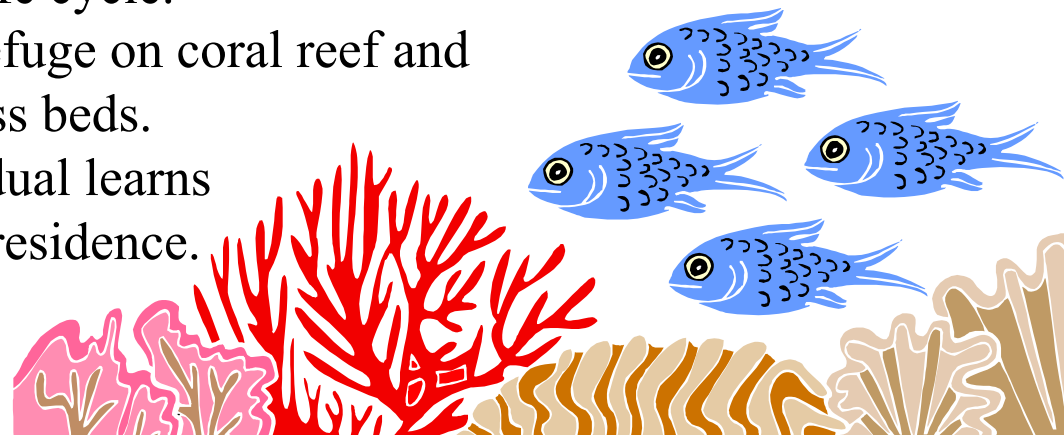
### 3. Patterns of movement and use of space

#### a. Shoaling

- Shoaling for social reasons, schooling for swimming migration, aggregating responding to environmental cue (temperature, current)
- Shoaling for foraging, protection, from predator, accuracy of migration to suitable area/habitat

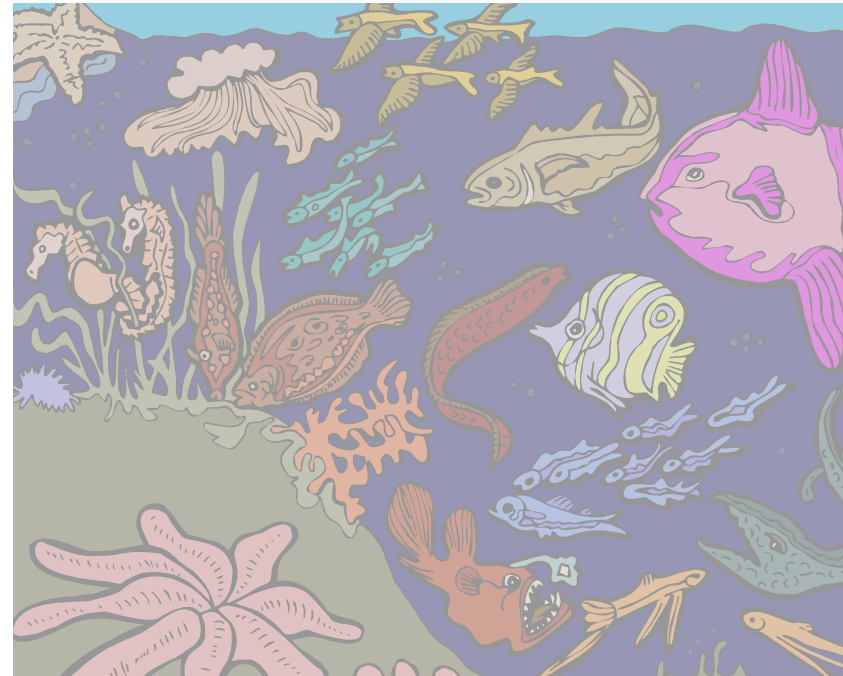
#### b. Migration

- Movement to suitable habitats at appropriate times during the life span
  - reproduction
  - feeding
  - refuge/shelter
- Complex if habitats suitable for feeding or refuge are different at different stages in the life cycle.
- Grunts (*Haemulidae*) refuge on coral reef and prey in sandy or seagrass beds.
  - Transplanted individual learns patterns from local residence.



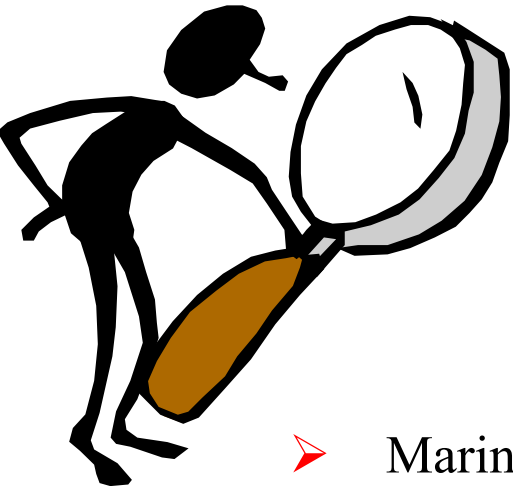
## 4. Larval dispersal

- Planktonic larval stages of benthic adults do serve as their dispersal strategy.
  - Non-feeding larvae has food stored in yolk form.
  - Basically the probability of finding an appropriate place to settle will decrease with distance travelled
- If parents have survived to breeding age in a given area, then that region can be regarded as of guaranteed suitable for the offspring.
- The longer these tiny organisms spend in the water dispersing, the greater the change being by the predator, thus more must be produced to counter balance such losses.
- Tidal and wind driven current carries planktonic larvae.



**The relationship between length of marine planktonic larval life and the distance likely to be transported away from the point of release (Crisp, 1978)**

<b>Duration</b>	<b>Approximate distance transported (km)</b>
<b>3 – 6 hrs.</b>	<b>0.1</b>
<b>1 – 2 days</b>	<b>1.0</b>
<b>1 – 2 weeks</b>	<b>10.0</b>
<b>0.5 – 3 months</b>	<b>100.0</b>
<b>1 year</b>	<b>1000.0</b>



# Benefits of Openness

## Transport of gametes and larvae

- Marine habitats involves the transport of gametes (microscopic eggs and sperm) and larvae (=bizarre, usually microscopic, immature forms of most marine organisms).
- Most organisms release thousands to millions of gametes into the water column. For organisms with a free-living larval stage (either because of direct development from egg to juvenile or because of brooding sperm enters a nearby adult and fertilizes the egg within the body of that adult).
- Many species of corals release buoyant gametes. Larval development to the juvenile form takes several days. The larvae is likely to be dispersed away from the parent reef and that new corals on one reef must come mainly from other reefs. Because of this, the reef depends on each other for a continued supply of larvae.

# Transport of food, nutrients and gases

- Most sessile and many mobile marine organisms are planktivorous. Sessile organisms must wait for food and nutrients to be brought to them. When plankton and larger organisms die and begin to decompose, this material is also carried in seawater and is consumed by other organisms.
- Nutrients (e.g., nitrogen, phosphorus, calcium, silica, and carbonate) and life sustaining gases (e.g., oxygen and carbon dioxide) are transported in particulate or dissolved form in seawater.
- Most marine organisms are well adapted to surviving on low concentrations of nutrients characteristic of most marine environments.
- Major natural inputs to the marine environment include rivers and the recycling of nutrients released when organisms die and decompose.



# Hazards of Openness

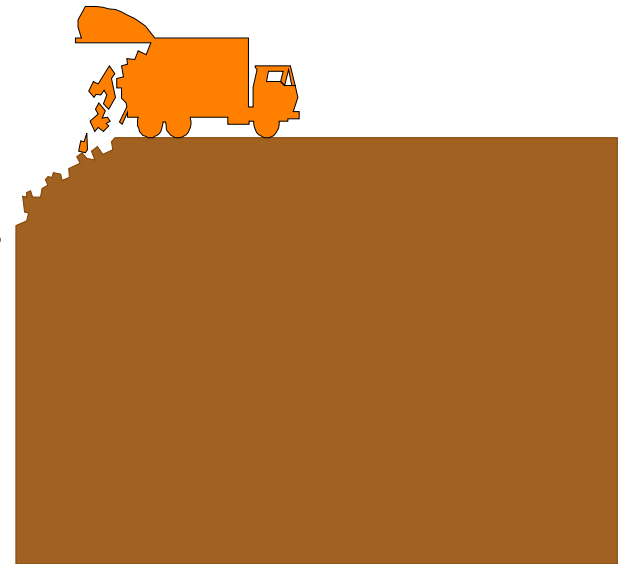
## Transport of pollutants and contaminants

- Like larvae and nutrients, pollutants and toxins are easily spread by currents tens to hundreds of kilometers away.
- Spills can spread over the ocean surface, throughout the water column and/or over benthos, i.e. spread in 3 dimensions.
- Contaminants can also be spread by mobile organisms, especially marine ones which usually travel further relative to body size.
- Interconnectedness of marine habitats resulting from transporting properties of sea water makes the marine environment especially vulnerable to pollution.
- Epidemics of noxious or pest organisms e.g., Crown-of-thorn starfish.



# Threat of man's uses of the marine environment

- Overexploitation – removal of resources faster than they can be replaced naturally or artificially
- Destructive techniques of usage – destruction of habitat essential to growth, survival and reproduction of resource or destruction of non-targeted species or juveniles of desired species (e.g., explosive fishing, trawling close to reefs, fish “driving”, etc.)
- Pollution
  - Sewage/detergents
  - Sewage/fertilizers and other nutrient-rich wastes
  - Sediments/turbidity
  - Herbicides
  - Pesticides
  - Petroleum hydrocarbons
  - Heated water from power-plants
  - Hypersaline waste water from desalination plants
  - Heavy metals (e.g. mercury, cadmium, lead)
  - Anti-fouling points and agents



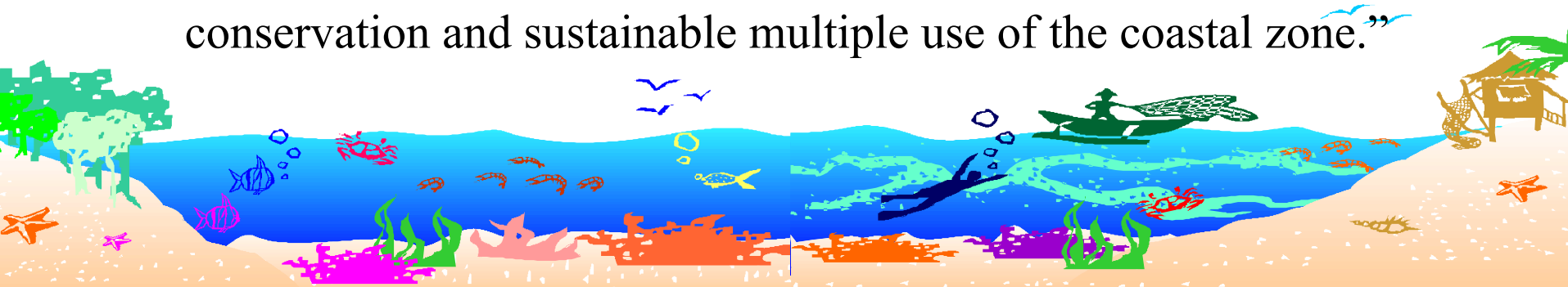




# Coastal Resource Management as a Basic Service of Local Governments

# What is coastal resource management?

- Coastal Resource Management (CRM) is defined as a coherent, multi-sectoral and multi-disciplinary process within a legal and institutional framework that assures equitable involvement and participation from all relevant sectors.
- CRM combines the bio-physical, socio-economic, cultural and political aspects in the conservation and sustainable use of coastal resources.
- CRM is a “...dynamic process in which a coordinated strategy is developed and implemented for the allocation of environmental, socio-cultural, and institutional resources to achieve the conservation and sustainable multiple use of the coastal zone.”



# Why is CRM necessary?

*Increasing populations, with advancing technologies, are making increasing demands on shrinking resources*

- 3.5 billion people live in the coastal region (63% of the total global population)
- Impacts on coastal ecosystems increasing
- Ability of coastal ecosystems to provide goods and services decreasing

*Coastal ecosystems are a source of food, materials, and income for lower socio-economic groups. If they lose these livelihoods, what will replace them?*

- Subsistence activities
- Artisanal fishing
- Small-scale mariculture, tourism
- Small-scale extractive industry

*Nations are planning development in the coastal zone to provide jobs and earn foreign exchange in*

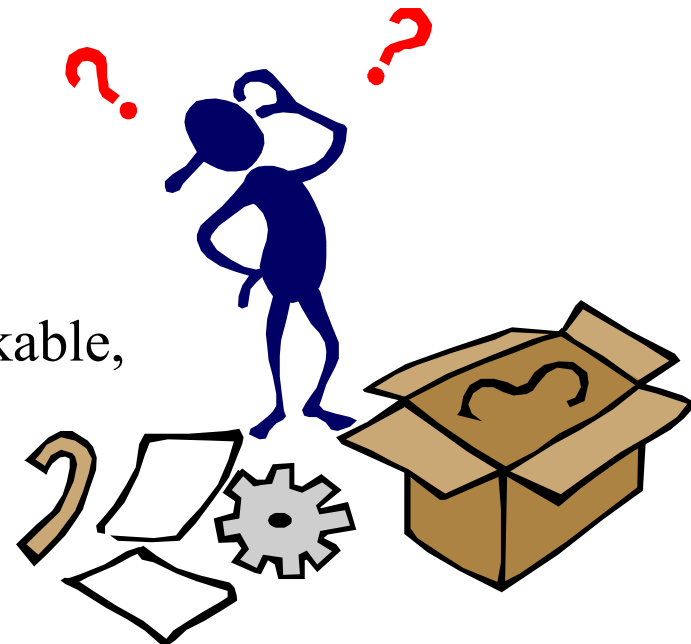
- Mariculture
- Tourism
- Industrial developments
- Mineral extraction



## Why is this happening?

*CRM is primarily a governance challenge, and there is traditionally low governance capacity*

- Coastal resources are often common property resources
- Little governmental experience in resource management
- Little relationship between laws, technical plans and implementation
- Little commitment to public process
- Lack of constituency or leadership for resource management
- Lack of human capacity to create workable, implementable programs



# Significance of coastal resources and regions

## *Existing and new development*

- Tourism
- Coastal mariculture
- Nearshore/offshore gas and oil
- New and intensified industrial development
- Ports
- Coastal mining
- Intensification of fisheries
- Intensification of agriculture
- New and expanding cities

## *Ecological*

- High productivity
- High biodiversity
- Mitigation of flooding and erosion



## *Sociocultural*

- Food
- Fuel
- Cultural religious sites
- Recreation

# Institutional issues in the Philippine coastal zone



- Weak law enforcement
- Weak judicial support for enforcement
- Inconsistent laws and ordinances
- Lack of capability and knowledge in planning, implementing and monitoring coastal management
- Overlapping functions among government organizations over the implementation of laws relevant to coastal environment
- Lack of political will in implementing coastal resource management programs

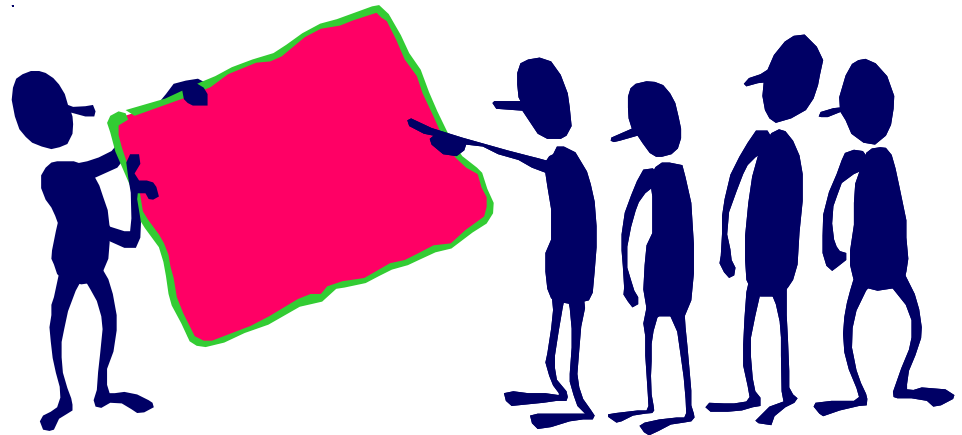
## Goals of CRM

- Sustainable development of coastal areas
- Protection and rehabilitation of coastal environments and habitats
- Clean up of polluted coastal water bodies



## Major features of the integrated approach

- Multi-sectoral, multi-agency and multi-disciplinary
- Creates opportunities to link planning and implementation
- Directs research at questions of direct relevance to resource management
- Involves those affected by management schemes in all phases of the strategy
- Promotes sharing of experiences among resource managers



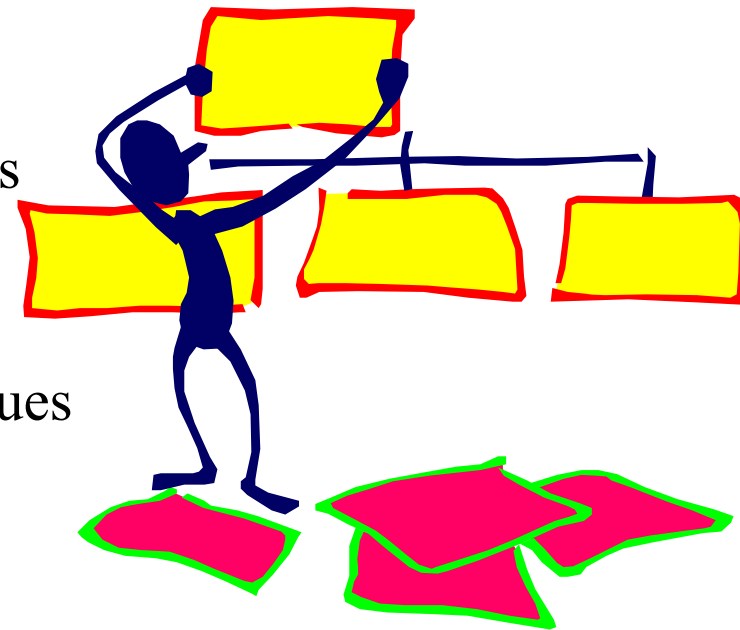
## Characteristics of a CRM program

- Has continuity
- Has defined boundaries with both seaward and landward components
- Has institutional identity as ...
  - an independent organization
  - or a network of organizations
- Integrates all uses of the coastal zone, including actual and potential
- Is culturally and spiritually responsive
- Is gender sensitive



# Principles of CRM

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

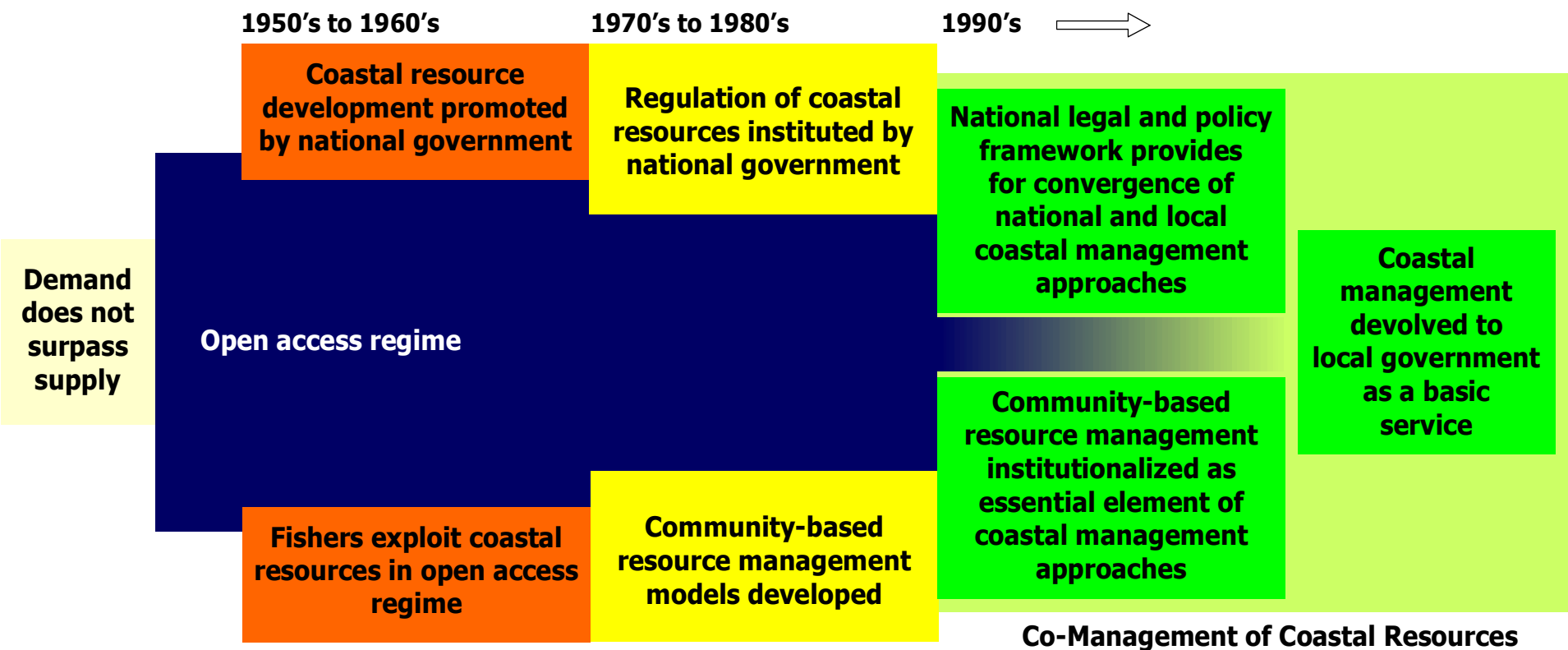


# Establishing CRM as a basic service of local government



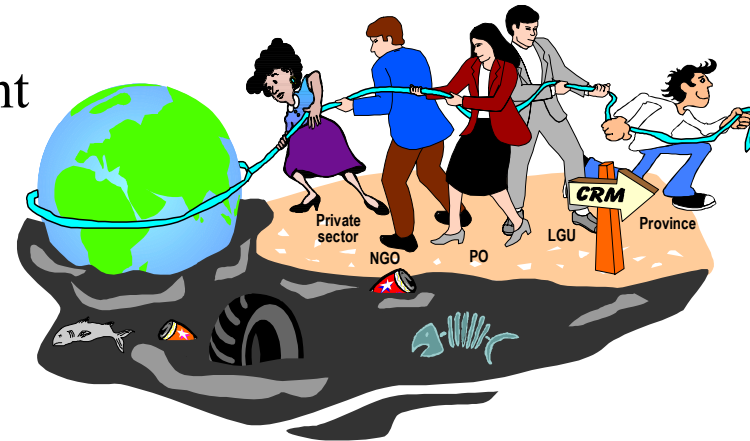
**LGU LEADERSHIP  
CAN MAKE THE  
DIFFERENCE!**

# Evolution of coastal management mechanisms in the Philippines

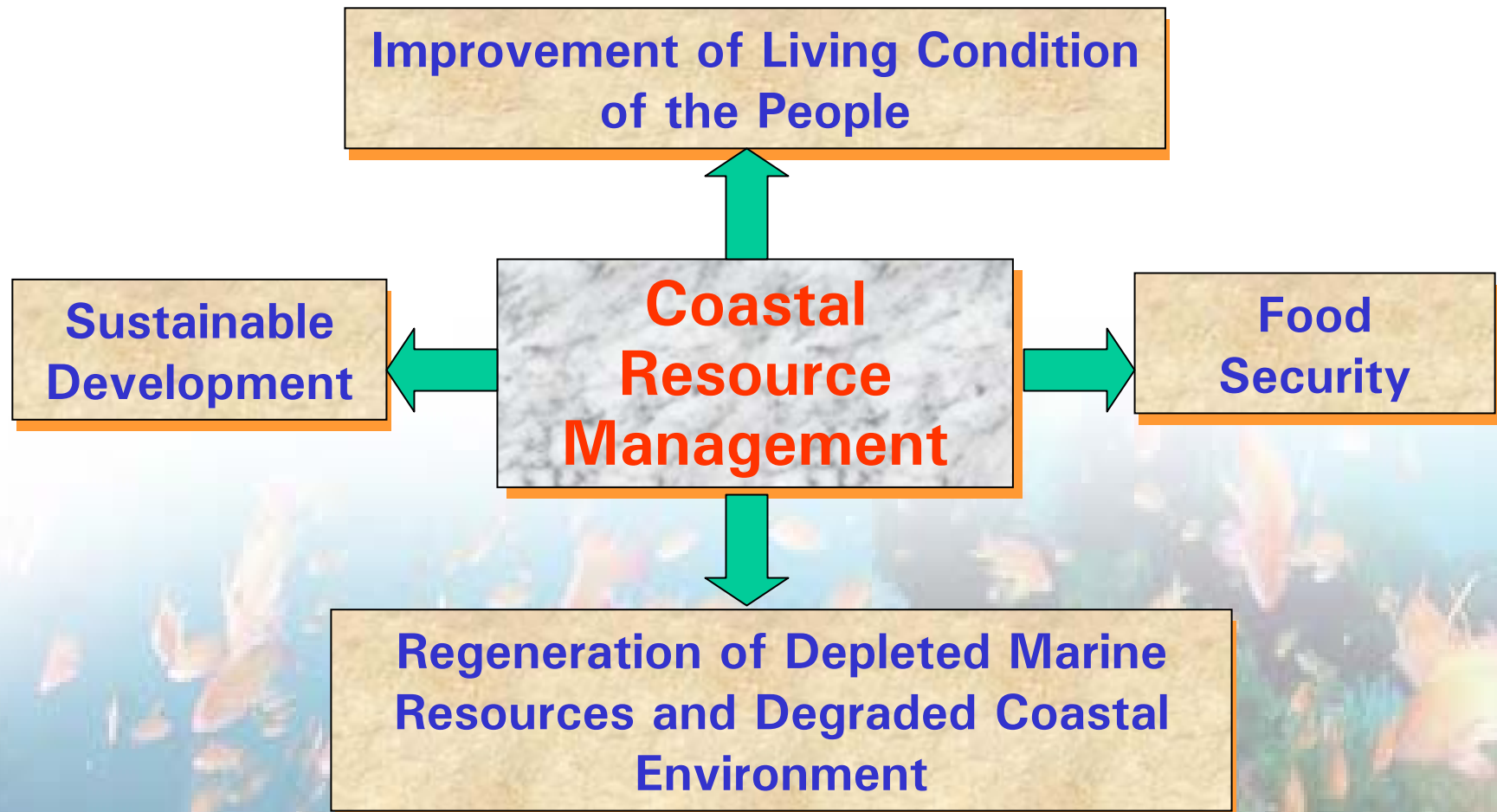


# New paradigms in coastal management in the Philippines

- Shifting emphasis from fisheries development to coastal protection and management
- Devolution of responsibility and mandate for managing municipal waters to local government
- Redefining roles of national government agencies toward assisting local government with coastal resource management
- Establishing multisectoral and inter-LGU collaboration to solve complex problems associated with coastal management
- Broadening the base of local and national support to sustain community-based coastal resource management initiatives
- Mainstreaming coastal resource management on the national social agenda
- Partnership's between LGU, NGOs, private sector, and POs



# Goals of CRM



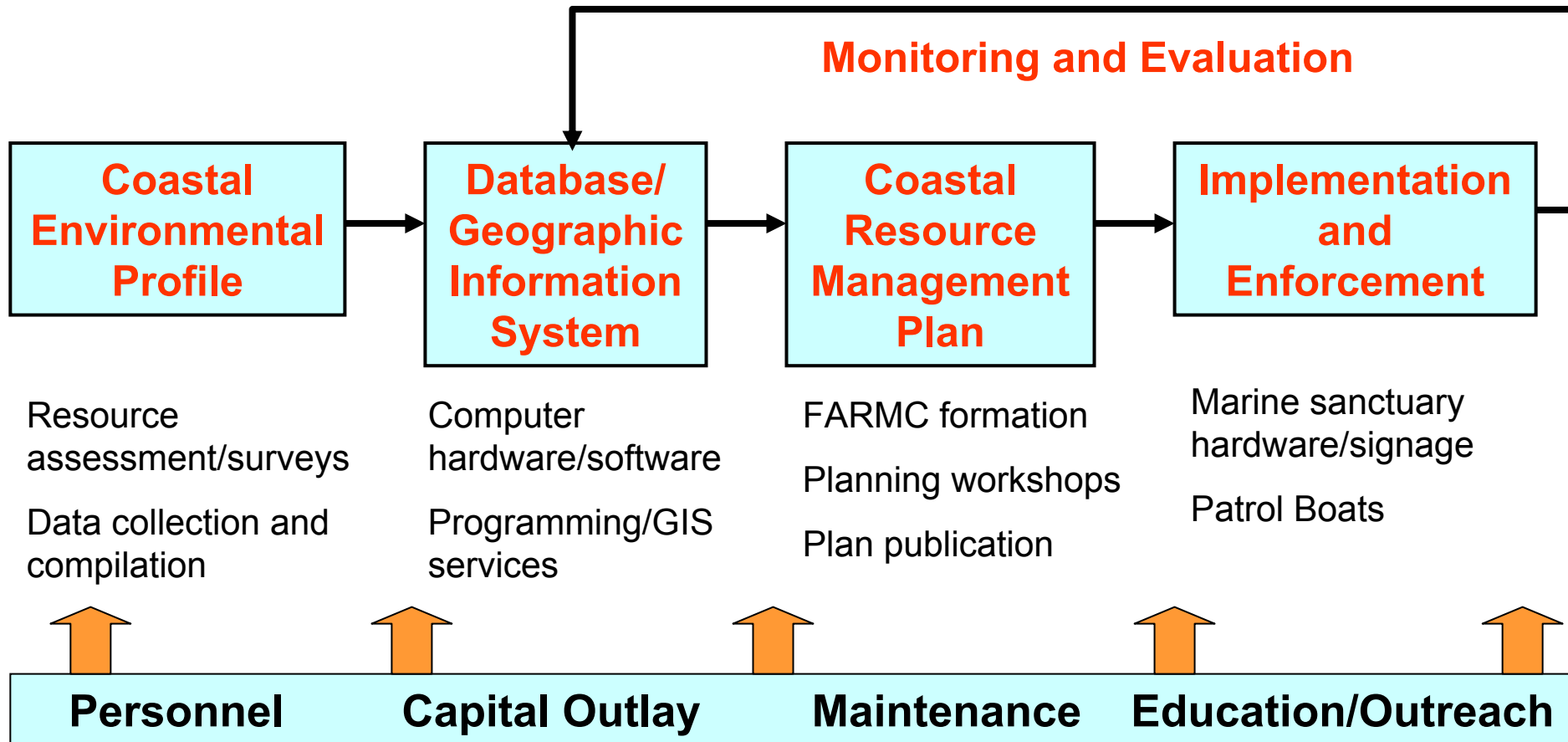
## Why invest in CRM?

- **Protect biodiversity**
  - ✓ Richest tropical marine biodiversity in the world
- **Achieve food security**
  - ✓ 50% of dietary protein comes from the sea
  - ✓ Healthy coral reefs can produce 20 mt of fish/km<sup>2</sup>/year
- **Sustain economic benefits**
  - ✓ Mangroves contribute Php 4.8 million/km<sup>2</sup>/year
  - ✓ Coral reefs contribute Php 2.0 million/km<sup>2</sup>/year
  - ✓ Open-water fishing areas contributes Php 0.04 million/km<sup>2</sup>/year

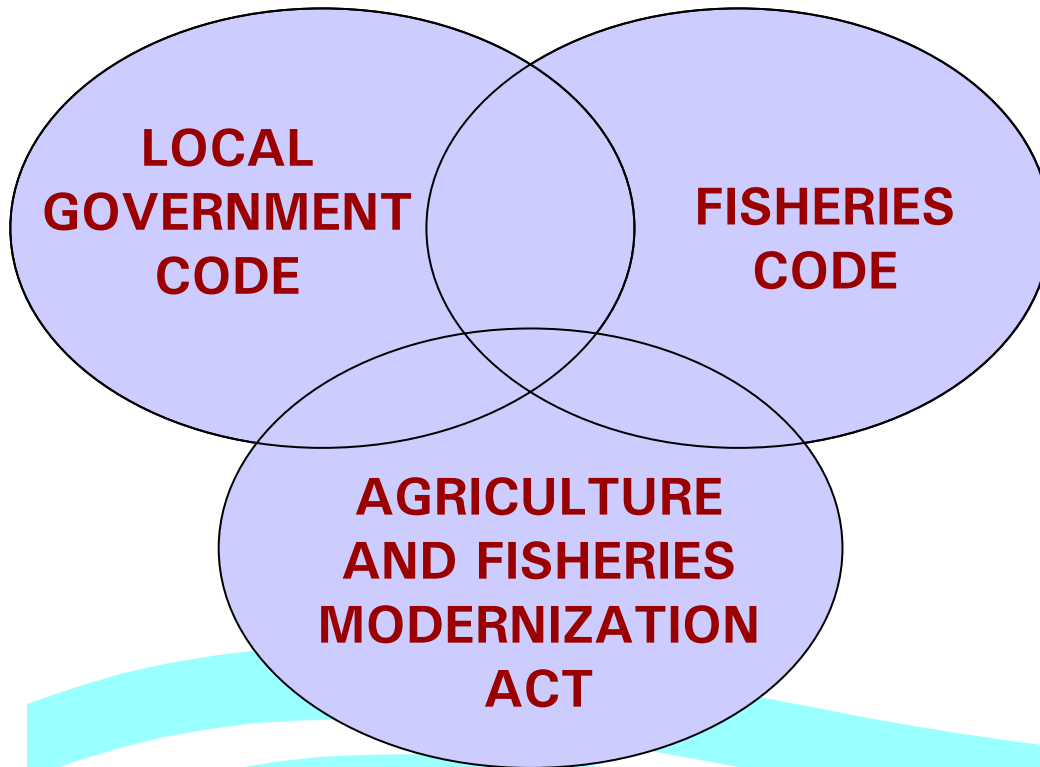


# What is the investment used for?

- To institutionalize CRM as a basic service of local government



# LGU mandate for CRM



**Planning**

**Protection**

**Regulatory**

**Enforcement**

**Legislation**

**Intergovernmental relations**

**Relations with POs and  
NGOs**

**Extension and Technical  
Assistance**

## Comparison of municipal water and land area for coastal municipalities of three provinces

Province	Coastal municipalities			Shoreline length (km)***
	Total municipal water area* (km <sup>2</sup> )	Total municipal land area* (km <sup>2</sup> )	Water/Land ratio**	
Siquijor	1,715	318	5.4	102
Bohol	6,427	2,329	2.8	642
Negros Oriental	3,260	4,336	0.8	369

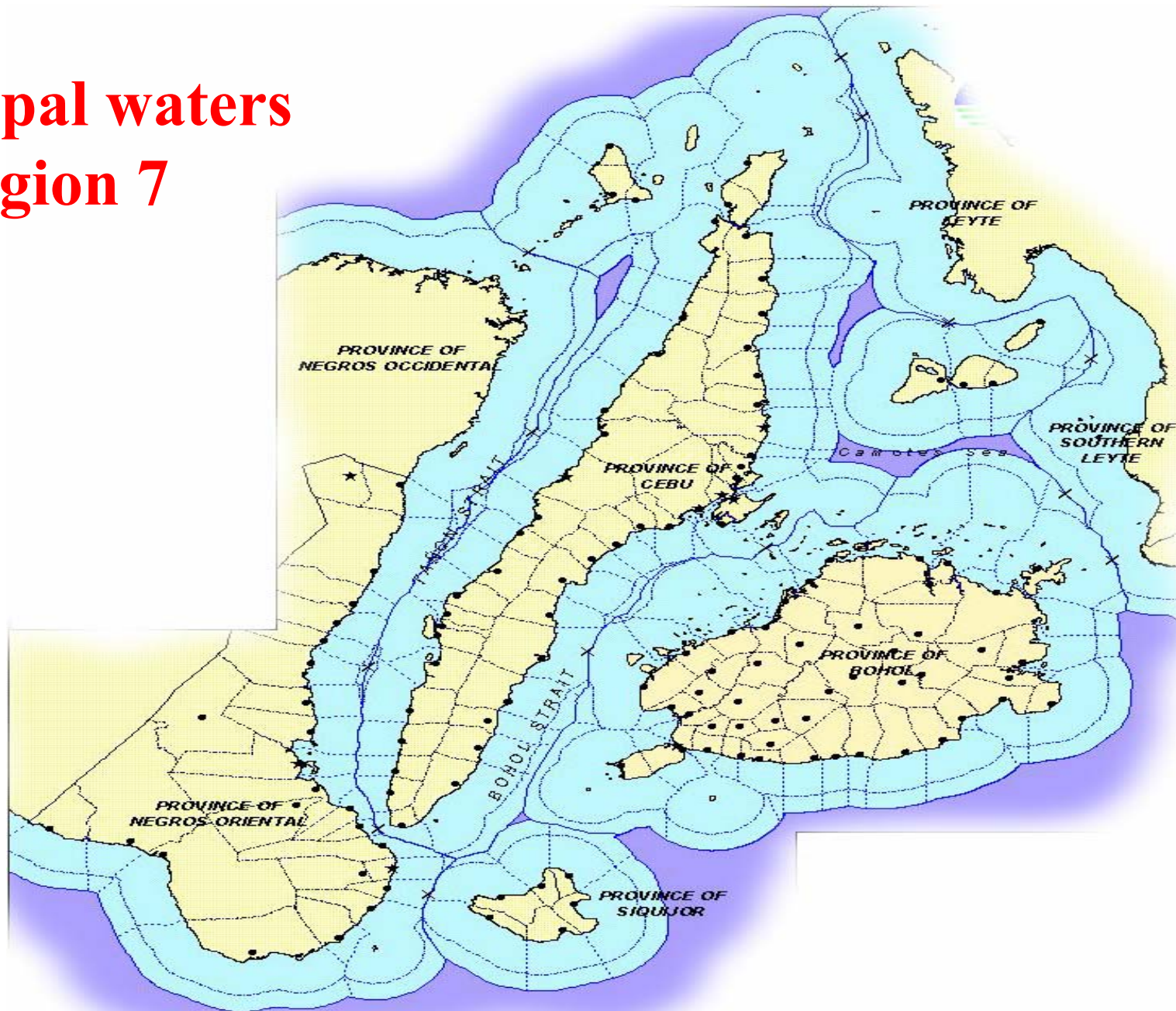
*Notes:*

*\*Estimated figures based on calculations made using geographic information system, CRMP (1999)*

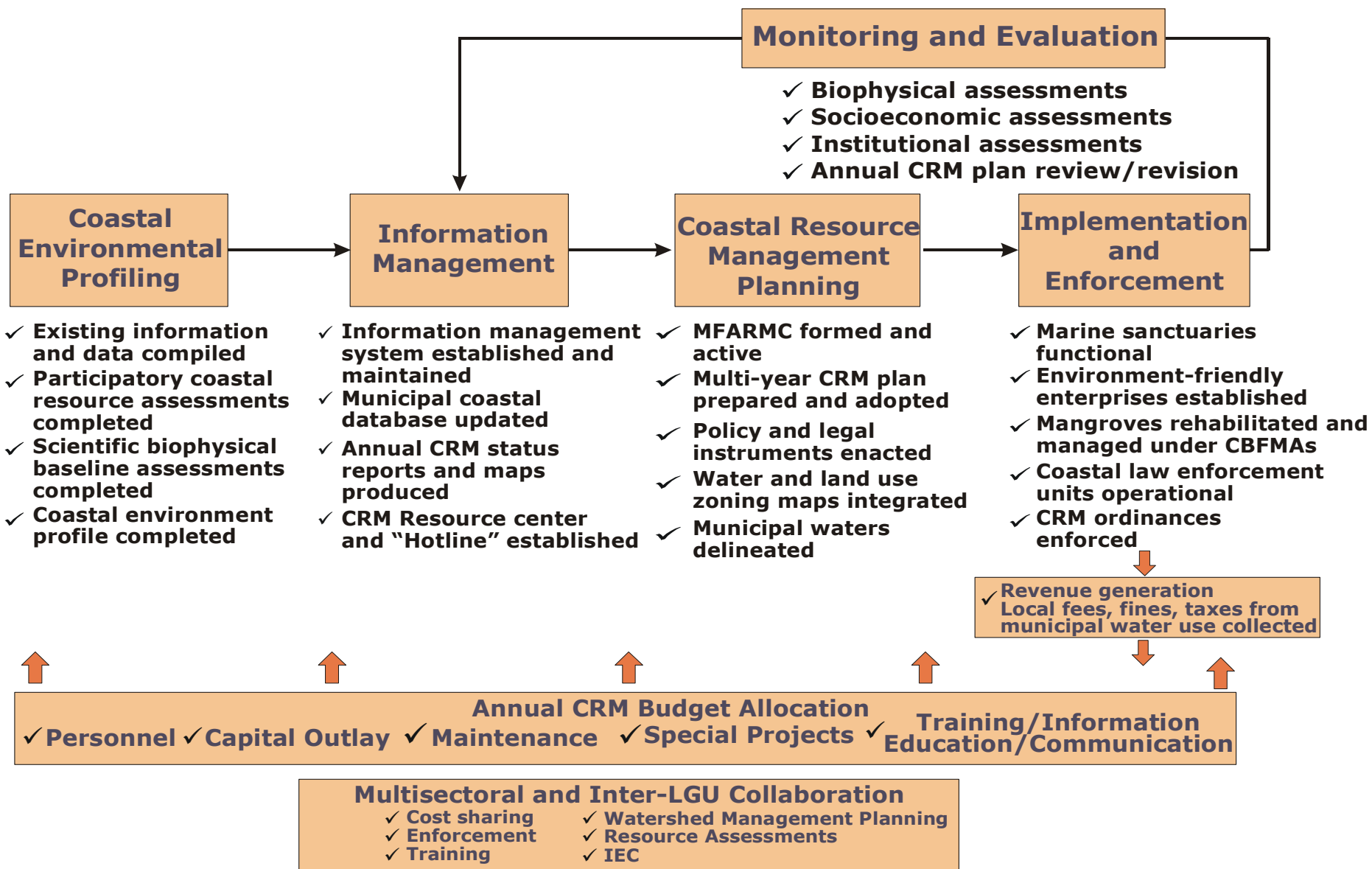
*\*\*Water/Land ratio = 1 means that the land area of a coastal municipality is equivalent to the municipal water area*

*\*\*\*Shoreline length is based on shoreline of the province and excludes small islands and islets*

# Municipal waters Region 7



# CRM as a basic service of local government



## Status of municipal CRM in 1999

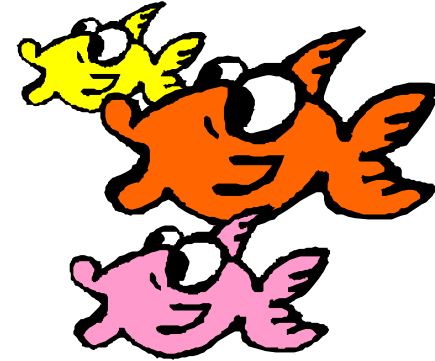
Out of 234 coastal municipalities surveyed:

- 62% had a coastal resource assessment
- 47% had a CRM plan
- 26% had a MFARMC (only 4% active)
- 49% had established a marine sanctuary
- 52% had allocated a budget for CRM
- 40% actively control illegal activities related to coastal resources

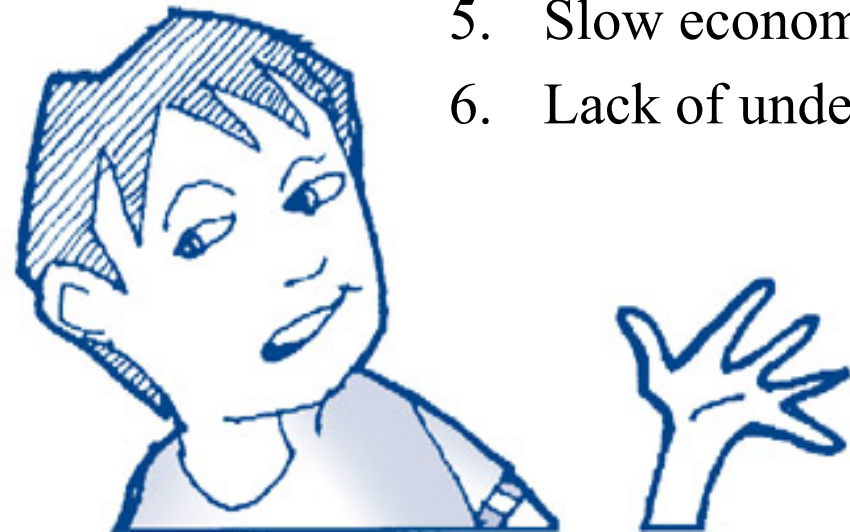
*\*Based on survey of coastal Mayors during May 1999 Conference of Coastal Municipalities*



## Top obstacles to local CRM in the Philippines



1. Inadequate funding for CRM
2. Lack of integrated environmental management, planning, and implementation
3. Lack of staff trained in coastal management/lack of technical expertise in CRM
4. Lack of livelihood alternatives to fishing
5. Slow economic development
6. Lack of understanding why CRM is important

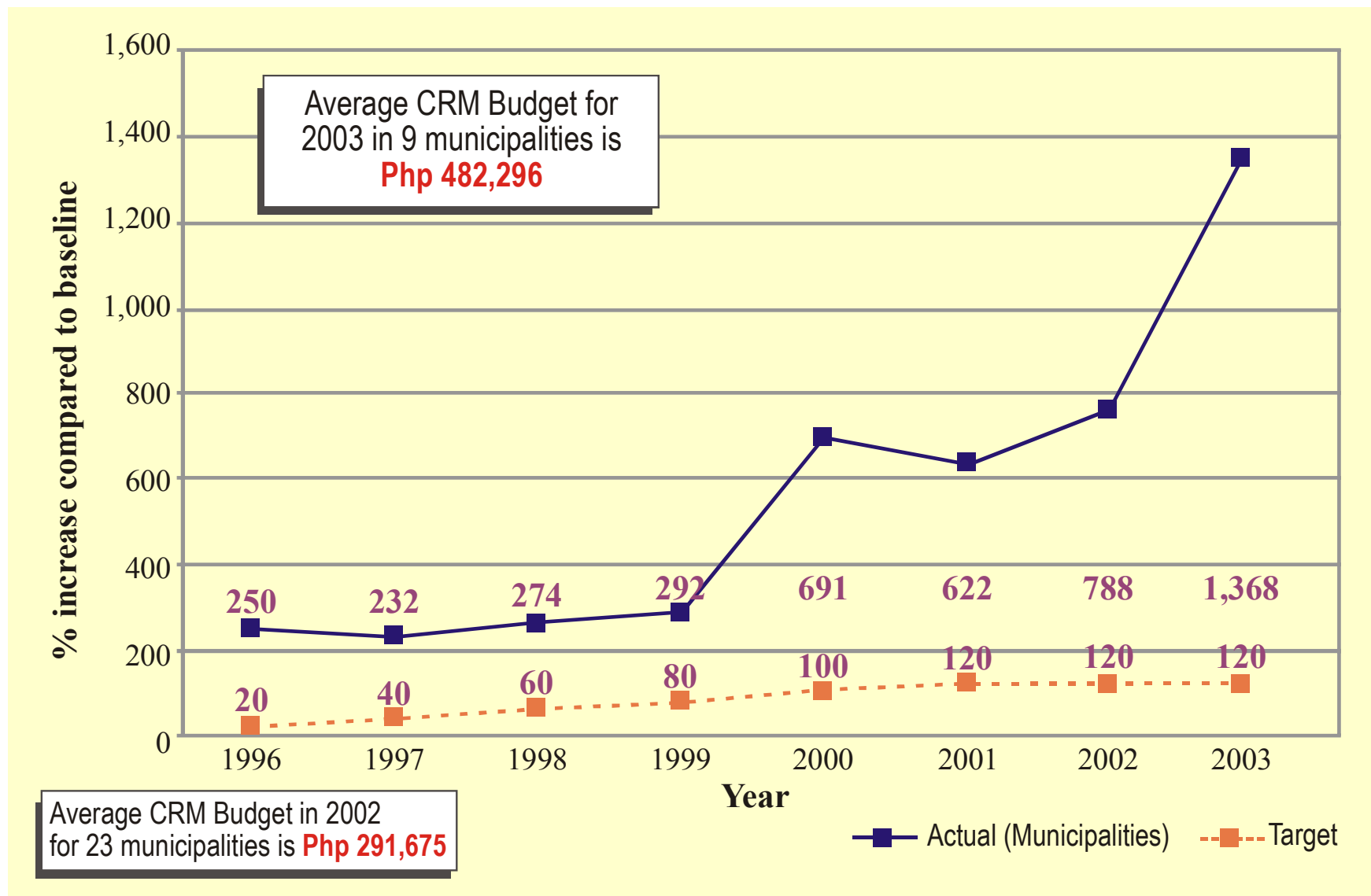


## Percentage of municipalities allocating budget for CRM

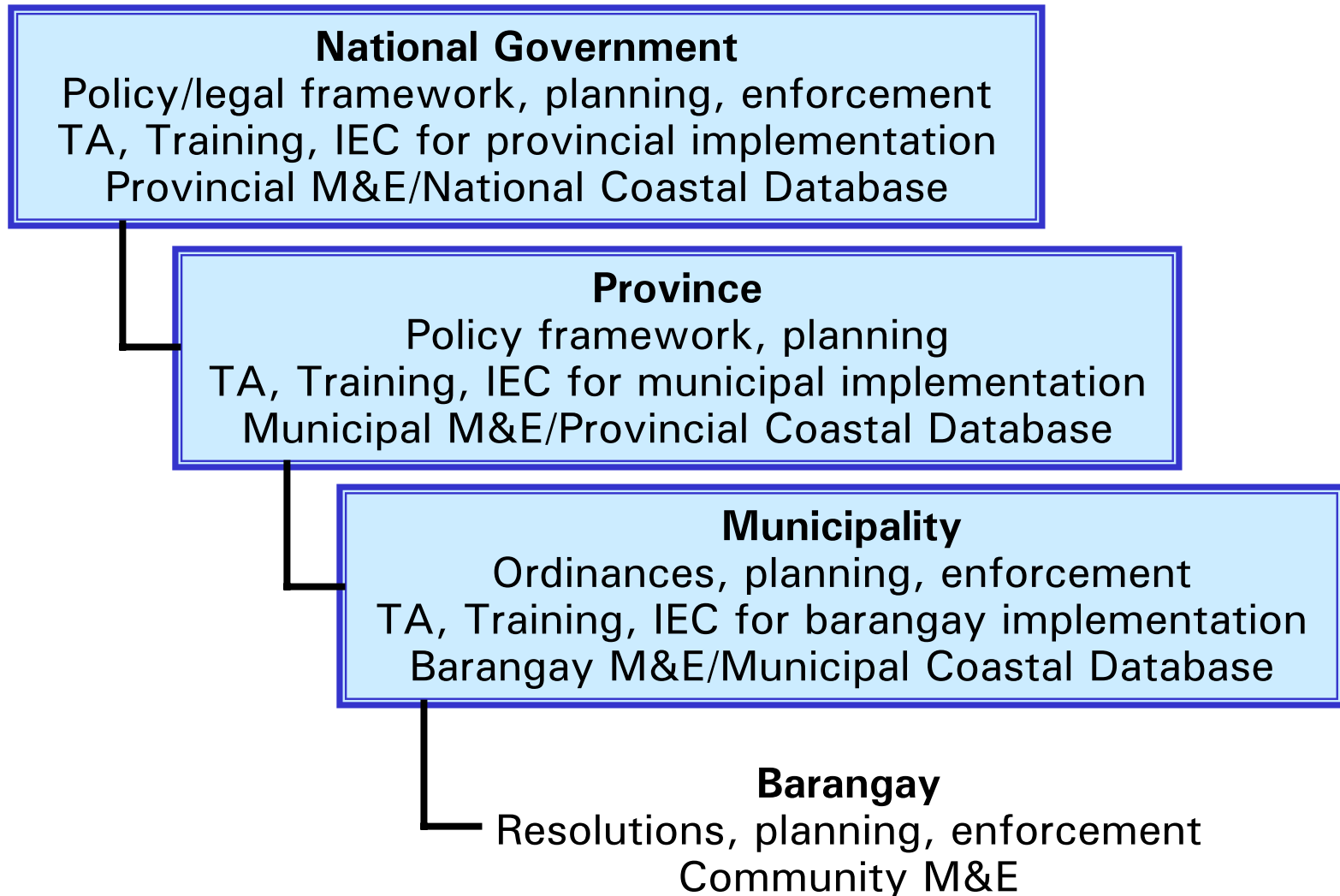
Year	% municipalities surveyed allocating budget for CRM n = 234
1996	1.3
1997	36.8
1998	44.9
1999	52.1

*Note: Survey results compiled from responses of municipal mayors during 1999 Conference of Coastal Municipalities, League of Municipalities of the Philippines*

# Average annual CRM budget allocations by LGUs



# Emerging institutional arrangements for CRM

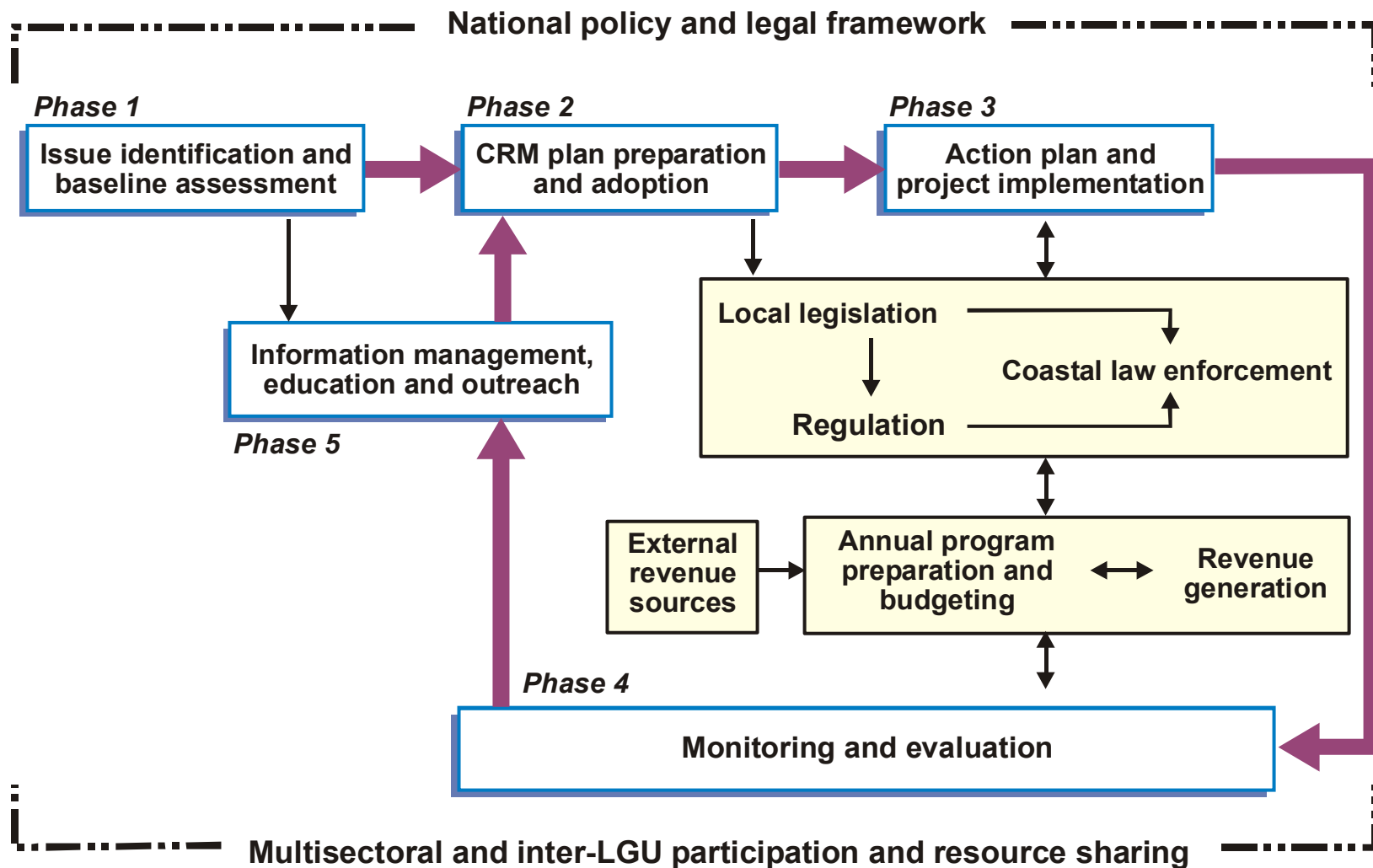


# Enhancing the legal framework for CRM as a basic service of LGU

- Describe CRM basic services of LGUs
- Relate CRM performance with financial allocations
- Clarify barangay, municipal, and provincial planning responsibilities and processes for CRM
- Clarify CRM technical assistance, training, and extension services of LGUs in particular the role of provinces

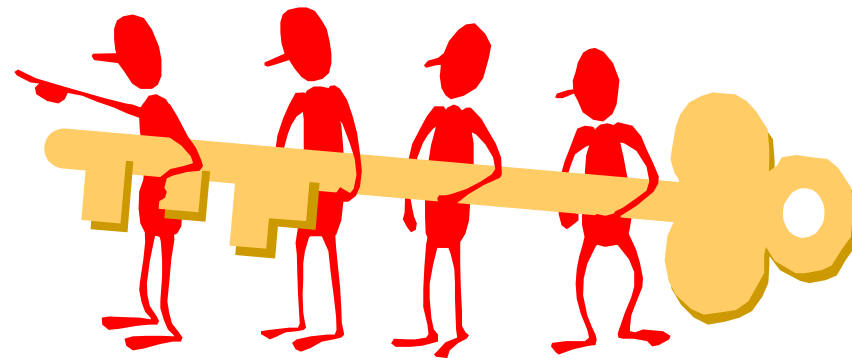


# CRM planning process adapted for Philippine local government



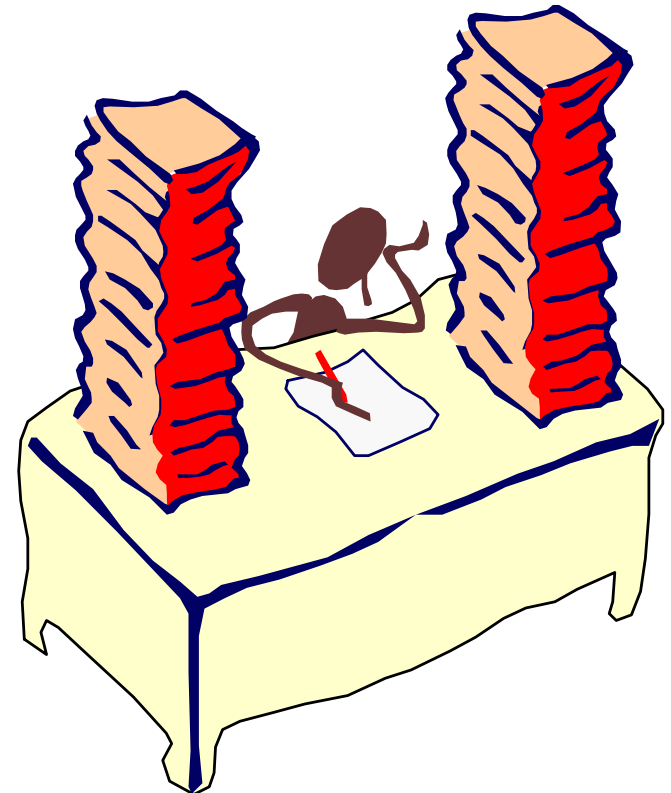
## Overall process of CRM

- Identification of major issues
- Issues evaluation and prioritization
- Formulation of detailed management plans for selected issues
- Plan adoption
- Plan implementation
- Evaluation and adjustment



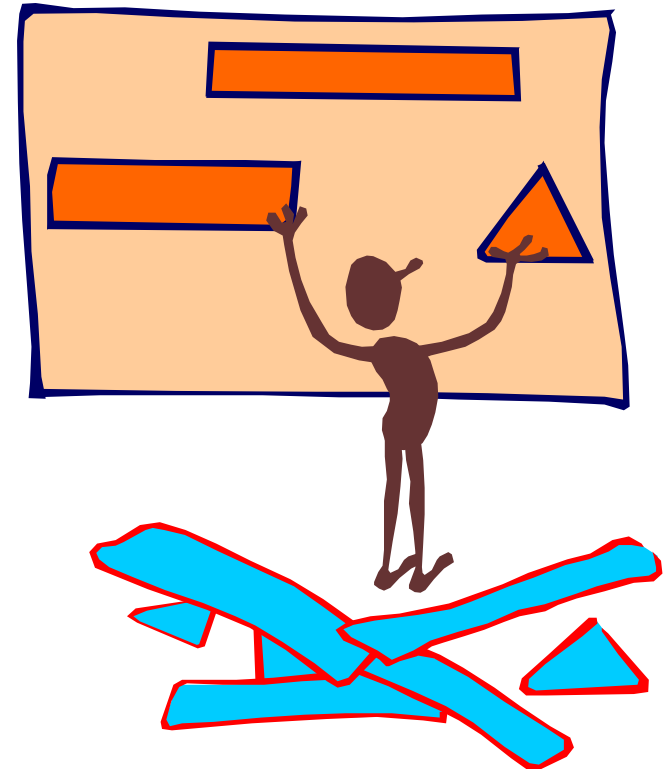
## Components of a CRM plan

- Objectives for management
- General policies
- Strategies to solve issues
- Actions for each strategy
- Institutional structure for implementation



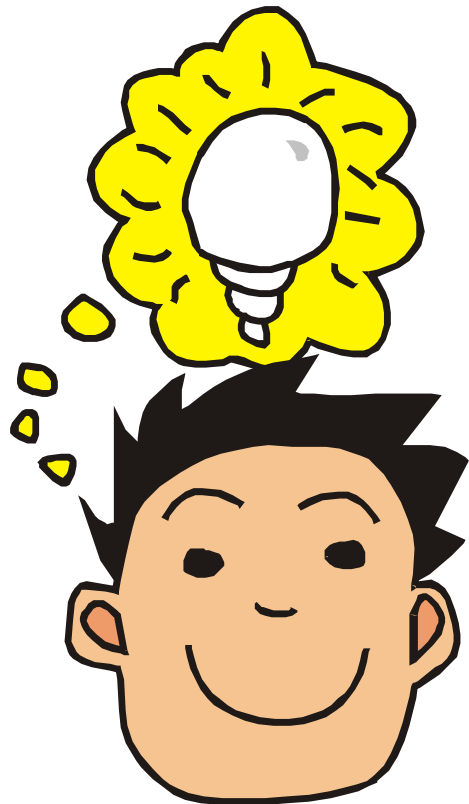
## Characteristics of a good plan

- Issue-based
- Realistic management actions
- Definite criteria for decision-making
- Supported by factual data
- Participatory and popular



# Plan formulation

- What are the needs?
  - *Identify issues*
- Which of the needs shall we be able to meet and when?
  - *Issues evaluation and objective setting*
- How shall we meet them?
  - *Strategy formulation*
- Who is to do what?
  - *Implementing structure*
- How can we cope with environmental impacts?
  - *Evaluation mechanisms*
- What resources must be developed?
  - *Resource identification and budgeting*
- When will the steps be taken?
  - *Work planning*
- How do we ensure progress?
  - *Monitoring schemes*

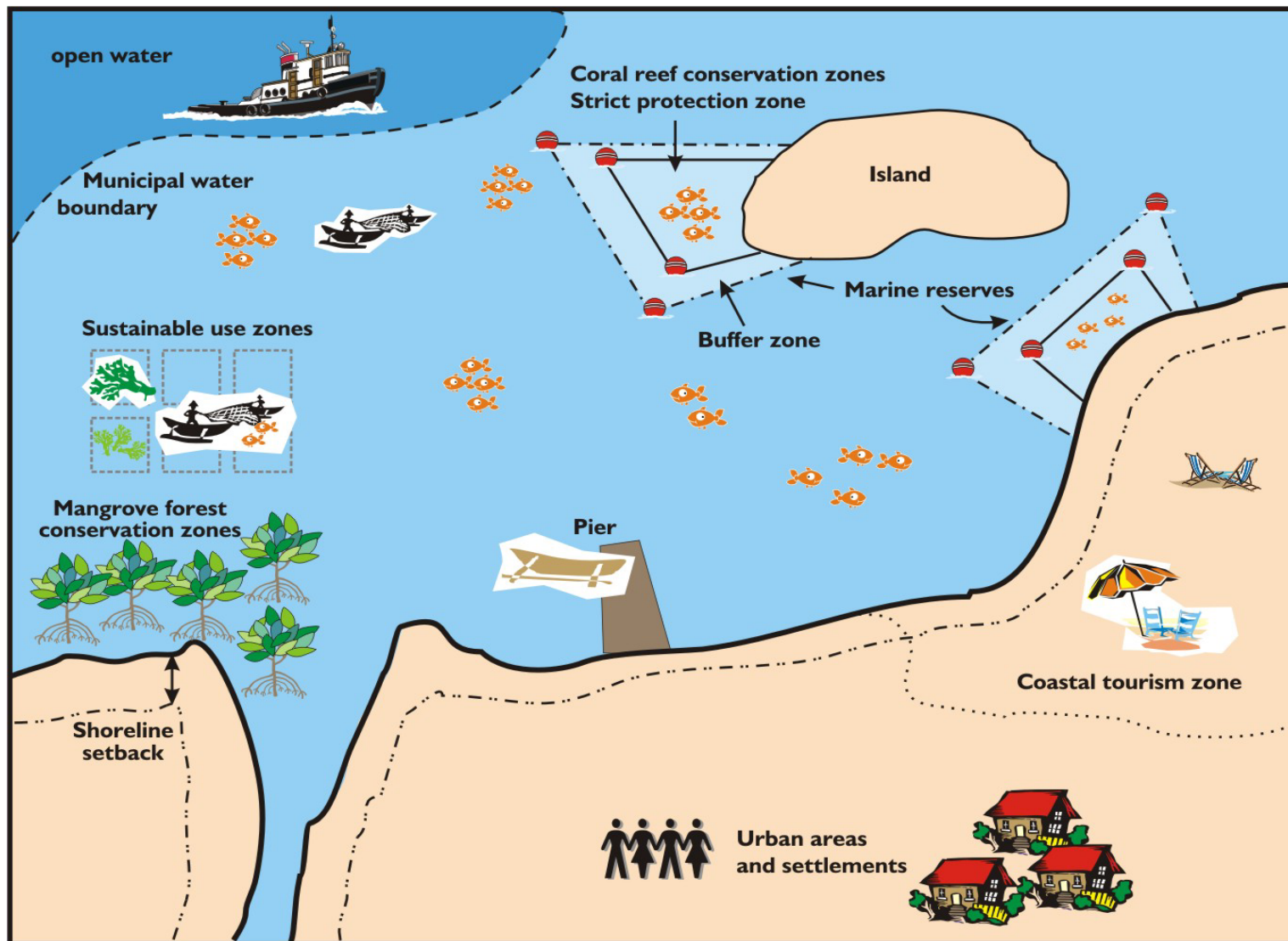


# CRM planning

- Habitat Management
- Fisheries Management
- Shoreline Management
- Coastal Tourism Management
- Enterprise and Livelihood Management
- Waste Management
- Watershed Management
- Coastal Zoning
- Legal Arrangements and Institutional Development



# Illustrative zoning plan for the coastal zone and municipal waters\*



*\*Not to scale*

# Marine protected areas: A strategy for managing habitats and fisheries



**Fisheries management aims to reduce fishing effort to sustainable levels and to improve the overall ecological integrity of the fishery and its habitats.**



**MPAs are merely one of the options under fisheries management and habitat management programs within CRM.**

**Other management options include:**

- Registration and licenses
- Gear restrictions and other effort restrictions
- Minimum mesh sizes
- Closed seasons, quotas, etc.



## Most of these are difficult to enforce and manage and are not so successful in management because...

1. **Need large amounts of information about the life histories of fish species (which scientists have not yet got)**
2. **Most theory is based on single species theory on stocks which is NOT applicable to multi-species, multi-gear fisheries, as in the Philippines.**
3. **Enforcement is difficult and expensive**



*MPAs/Marine sanctuary – gaining worldwide recognition as an effective and efficient habitat and fisheries management tool.*

## Fisheries Code R.A. 8550 definition

### ➤ Fishery refuge and sanctuaries

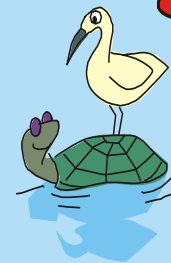
“A designated area where fishing or other forms of activities which may damage the ecosystem of the area and human access may be restricted.”

### ➤ Fishery reserve

“A designated area where activities are regulated and set aside for educational and research purposes.”



**NO-TAKE  
ZONE**



# MPA definitions

## ➤ General protected area

“Identified portions of land and water set aside by reason of their unique physical and biological significance, managed to enhance biological diversity, and protected against destructive human exploitation”.

## ➤ Marine protected area (MPA)

“A defined area of the sea established and set aside by law, administrative regulation, or any other effective means, in order to conserve and protect a part of or the entire enclosed environment, through the establishment of management guidelines. It is considered a generic term that includes all declared areas governed by specific rules or guidelines in order to protect and manage activities within the enclosed area.” (Arceo *et al.* 2004)

## ➤ **Marine reserve**

“An area where access and uses (whether extractive or non-extractive) are regulated or controlled for specific uses or purposes. A marine reserve may include a marine sanctuary within its boundaries. The entire area need not be placed under the same conditions or restrictions as a marine sanctuary, but all uses are still controlled and regulated to the extent necessary to ensure that little or no harm is imposed on the environment enclosed in the reserve.” (Arceo *et al.* 2004)

## ➤ **Marine park**

“A type of marine reserve, in which multiple uses may be allowed through zoning regulations, and where conservation-oriented recreation, education and research are emphasized. A marine park may include a marine sanctuary within its boundaries. An example of a marine park in the Philippines is the Tubbataha Reef National Marine Park.” (Arceo *et al.* 2004)



## ➤ **Marine sanctuary**

“A defined area established and set aside exclusively for the purpose of protecting habitats and species, through the prohibition of all extractive uses and strict regulation of non-extractive uses. This term is synonymous with ‘no-take-zones’ (NTZs). A marine sanctuary may have buffer zones around the area sought to be protected from extractive and non-extractive uses. It may be located within a marine reserve or marine park.”  
(Arceo *et al.* 2004)



# Characteristics of a community-based marine sanctuary or reserve:

- Encompasses NO-TAKE
- Managed and enforced by the community and the LGU – co-management
- Have a legal basis



# Objectives of MPAs

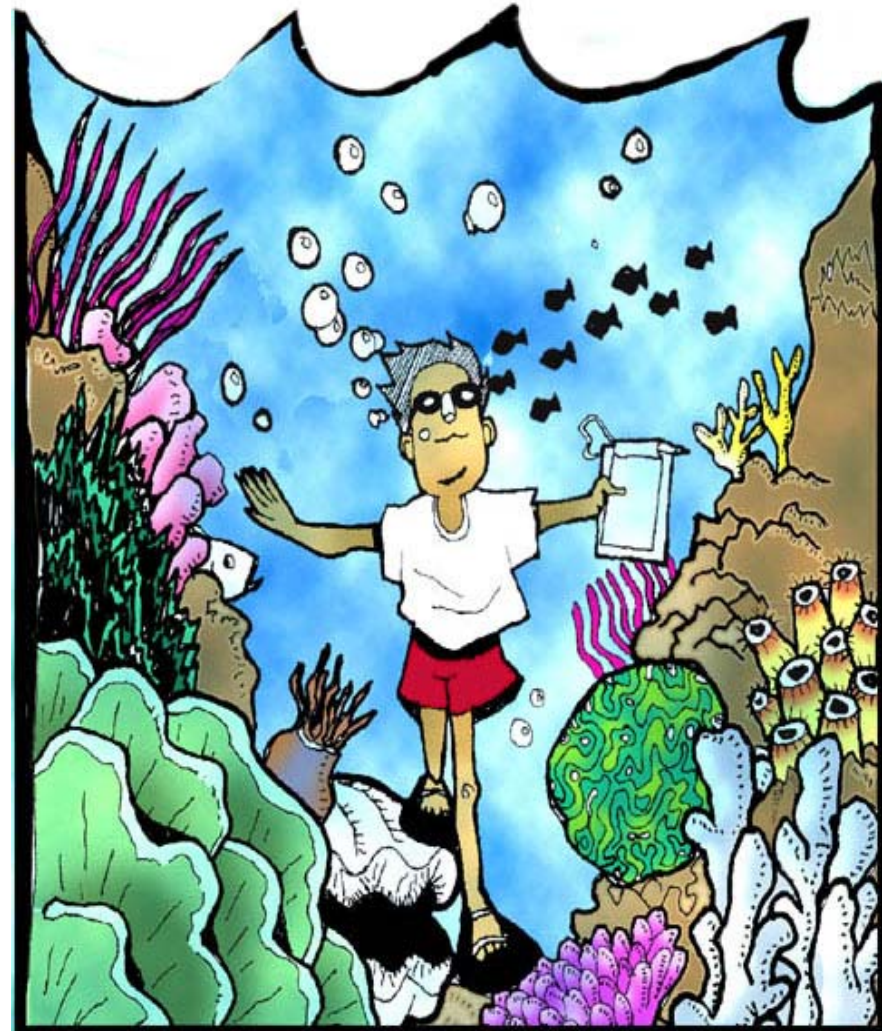
- Preservation of biodiversity and genetic biodiversity
- Conserving ecosystems and maintaining ecological processes
- Sustainable use of resources
- Protecting commercially valuable species
- Replenish depleted stocks
- Education and research
- Protection from natural hazards
- Recreation and tourism
- Multiple objective MPAs

Source: Salm *et al.* 2000)



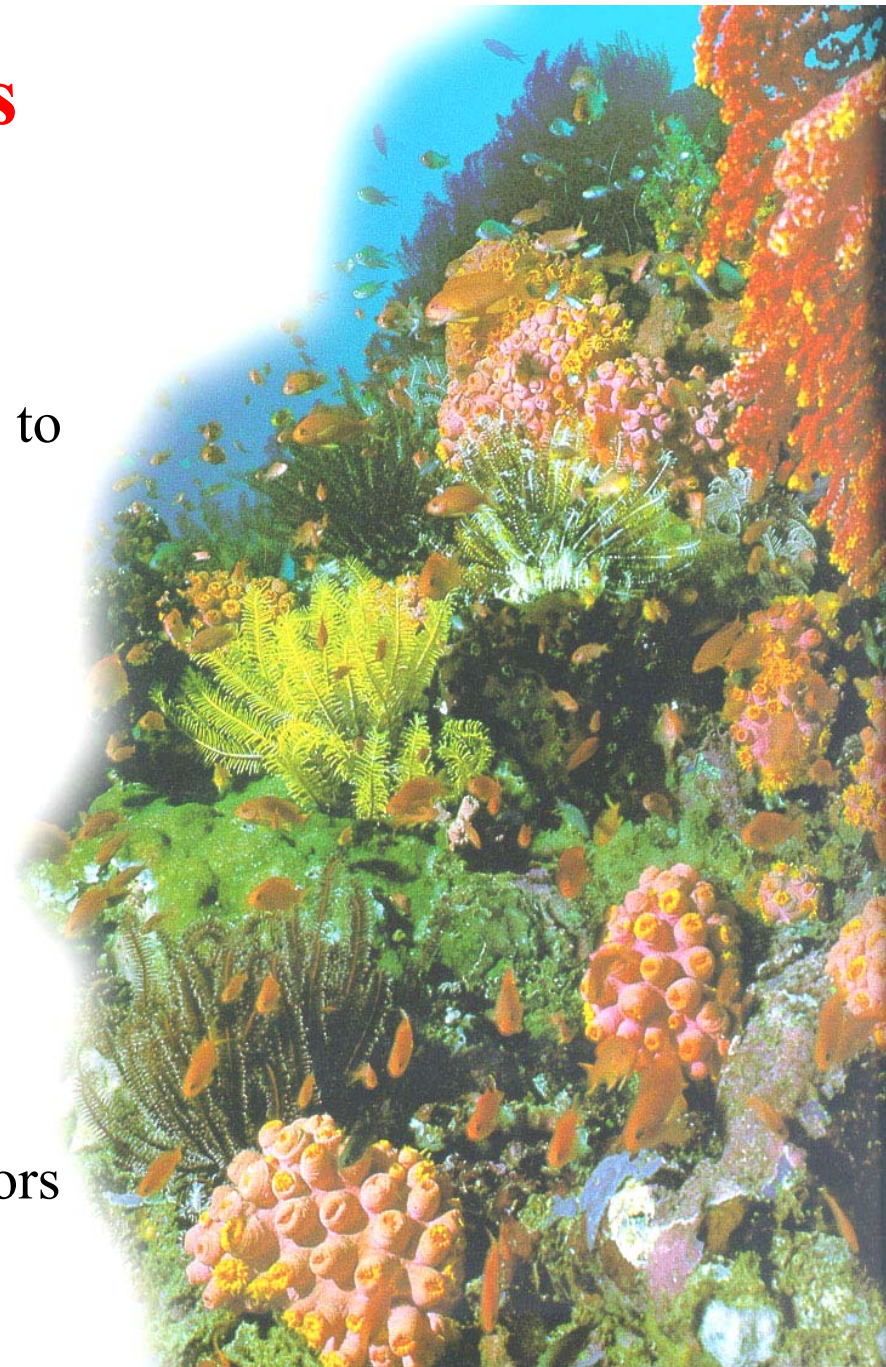
# Considerations for choosing management objectives:

- Participation and Equity  
*What do stakeholders want?*
- Feasibility (realistic)  
*Size, area, contribute to network, etc.*
- Sustainability  
*How to try and make it as sustainable as possible*
- Use Adaptive Management Project Cycle (*ensures better monitoring and lessons to be learned*) and keep referring back to the plan and adjusting as you go along

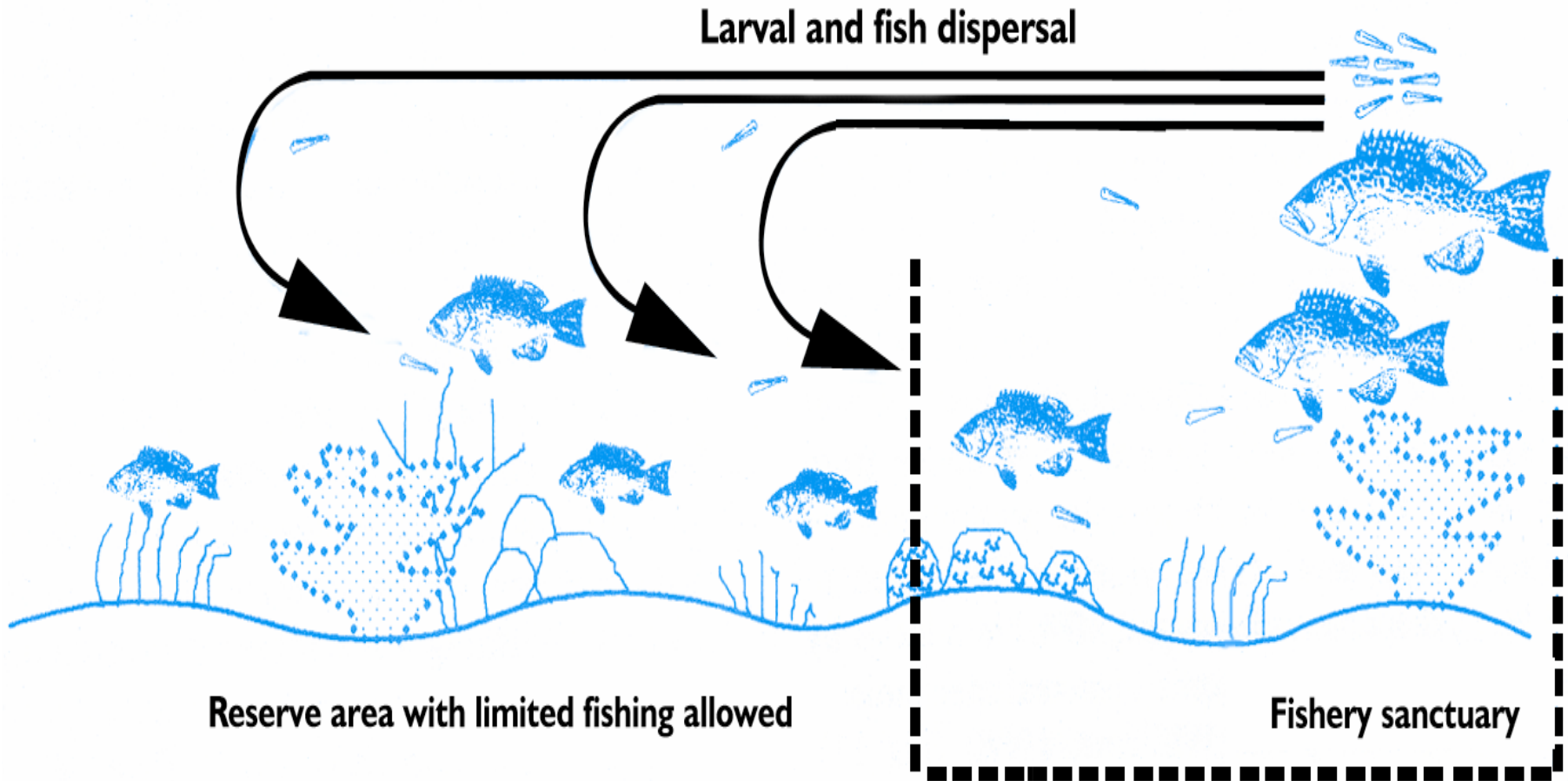


## **Benefits of reserves**

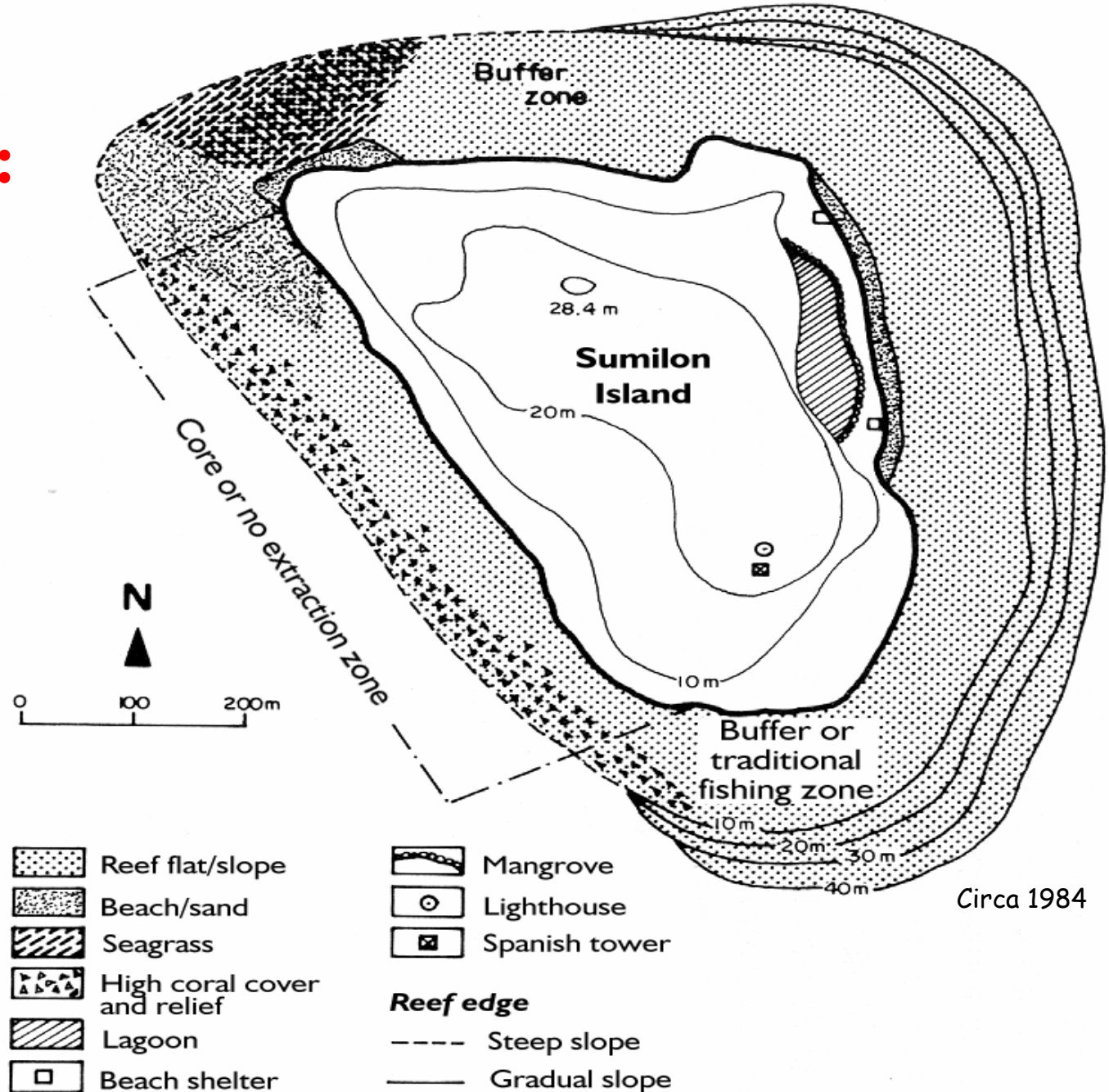
1. Increased spawning stock
2. Increased spawning per unit stock
3. “Spillover” – enhanced catches close to reserves
4. Migratory species also benefit
5. Improved habitats, increased productivity and carrying capacity
6. Maintained genetic diversity within stocks
7. Enhanced biodiversity and species protection
8. Reduced conflict among fishery sectors and between fisheries and other uses



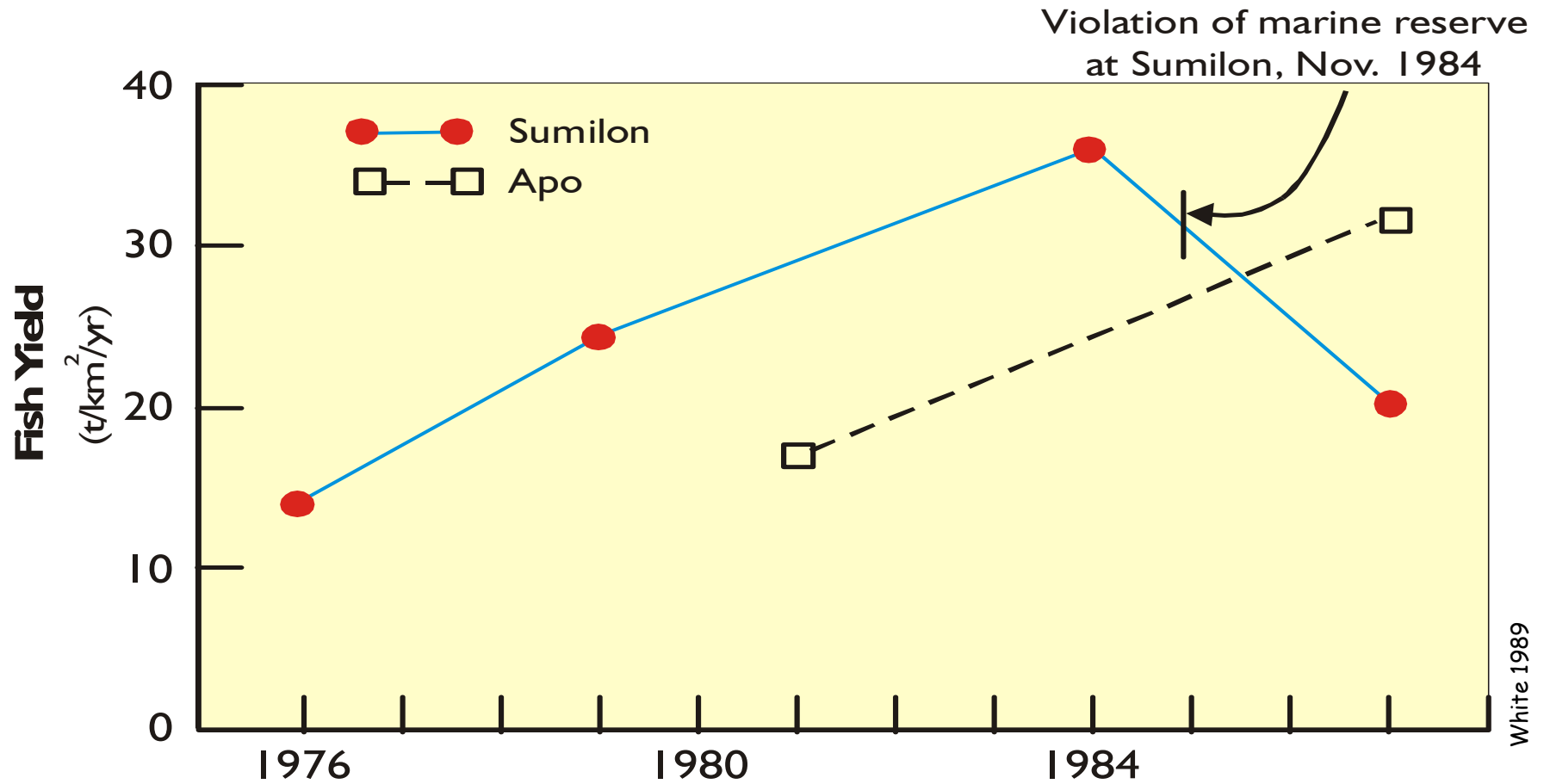
# Dispersal of fish and larvae from the sanctuary of a marine reserve



# Sumilon Island, Cebu: Sanctuary (core) and reserve

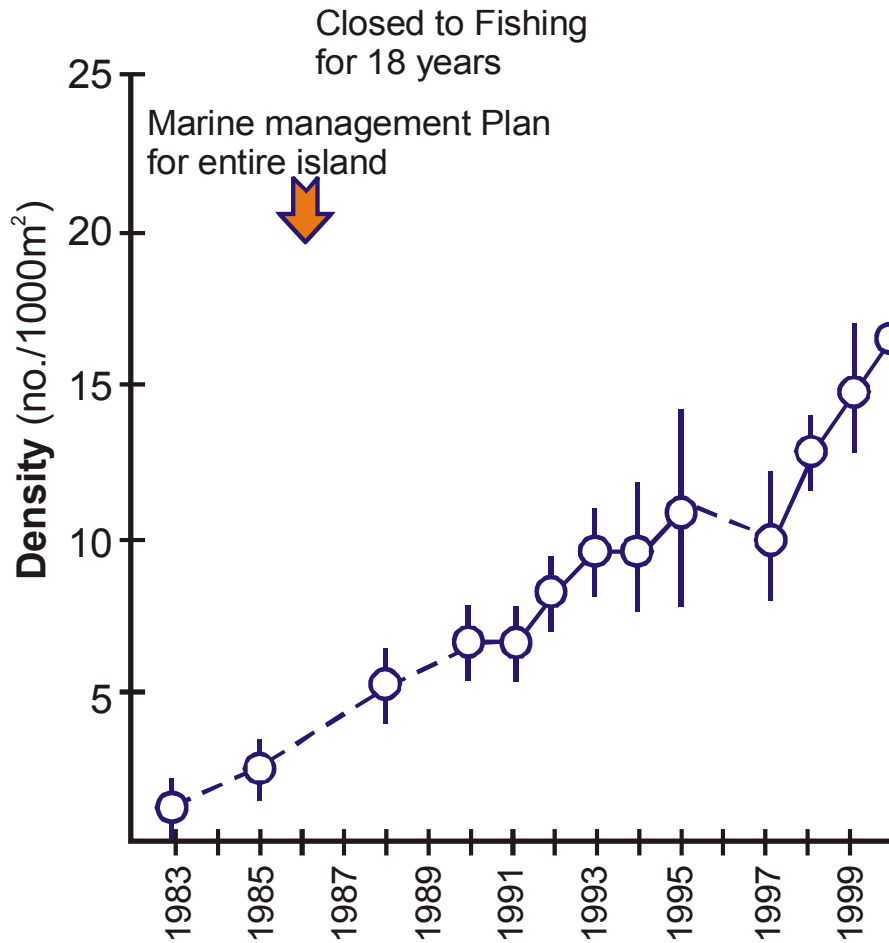


# Change in fish yield reported for Sumilon and Apo Island from 1976 through 1986, reflecting the effects of different management regimes

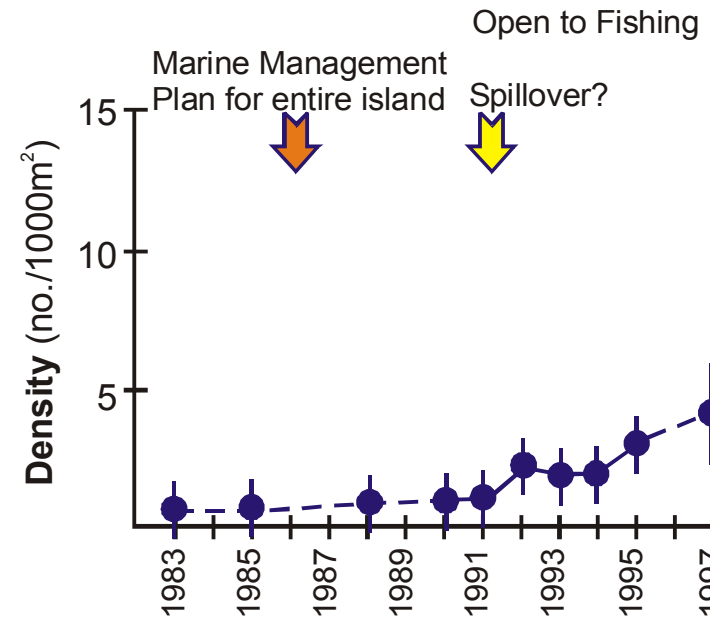


# Density of large predatory reef fish in Apo Island

## Apo Reserve



## Apo Non-reserve



Source: Russ and Alcala 2003

## Attributes of a good MPA

- Reasonable quality of resources, if habitat is poor, make it bigger and include more habitats
- Management committee organized and active with clearly defined roles and medium term action plan
- All sectors have a role in the sanctuary, women, fishers, youth council etc.
- At least 60% of community are willing to support the sanctuary
- Clear and strict guidelines developed through a series of consultations
- Clear, delineated and marked boundaries and zones with guidelines on the use of each zone
- Clear, attractive, well positioned and in local dialect, signboards



## Factors of the success of MPA

- Need a good initiator/facilitator with experience in implementation of coastal projects
- Counterparting of resources and involvement of all agencies with a mandate
- Involvement of all sectors of community and municipality – Co-management
- Continuous IEC
- Clear and strict guidelines for the sanctuary
- A good management committee is established with clear management plan
- Full-time guarding and patrolling
- Aware and well-informed community
- Budget allocated for future years
- Variety of strong leaders in the community as well as second liners



# Management Rating System

This simple rating system is dynamic and is not a definitive statement on the status of any MPA rated. *Put a check mark (✓) on the box provided if the criterion is fully satisfied or accomplished*

## Level 1: MPA is initiated - Passing (Year 1 since legal establishment) (1-6 points)

1a	MPA concept accepted <i>(MPA started through local initiative or social acceptance sought through public consultations by external groups. Consulted members of affected stakeholders: fishers, other resource users and social groups, both men and women.)</i>	
1b	Site surveyed using standard/accepted methods with baseline assessment complete, preferably conducted in a participatory process <i>(Reports completed on fish abundance, coral cover and profile on community and coastal management.)</i>	
1c	Site selected <i>(Site chosen based on baseline assessment results and public consultations.)</i>	
1d	Education program raising awareness about MPA functions and benefits started <i>(Conducted a series of public education activities.)</i>	
1e	Management body membership tentatively determined <i>(Management core group starting to conduct regular meetings with proper documentation.)</i>	
1f	Preliminary management plan drafted	

Management rating system (*continued*)**Level 2: MPA is established - Fair (Year 1 or 2 since legal establishment) (16 pts required)**

2a	Community acceptance gained and documented <i>(Documented through public consultation documents e.g. Barangay Resolutions and/or signature campaigns.)</i>	
2b	Ordinance passed and approved by the Municipal Council <i>(Ordinance should be well-drafted and enforceable and should be consistent with the concepts of sustainable use and equitable sharing of resources.)</i>	
2c	Management body formally organized and recognized <i>(Management group has legal mandate and is recognized by the local government; For POs – registered with the Security and Exchange Commission or Department of Labor and Employment.)</i>	
2d	Management plan adopted by community and LGU or PAMB <i>(Management plan initially implemented and endorsed by LGU/PAMB.)</i>	
2e	Management activities started <i>(Conducted initial MPA activities such as: installation of enforcement support structures, patrolling and surveillance, apprehension of violators, etc.)</i>	
2f	Biophysical monitoring includes local participation <i>(Locals were trained to do biophysical survey using standard/accepted method)</i>	
2g	IEC activities conducted to raise understanding on MPA rules and regulations <i>(MPA rules &amp; regulations disseminated using appropriate and practical means to target all direct users and other stakeholders; initial stakeholder knowledge assessment conducted)</i>	
2h	Anchor buoys, marker buoys and/or boundary markers installed	
2i	MPA rules and guidelines posted at strategic locations	
2j	MPA outpost or other structures constructed <i>(Guardhouse and/or other MPA-related structures constructed)</i>	

Management rating system (*continued*)**Level 3: MPA is enforced - Good (Only applies for 2 years or older) (24 pts required)**

3a	Education program sustained public awareness and compliance <i>(A long-term IEC program exists and is currently being implemented in support of enforcement and the general MPA objectives.)</i>	
3b	Regular biophysical monitoring measuring habitat condition and changes conducted <i>(Documented surveys conducted at least once annually using standard/accepted method.)</i>	
3c	Collaborative patrolling and surveillance conducted by mandated enforcement group and local community volunteers <i>(Fish wardens on rotation assigned to guard and patrol the MPA, day and night with assistance from local community volunteers.)</i>	
3d	MPA billboard signs, boundary markers and anchor buoys maintained <i>(Funds allocated for maintenance of enforcement support structures. May be part of the municipal CRM budget.)</i>	
3e	Management body active <i>(Implements the management plan; coordinates enforcement activities; members attend meetings regularly; coordinates and participates in regular monitoring activities.)</i>	
3f	Budget from local government or from other sources allocated and is accessible for MPA management <i>(There is a legal document by the local government or an agreement with the private sector allocating budget for MPA management.)</i>	
3g	Fishing effectively stopped inside of sanctuary zone <i>(No fishing-related violations/apprehensions reported in the sanctuary for the past year.)</i>	
3h	Illegal and destructive fishing reduced outside of MPA <i>(Violations/apprehensions reported within 500 m from the MPA boundary was reduced by 50% for the past year.)</i>	

Management rating system (*continued*)

**Level 4: MPA is sustained - Very good (Only applies for 3 years or older) (30 points)**

4a	MPA management plan updated in a participatory process <i>(Mgmt plan amended with the participation of various stakeholders: fishers, resort and diveshop operators, local government units, other resource users, both men and women.)</i>	
4b	Annual biophysical monitoring and feedback of results supervised by the managing body and implemented for 2 years or more <i>(Documented surveys using standard/accepted method. Reports are available.)</i>	
4c	Budget from government or from other sources allocated and was accessed for 2 or more consecutive years <i>(There is a legal document made by the local government or an agreement with a funding group allocating budget for MPA operations; financial report available.)</i>	
4d	Management body trained and capacitated to run the MPA independently <i>(Management body supervises management activities {implementation of plans, enforcement, budgeting, monitoring and evaluation} and coordinates activities with partners.)</i>	
4e	Enforcement system fully operational <i>(Enforcement group with mandate and workplan; enforcement support structures maintained and patrolling activities sustained over the years.)</i>	
4f	Illegal and destructive activities stopped inside and within the vicinity of MPA <i>(No violations/apprehensions reported inside and within 500 m from the MPA boundary in the past year.)</i>	
4g	Environment-friendly enterprise and/or user fees collected as a sustainable financing strategy <i>(Sells environment-friendly products/goods to tourists; imposes collection of user-fees; etc.)</i>	

Management rating system (*continued*)**Level 5: MPA is institutionalized - Excellent (Only applies for 4 years or older) (40 pts)**

5a	Information and education program on MPAs maintained over the years <i>(Information dissemination activities sustained according to long-term IEC program.)</i>	
5b	Ordinance passed by the Provincial Council giving MPA stronger political support <i>(Gives MPA institutional support to strengthen enforcement and collaboration.)</i>	
5c	Management plan refined for adaptive management <i>(Incorporates further refinements after gaining much experience and lessons to improve management strategies.)</i>	
5d	Management plan incorporated in the LGU development plan <i>(MPA incorporated within the long-term LGU area-wide development plan.)</i>	
5e	Evaluation of impacts on ecology & socio-economy conducted & feedback of results completed <i>(Assessment of resource status and long-term trends conducted. Analysis of change in local economy and long-term-trends of user groups conducted. Reports of these studies have been completed and reported back to stakeholders.)</i>	
5f	Revenues from enterprise and/or user fees sustained and accounted for <i>(Existing sustainable financing mechanisms are well-managed and well documented; financial reports easily accessible.)</i>	
5g	Management body capacitated for financial management and fund sourcing <i>(Management body is well-trained to manage funds effectively [Facilitates proper handling, wise use &amp; proper documentation]. They are also trained to seek for financial assistance [Formulated and submitted proposals].)</i>	
5h	MPA emphasizes on public education and is being used as a study tour site, residents advocate for MPA <i>(After much experience, members are ready to share lessons and impart knowledge. Presence of an identified group that conducts tours &amp; is capable of giving talks on MPA; Paper/s written on their success stories published.)</i>	
5i	Expansion strategies or enhancement programs initiated <i>(MPA coverage is expanded, e.g., from a sanctuary to a park, or scope of conservation activities is heightened, e.g., coral reef restoration, re-seeding of clams, etc.)</i>	

Management rating system (continued)

Total points accumulated: \_\_\_\_\_

- Total possible points: 40
- All points are cumulative.
- Points from higher levels can be used to satisfy lower rating levels.
- Adapted from the work of the Coastal Resource Management Project team of Negros Oriental (William Ablong and Erwin Dolumbal) with assistance from A. White, 2001.

<p>Priorities for improved management: (Choose top 3 answers)</p>	<p><input type="checkbox"/> Lack of community awareness and support</p> <p><input type="checkbox"/> Weak government support</p> <p><input type="checkbox"/> Weak law enforcement</p> <p><input type="checkbox"/> Lack of a sustainable financing mechanism</p> <p><input type="checkbox"/> Need for management capacity development</p> <p><input type="checkbox"/> Politics</p> <p><input type="checkbox"/> Multiple resource use conflict</p> <p><input type="checkbox"/> Lack of supplemental and alternative livelihood</p> <p><input type="checkbox"/> Others, specify: _____</p>
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Name(s) of assessor, position and affiliation: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

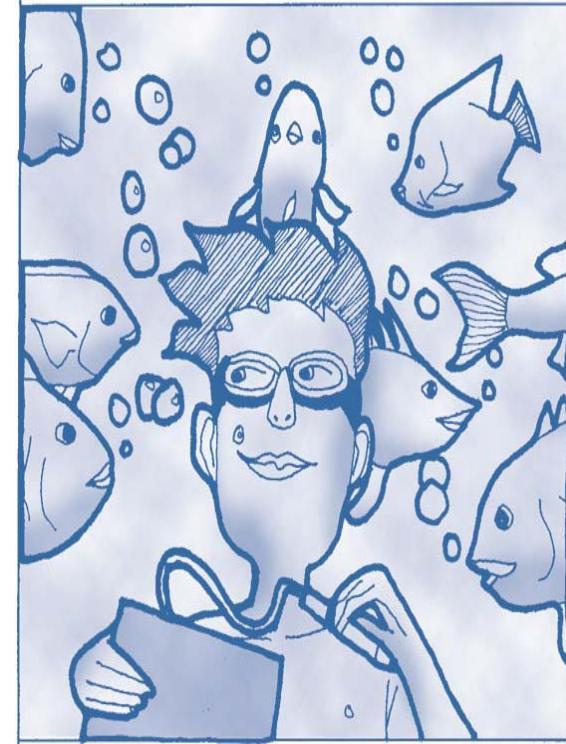
Contact information (Phone, fax, email, postal address): \_\_\_\_\_

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## Lessons learned and recommendations

- Slowly go at the pace of the community
- If there are problems go back a step and start again
- Need a good area that will give other positive results within one year
- Strong IEC even after establishment
- It is a process which takes 6 months to two years to implement
- Include large buffer zone with restricted fishing gears
- Include landward section and other habitats in the area
- Monitor it!
- Have a formal launching ceremony
- Be open to offer technical assistance even after establishment
- Staff should have a technical background
- Make the guardhouse an education center
- Make the sanctuary a showcase with other visitors if it is doing well



# MPA Establishment and Management Process and Community Organizing



# Criteria in selecting MPA

## Ecological importance

- Contributes to maintenance of essential ecological processes or life support systems, e.g. source for larvae for downstream areas;
- The degree to which the area, by itself or in association with others;
  - ✓ has a complete ecosystem (mangrove, seagrass, coral reefs)
  - ✓ contains diversity of life forms (high coral cover)
  - ✓ is a critical habitat for rare or endangered species (Dugong, sea turtle, etc.)
  - ✓ contains nursery or juvenile areas
  - ✓ contains important feeding, breeding or rest areas
  - ✓ preserves genetic diversity, i.e. diverse and abundant in terms of species.

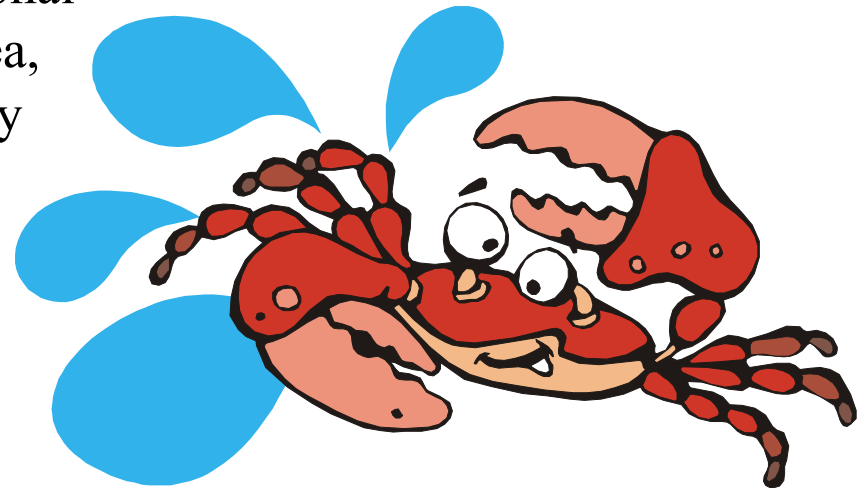


## Social importance

- Existing or potential value to local, national or international communities because of heritage, historic, cultural, aesthetic, educational or recreational qualities
- The degree to which the area impacts on the community (who and how many will be adversely affected)

## Economic importance

- Existing or potential contribution to economic value by virtue of protection of recreation, subsistence use by traditional inhabitants, tourism, refuge, nursery area, and recruitment source for commercially important species.



## Practicality/feasibility considerations

- Degree of insulation from external destructive influences
- Social and political acceptability
- Community support
- Accessibility for education, tourism, recreation
- Compatibility with existing uses, particularly by locals
- Ease of manageability (location, area covered)
- Compatibility with existing management regimes



# Phases and activities for MPA establishment and management within local government jurisdictions

Phases of Coastal Management	Stages and activities for MPA Establishment and Management
1. Issue identification and baseline assessment	Recognition of a need and program preparation Integration with the community and assessment of issues 1. Community organization and mobilization 2. Conduct of baseline studies 3. Information, education and communication
2. Plan preparation and adoption	Definition of goals and objectives: Formation of the core group and development of the management plan 1. Formation of the core group 2. Definition of goals and objectives 3. Preparation of management strategy and action plan 4. Determination of reserve boundaries and zones

Phases and activities ... (continued)

Phases of Coastal Management	Stages and activities for MPA Establishment and Management
3. Action plan and project implementation	Implementation: Formalization of the reserve, implementing management strategies, enforcement, and community strengthening <ol style="list-style-type: none"> <li>1. Formalization of the reserve through local ordinance</li> <li>2. Implementation of strategies for managing the reserve</li> <li>3. Enforcement</li> <li>4. Permits and user fees</li> <li>5. Strengthening of community involvement</li> </ol>
4. Monitoring and evaluation	Monitoring and evaluation Refinement of the management plan
5. Information management, education, and outreach	Review of status of MPA and its benefits Refinement of education program from experience Development of outreach program as appropriate

# A conceptual framework for community-based marine sanctuaries in the Philippines

Steps in the process	Time (months)	Actions taken	Intermediate and final outcomes
1. Community entry, preparation and appraisal	3-6	<ul style="list-style-type: none"> <li>➤ Larger community consultation for initial identification of issues</li> <li>➤ Community site selected</li> <li>➤ Field officer assigned full-time to the community</li> <li>➤ Baseline surveys conducted</li> <li>➤ Selected PCRA activities conducted</li> <li>➤ Informational meetings (formal and informal) and discussions concerning the project and goals</li> <li>➤ Preliminary public education activities carried out</li> <li>➤ Community core group identified</li> <li>➤ Stakeholder analysis conducted and identification of PCRA participants</li> </ul>	<ul style="list-style-type: none"> <li>➤ CRM issues in the community identified</li> <li>➤ Socioeconomic, cultural and environmental context understood by project team and members of core group</li> <li>➤ Widespread community understanding of project objectives and approach</li> <li>➤ Information of resource status gathered</li> </ul>

A conceptual framework ... (continued)

Steps in the process	Time (months)	Actions taken	Intermediate and final outcomes
<p>2. Planning including:</p> <ul style="list-style-type: none"> <li>▪ Public education</li> <li>▪ Capacity building</li> <li>▪ Community consultation</li> <li>▪ Ordinance formulation</li> </ul>	<p>12-24</p>	<ul style="list-style-type: none"> <li>➤ Cross-visits with successful marine sanctuary sites</li> <li>➤ Public education on coral reef ecology, marine sanctuary concept, environmental laws and enforcement</li> <li>➤ Training on community monitoring and mapping of reef</li> <li>➤ Selected early actions on issues of concern to the community implemented</li> <li>➤ Training on financial management and accounting</li> <li>➤ Study tour, training or development of potential supplemental livelihood opportunities such as tourism</li> <li>➤ Community core group training on coastal management</li> <li>➤ Community ordinance contents drafted</li> <li>➤ Community consultation meetings and discussions (formal and informal) conducted</li> <li>➤ Community ordinance revised and final version completed</li> </ul>	<ul style="list-style-type: none"> <li>➤ Community understanding of human impacts on coastal resources, environmental laws and sanctuary concept</li> <li>➤ Map of the coral reef developed by the community to be used as basis of marine sanctuary site selection</li> <li>➤ Community awareness of local coral reef conditions and capacity for on-going monitoring established</li> <li>➤ Widespread community support for the project objectives and marine sanctuary concept</li> <li>➤ Community capacity for participatory planning, implementation and fund management strengthened</li> <li>➤ Community capacity to address CRM problems with simple solutions strengthened</li> <li>➤ Widespread participation of stakeholders in planning</li> <li>➤ Widespread/majority community consensus on marine sanctuary location, size, allowable and prohibited activities, sanctions and management arrangements</li> </ul>

*A conceptual framework ... (continued)*

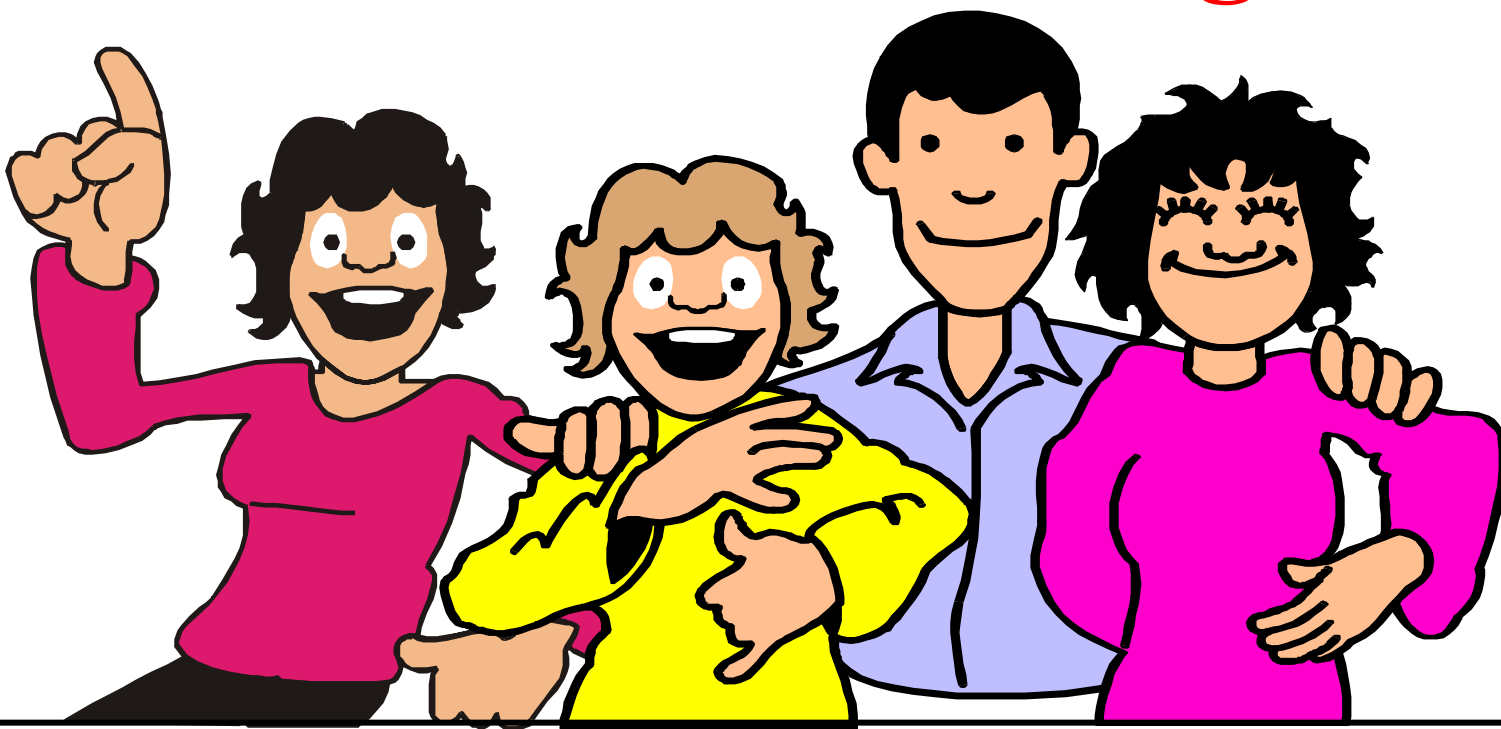
<b>Steps in the process</b>	<b>Time (months)</b>	<b>Actions taken</b>	<b>Intermediate and final outcomes</b>
<p><b>3. Community ordinance approval</b></p>	<p><b>1-12</b></p>	<ul style="list-style-type: none"> <li>➤ <b>Vote of approval for the sanctuary at a community meeting(s) and by barangay resolution</b></li> <li>➤ <b>Approval and signatures on the municipal ordinance by the municipal council</b></li> <li>➤ <b>Review of municipal ordinance by the province</b></li> <li>➤ <b>Formal opening ceremony conducted with government representatives in attendance</b></li> <li>➤ <b>Funding mechanisms for implementation (donations, fees, fines, grants, endowments, gov. Allocations, etc.) identified and planned</b></li> </ul>	<ul style="list-style-type: none"> <li>➤ <b>Formal acceptance of the marine sanctuary by the community and local government</b></li> <li>➤ <b>Sound legal basis for management and enforcement</b></li> <li>➤ <b>Financial resources for implementation determined</b></li> </ul>

A conceptual framework ... (continued)

Steps in the process	Time (months)	Actions taken	Intermediate and final outcomes
4. Implementation and adjustment	∞ (forever)	<ul style="list-style-type: none"> <li>➤ Boundary markers installed and maintained</li> <li>➤ Information signboards installed</li> <li>➤ Management plan developed</li> <li>➤ Management committee meeting</li> <li>➤ Reef and fisheries monitoring conducted</li> <li>➤ Enforcement actions occurring</li> <li>➤ Sanctions taken against violators</li> <li>➤ Public education ongoing</li> <li>➤ Implementation activities budgeted</li> <li>➤ Implementation funds received, spent and accounted for</li> <li>➤ Coordination and networking with external technical, financial or organizational support institutions occurring</li> <li>➤ Program monitoring, evaluation and adjustment by the community ongoing</li> </ul>	<ul style="list-style-type: none"> <li>➤ High compliance with rules governing the marine sanctuary</li> <li>➤ Effective management of the marine sanctuary occurring</li> <li>➤ Improved coral cover inside the marine sanctuary</li> <li>➤ Increased fish abundance and diversity in the sanctuary</li> <li>➤ Increased catch of reef-related target fish species adjacent to the sanctuary</li> <li>➤ Other quality-of-life improvements/benefits for the community attained</li> <li>➤ Sufficient resources (financial or in-kind) for the implementation allocated, obtained and utilized</li> <li>➤ Access to outside support systems maintained</li> <li>➤ Management measures adjusted as needed</li> </ul>

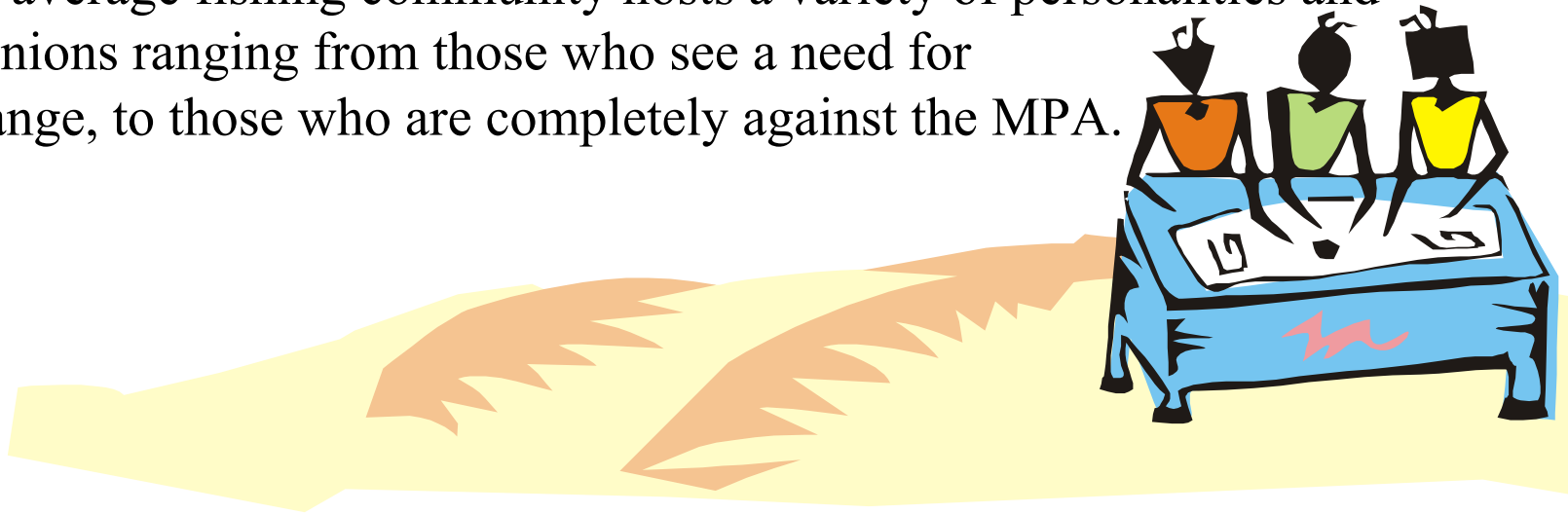
Source: Crawford, B., M. Balgos, C. Pagdilao. 2000. Community-based sanctuaries in the Philippines: A Report on Focus Group Discussions. Coastal Management Report #2224. PCAMRD Book Series No. 30. CRC. pp. 26-27.

# Information, Education and Communication Strategies in Marine Protected Area Establishment and Management



# Why info campaign for MPAs is necessary?

- A very high level of public information and awareness raising is required for MPAs
- The MPA is also a tool which causes the most misperceptions as to its objectives and what it is to do
- Most fisherfolk think that it will do harm to them by removing a fishing ground (and normally their best fishing ground if site selection is carried out properly), but if explained properly however these misconceptions can be dismissed.
- An average fishing community hosts a variety of personalities and opinions ranging from those who see a need for change, to those who are completely against the MPA.



## Some critical comments usually encountered

*“What right to remove the fishing ground that my father’s grandfather fished in!”*

*“We have a hard enough life and now you want to take away all our fishing rights in the area and therefore livelihood.”*

*“Ang mga philosopho...”*

*“Be prepared!”*



## Planning your info campaign

- Info campaigns have to focus on pre-, during, and post-establishment phases, being a cross cutter for the different parts of the cycle.
- Most public education campaigns have been aimed specifically at fisherfolk organizations and only to a few other members of the community.



## Hands-on lessons in Bohol

- **Balance:** the staff, a potent mix, is composed of community organizers with solid technical backgrounds, e.g. fisheries graduates with experience in community organizing.
- **Concepts and examples:** ideas relevant to the daily life of the fisherfolk must be stressed, for example, what has worked well in Bohol is to explain the MPA as a SEA BANK, an area which will act as a long term bank account with interest that will grow over time. If easy concepts are used the fishers will remember them and be able to do most of the dissemination themselves.



## Hands-on lessons ... (continued)

- **Feedback:** The facilitating staff must also be able to feedback the progress and/or any misconceptions. In a project of this kind it is very common that there are large misconceptions and they must be addressed as soon as they arise, either by the fishers themselves or with the help of the facilitator.
- **Hands-on:** This approach should be adopted. All staff and beneficiaries should be involved in all project components, like in manta tows, resource assessment, teaching the fisherfolk how to conduct semi-scientific research, etc.



## Hands-on lessons ... (continued)

- **Localize:** Everything, from language to trainers, use local beliefs, local examples, local names of fish /resources etc.
- **Popular education:** These techniques work best; be creative. Games, acting, role plays all should be used within the trainings and more importantly are fun and therefore get remembered!
- **Production:** Written materials about the MPA; this needs to be done with a lot of graphics and be written in the local dialect and can be very cheap and effective if properly done.



## Hands-on lessons ... (continued)

- **Trust:** Must be gained from the community as much as possible; sometimes it is much more effective to sit down and (optional) have a glass of tuba (coconut wine) and listen to the fishers than to keep giving seminars / workshops etc.
- **Visuals:** Use as many as possible, videos, (even better of local area underwater photos, (needn't be expensive or technical, use disposable cameras), leave the outputs behind.



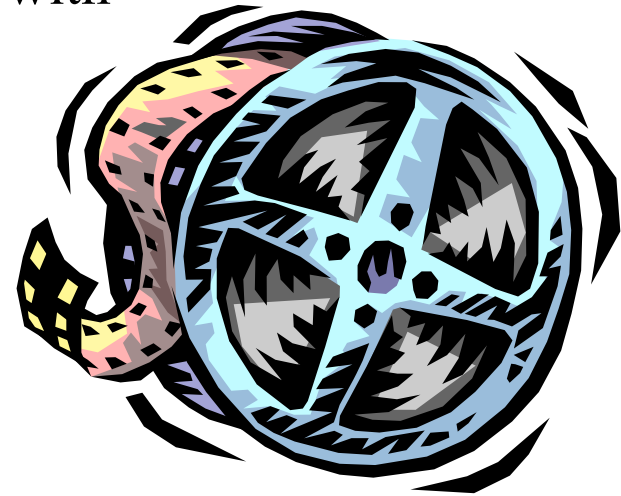
Hands-on lessons ... *(continued)*

- **Documentation:** of whole process, involving the community in the process; such as by doing a short, rough video of the whole process, or the community writing their own documentation alongside the facilitator etc.
- **Monitor and Evaluate:** the whole process, a lot of feed-backing is required to facilitate good community relations and better plans for the future.



## IEC bits and bobs

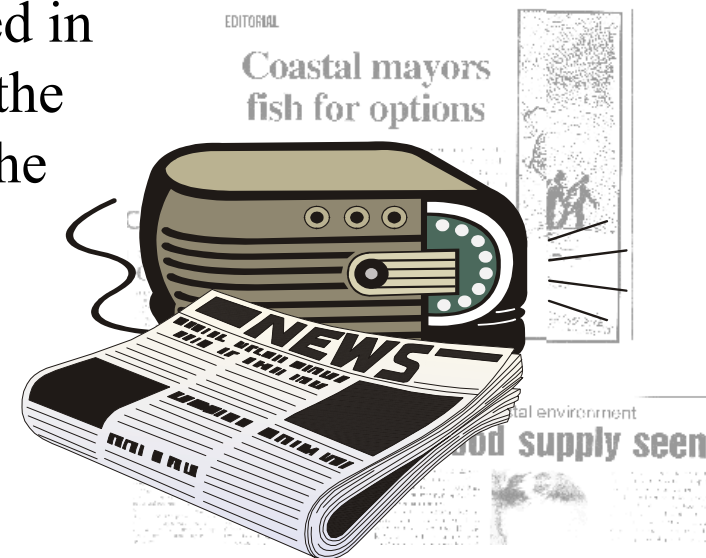
- **Homemade videos:** Very effective, perhaps with an underwater camera (expensive) doing a time series analysis of the sanctuary and interviews with the fishers about the area.
- **Television:** Usually expensive and sometimes will not reach people without television (most fisherfolk in Bohol); this depends on your budget. A cheaper way is to produce a local video and then ask the local cable channel to play the video or show it in the *barangay*, it is enjoyed a lot by the local community and helps a lot in the education process.



## IEC bits and bobs (continued)

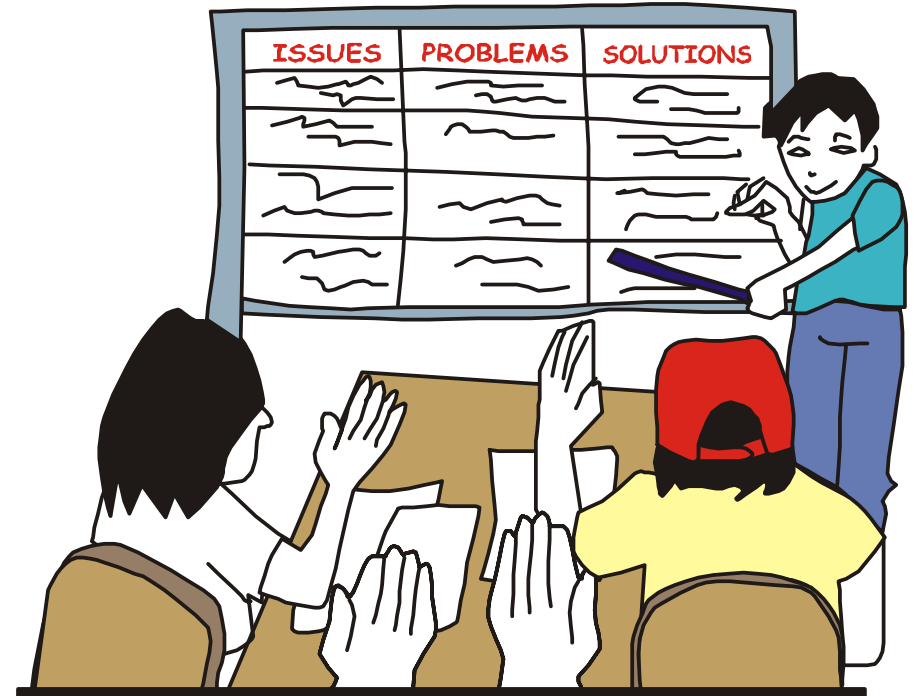


- **Radio:** Very effective in the *barangays* as most fishers own radios. Again, target local radio stations to begin with and those that use the local tongue. This can also reach far flung *barangays* who otherwise would not hear of such tools.
- **Newspapers:** Target local newspapers; It is a sure way of getting to the local influential people. One newspaper in Bohol developed a section about the environment specifically for NGO's. Also, journalists are usually quite interested in environmental stories. If the stories are good enough the local journalists can help you look for more national coverage.



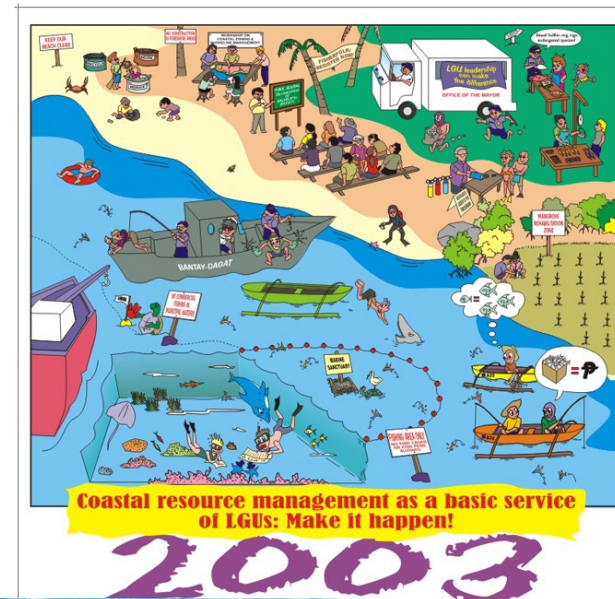
IEC bits and bobs (*continued*)

- **Meetings/trainings/workshops:** Often held to discuss particular agendas and can involve very diverse groups of people; A very good place to learn and listen to different opinions and why the people feel that way regarding the MPA etc. Should encourage participation of all sectors of the community and have a good facilitator.



IEC bits and bobs (*continued*)

- **Comics/Fisherfolk publications:** These can be used to disseminate information at the local level; They must be only a few pages long, be in local language and have a clear point relating to daily life with plenty of illustrations; can be produced very cheaply and one copy can reach at least one whole family if well presented.
- **Posters/calendars/fixed exhibits:** Very effective if placed in the correct place; A poster with underwater photos of the sanctuary can be very effective as long as it is done well and in local language etc. A calendar will stay on a wall for a year! Barangay monitoring boards;



## IEC bits and bobs (continued)

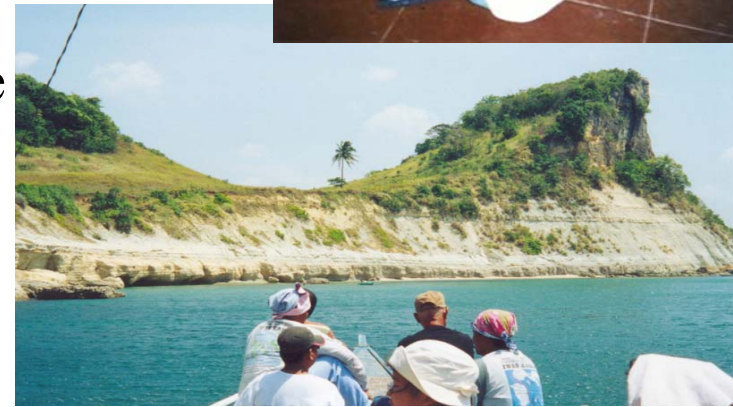


- **T-shirts:** Sometimes very helpful in helping with awareness raising e.g. All the fishery wardens or all the members of an organization etc. They are often a good conversation starter and the person wearing the t-shirt is someone who is bound to be quite active and aware.
- **Sponsoring events:** Local events can be sponsored such as basketball competitions or even a disco held by and for the local fisherfolk. Theme nights about the sea, such as an environmental concert where the fisherfolk all write and sing songs about the changes in the sea in the last twenty years in their *barangay* are also very effective.



IEC bits and bobs (*continued*)

- **Curriculum development:** We have been able to involve the local schools in the process and have waged a strong Primary and High School advocacy campaign in two of our project areas. This has included inserting some coastal ecology into the syllabus within the High Schools. The DECS system has its subjects with ‘Minimum Learning Competencies’ and there is ample room for entry of basic marine ecology if the school teachers are open to it.
- **Cross-visits** of the teachers and students to an MPA is a good entry point, especially if the MPA is nearby. Our experiences include students who have conducted their High School science projects on the effects of a local MPA, along with them presenting a drama at the local fiesta, and other activities such mangrove reforestation, poster competitions etc. Very effective!



IEC bits and bobs (*continued*)

- **Recreational activities:** One strategy which has worked very well with local politicians and government agencies is to hold picnics/ snorkeling days at sea. These are fun and with capable staff it can enable a lot of informal education.



# Resource Mapping and Baseline Data Gathering



## Criteria for site selection

1. Ecological importance
2. Social importance
3. Economic importance
4. Practical
5. Other criteria  
(urgency, effectiveness, manageability)



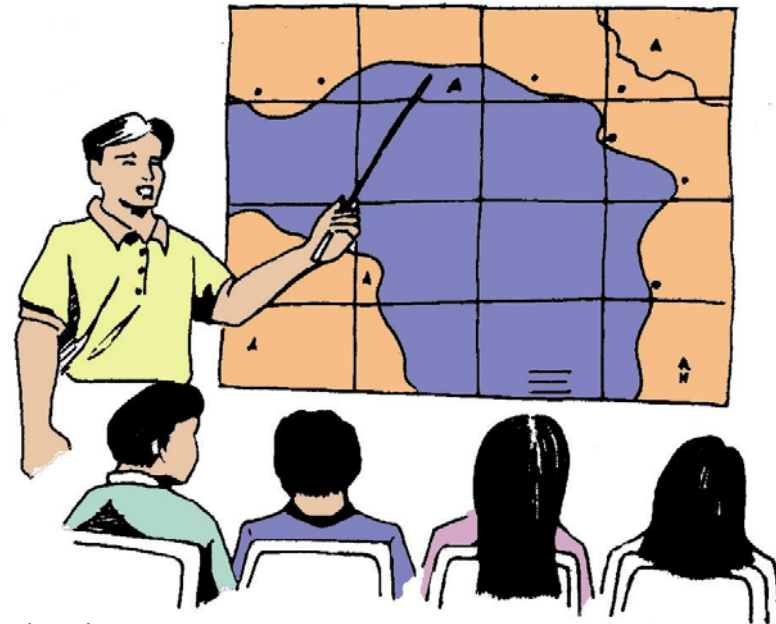
## Steps in resource mapping

- Select group which represents many sectors of the community
- Conduct at least a one-two day site selection PCRA picking 2-3 sites with the community and have the groups collect data about the areas in the morning using the fish visual census and manta tow techniques.
- Use MPA Report Guide to store data

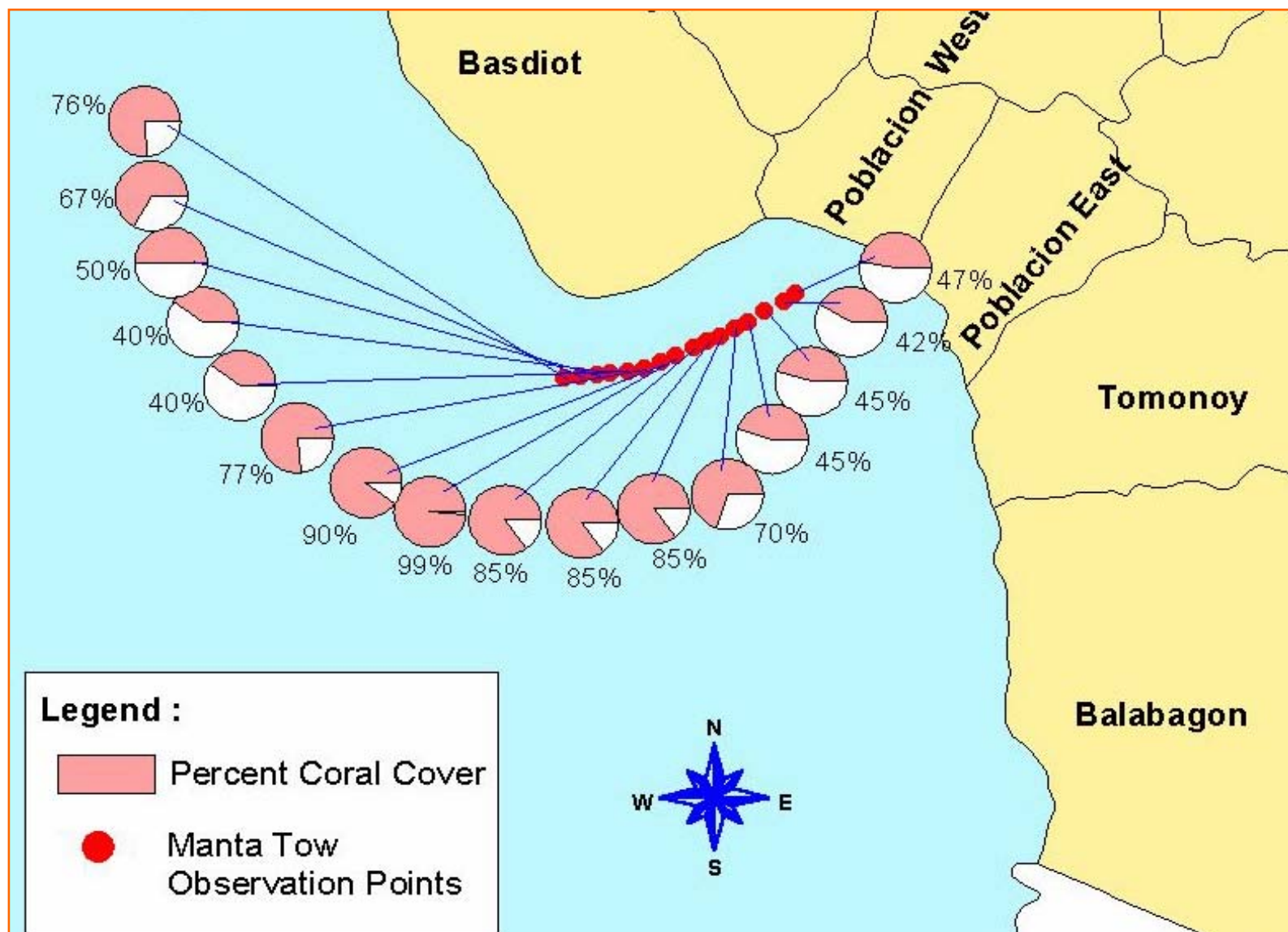


## Steps ... (continued)

- Present the results to the group and give a small input regarding the siting and selection of areas as well as size needs with local NGO or facilitating institution
- Incorporate the site selection criteria mentioned to add other information about the area and to build up a picture of each area, thereby, determine the best choice.
- Include information like closeness of houses, ease of patrolling and duties, current uses e.g. *bunsod*, diving area etc.
- After this have the group decide on what area is best based on your criteria
- Hint to have older members of the community and fisherfolks help you out.



# Manta tow output showing percent coral cover



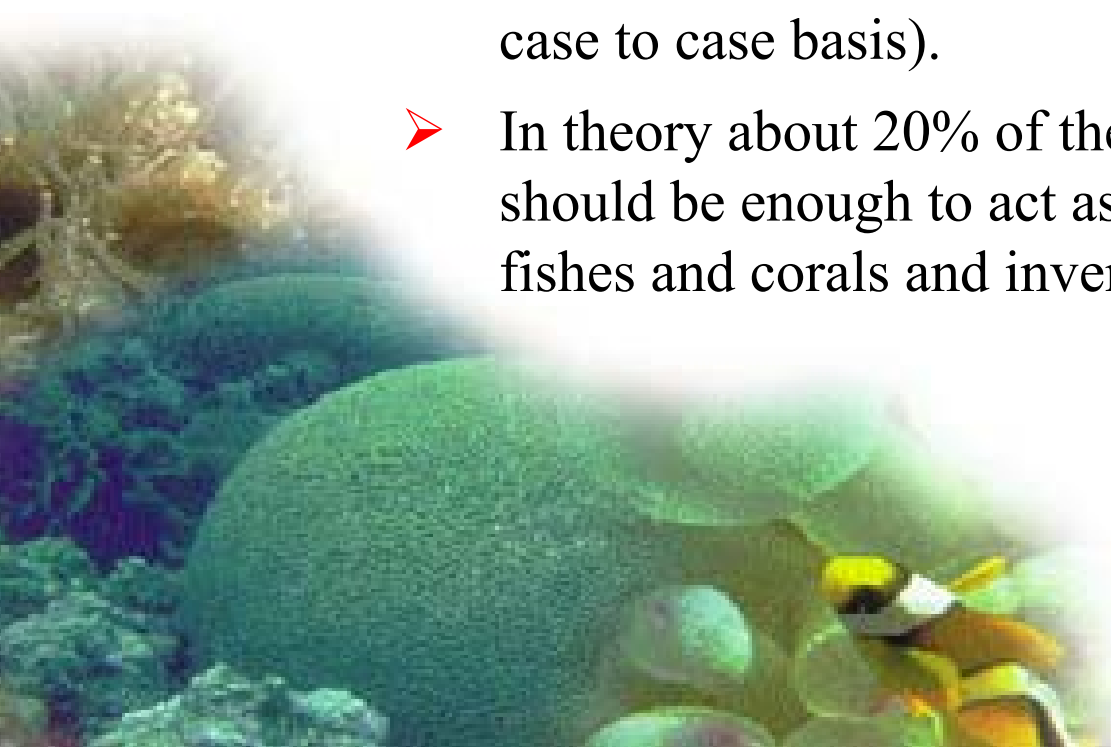
## Size and shape of sanctuaries

- Better to have larger sanctuaries (in theory).
- All sanctuaries are helping, many processes unknown still and even in a massive area with low habitat there may be larval, eggs and other impacts which are unseen
- Smaller reserves will look after smaller range fishes, larger sanctuaries will allow for fishes with larger ranges.  
(predators large ranges) damselfishes anemone fishes small range



## Opportunity cost

- It is actually quite expensive to set up, manage, and patrol a sanctuary.
- In Bohol, the limit is set up to about 10 hectares minimum for a sanctuary. This will insure that the impact and return on fish catch of the sanctuary is worth the investment and sacrifice of the fisherfolks (again case to case basis).
- In theory about 20% of the fishing ground or habitat should be enough to act as “insurance policy” for main fishes and corals and invertebrates within the area



## Design

- Should try and include land as part of area and should block off the whole of an area (easier enforcement and some species still move onto land occasionally, etc.)
- Should try and include coral reefs and other associated habitats and nursery grounds such as seagrasses, mangroves etc.

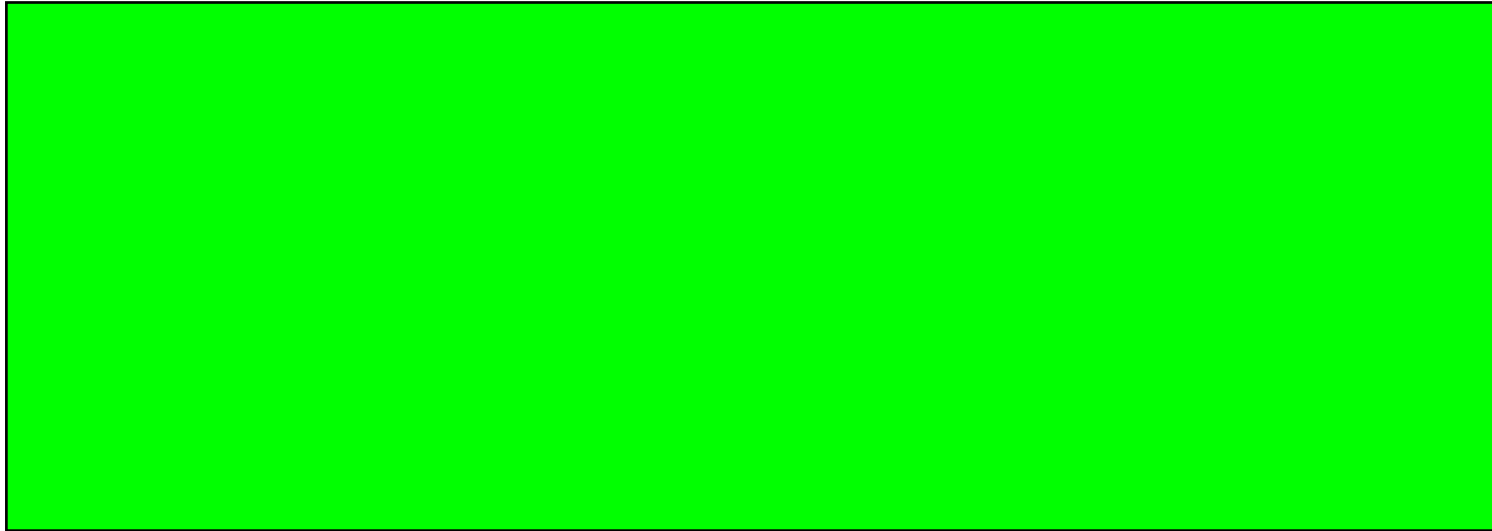


## Surface area to volume ratio

‘Leakage’ concept possible designs for a 10-hectare sanctuary

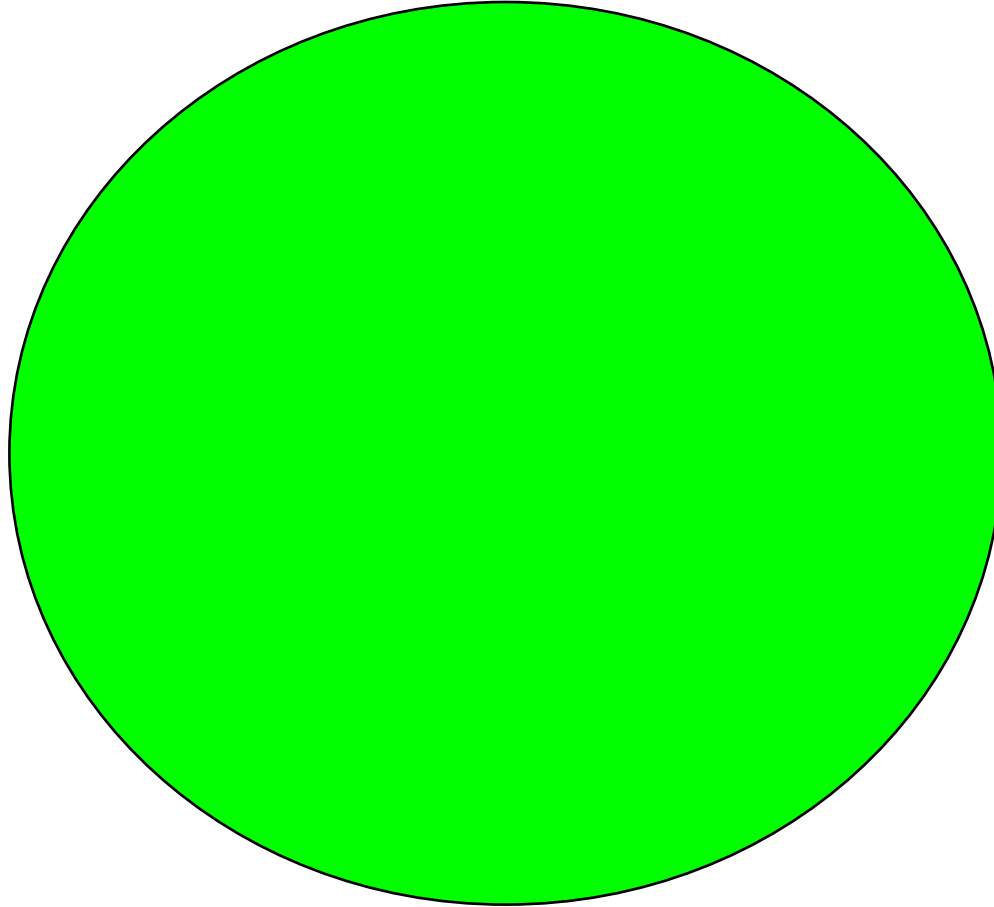
### Rectangle

*1000\*100 Large surface area, more leakage*



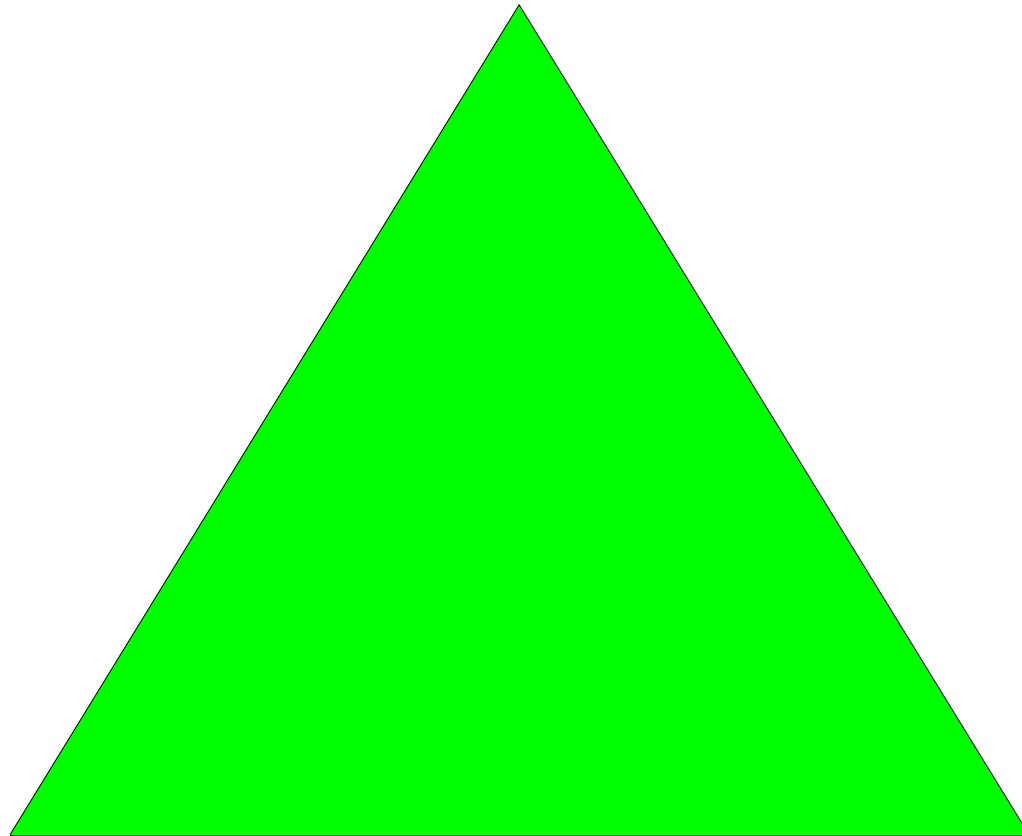
## Circle

*Medium size surface area to volume ratio*



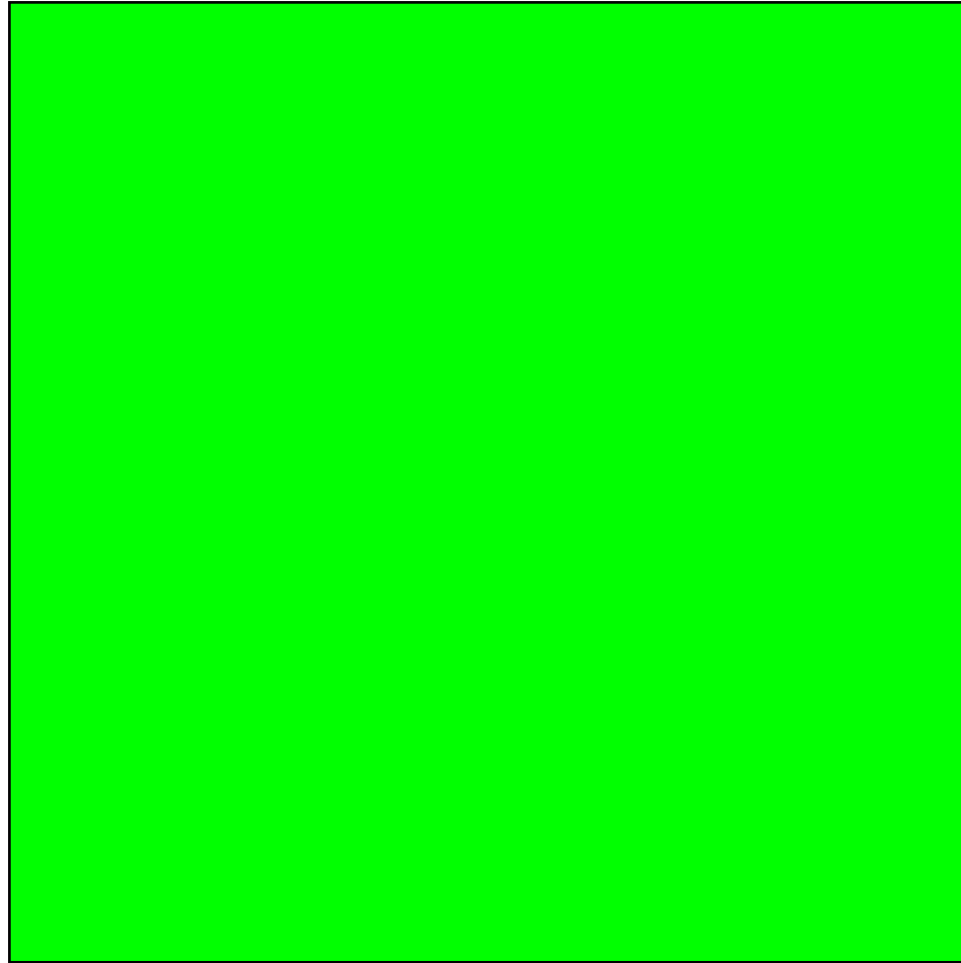
## **Triangle**

*Large area for leakage*



## Square

*Smallest surface area compared to volume*



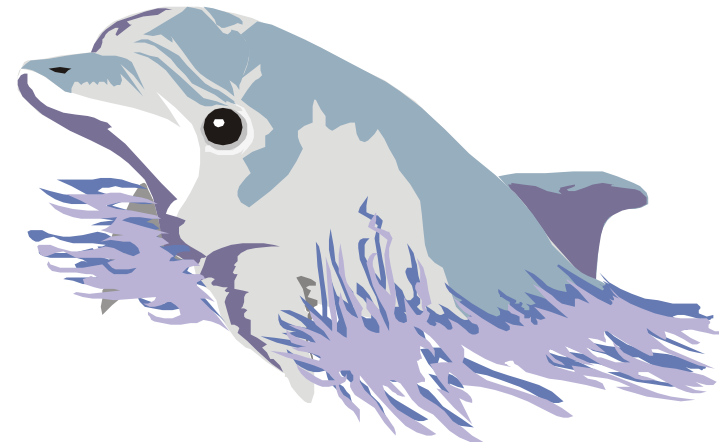


## Practical reminders

- Remember to fit your optimum area around the features of the reef (i.e., drop off, inshore portion, etc).
- Rules of thumb: Lots of guess work, ask the older fisherfolks!
- Try and fit in with the features of the reef and area, i.e. drop off reef crest include all of this and then perhaps add 100-200 meters extra etc.

## Placement conclusions

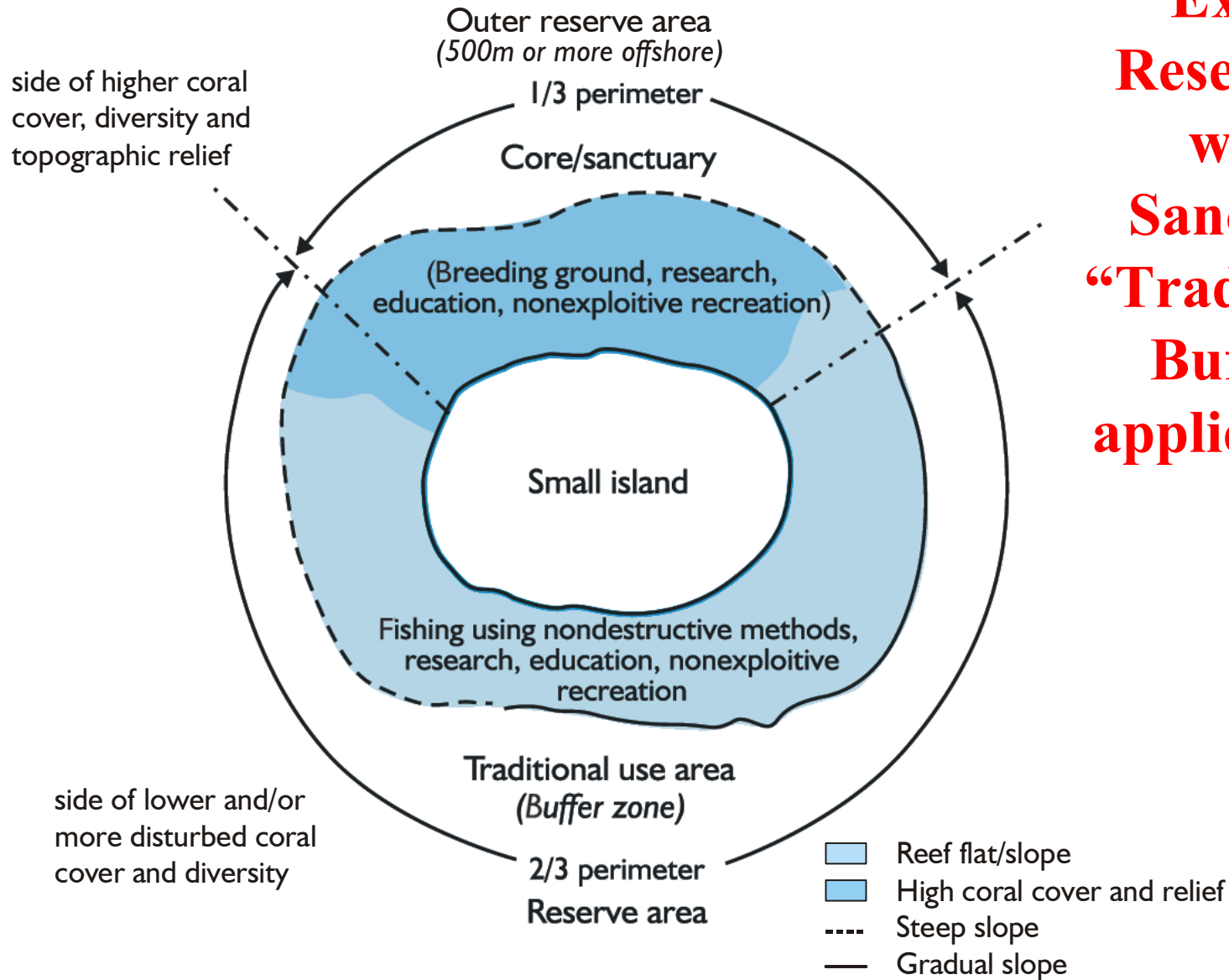
- Should involve community in whole process
- Use mapping as mainstay of process to identify what is the best areas
- Involves compromises
- Consider both social and biological factors
- Include adjoining ecosystems and habitats which fishes use e.g., seagrass with corals etc.
- Include land if possible
- Put it in an area which is easy to protect (visible)
- Put it in an area where there are few full time fishers
- Keep boundaries practical, logical and easy to locate
- Talk to the older fishers!



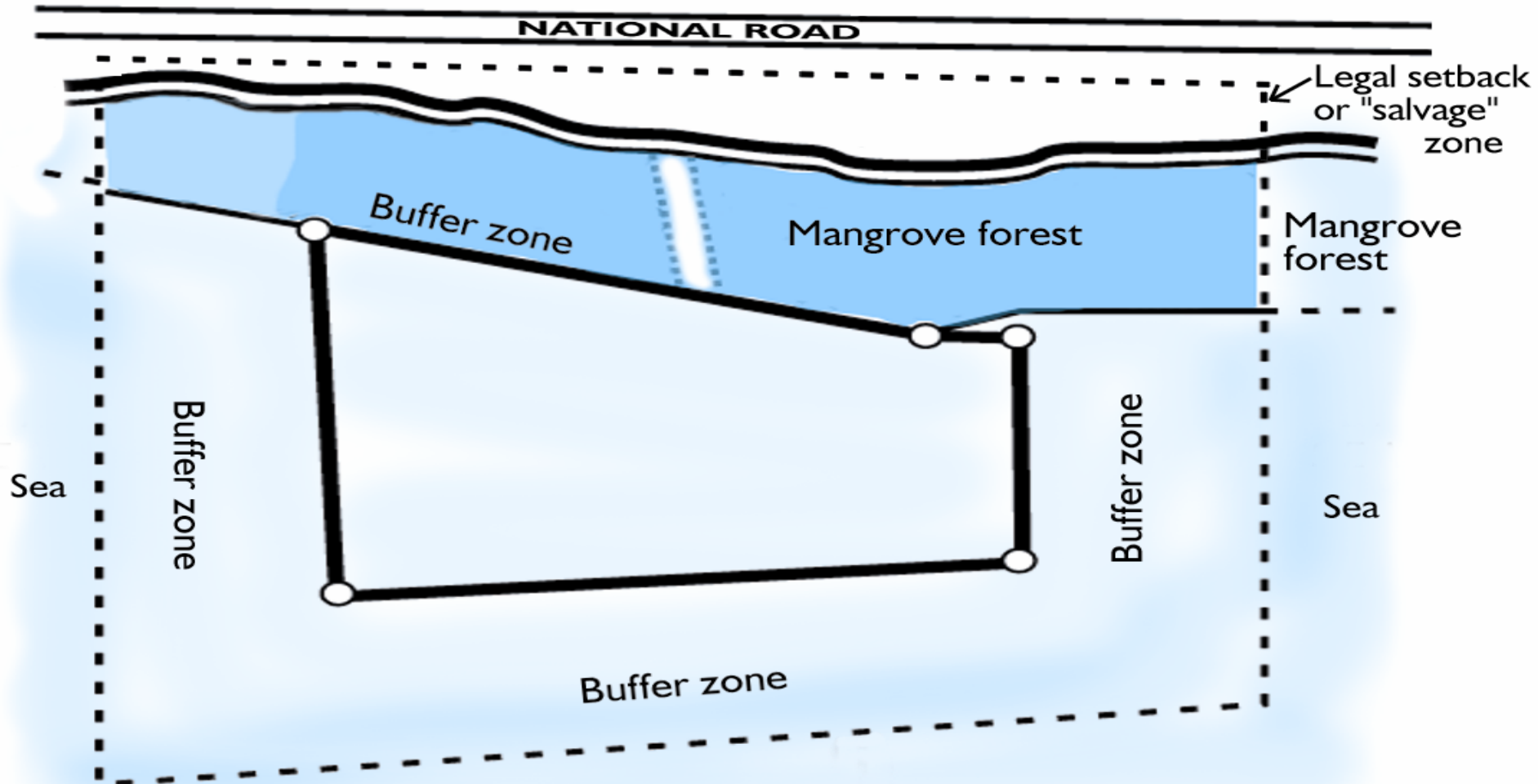
# MPA Plan Preparation and Zoning



**Example of Reserve System with Core Sanctuary and “Traditional Use” Buffer Areas applied to islands**

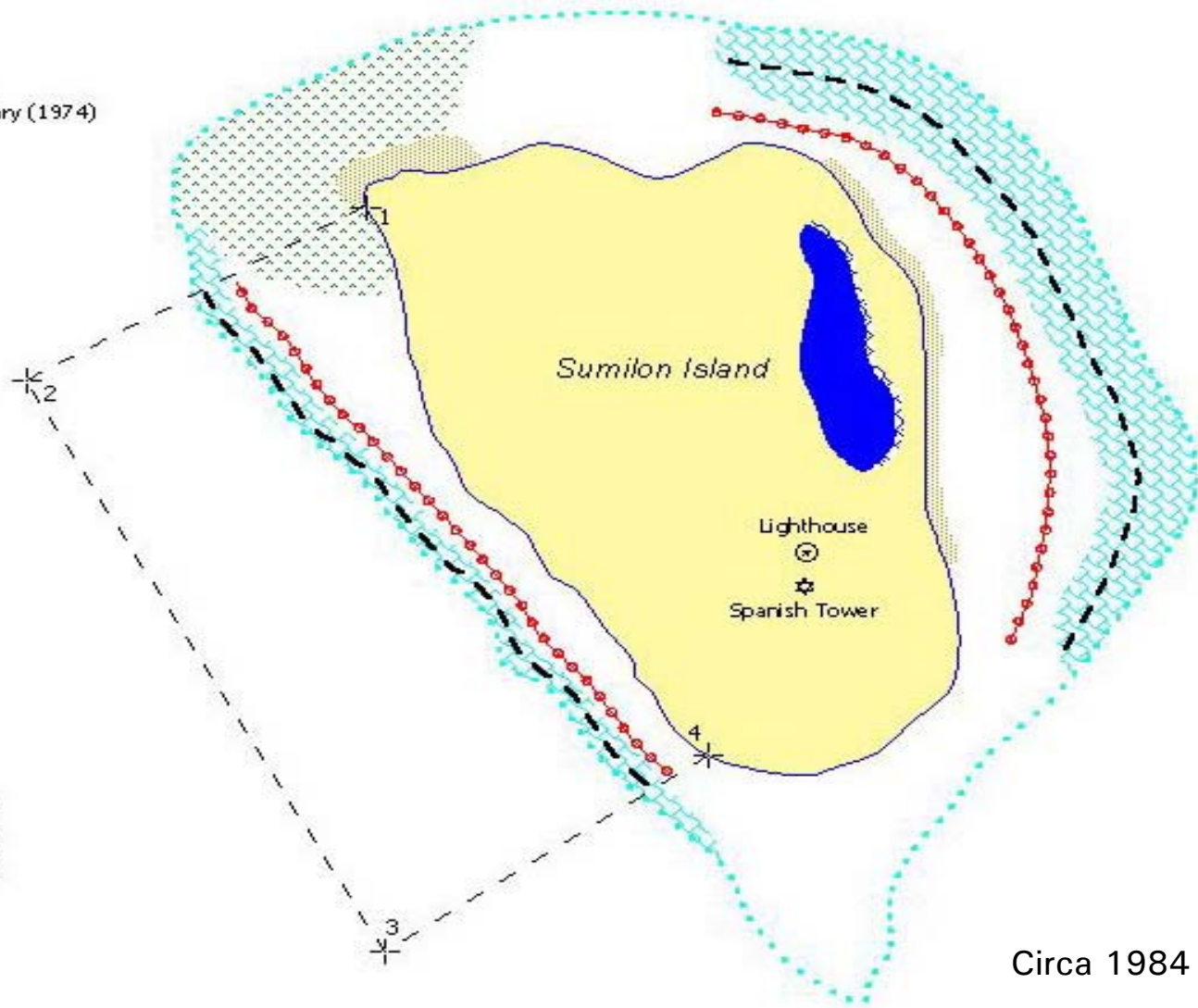
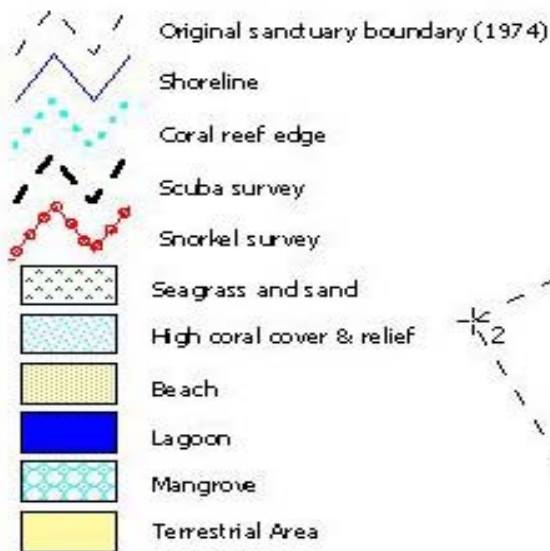


The “box and border” model where a sanctuary is established along the coastline and a buffer zone of a certain width is created around its perimeter to form the “reserve area”



# Sumilon Island, Cebu : Sanctuary (core) and Reserve

Legend:



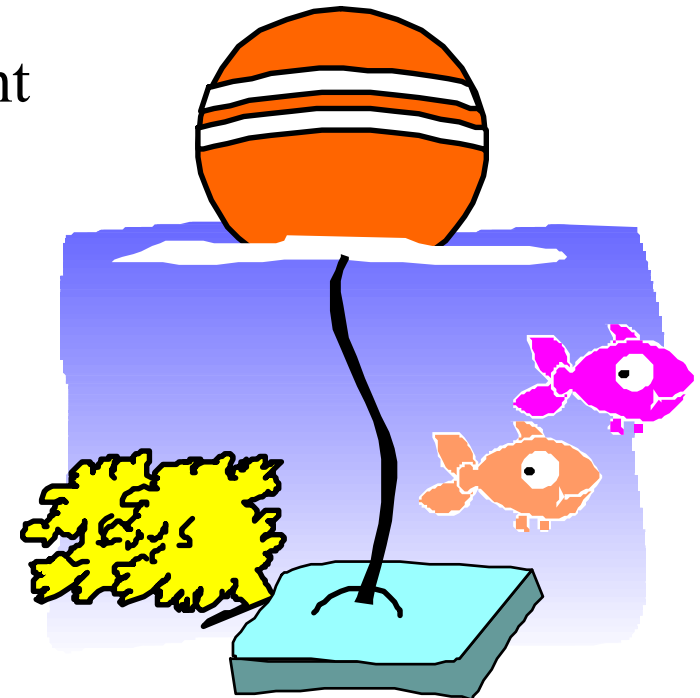
Sanctuary coordinates  
(Amended 1999):

- 1 - 9° 26' 08" N 123° 23' 07" E
- 2 - 9° 26' 02" N 123° 22' 57" E
- 3 - 9° 25' 42" N 123° 23' 18" E
- 4 - 9° 25' 49" N 123° 23' 18" E

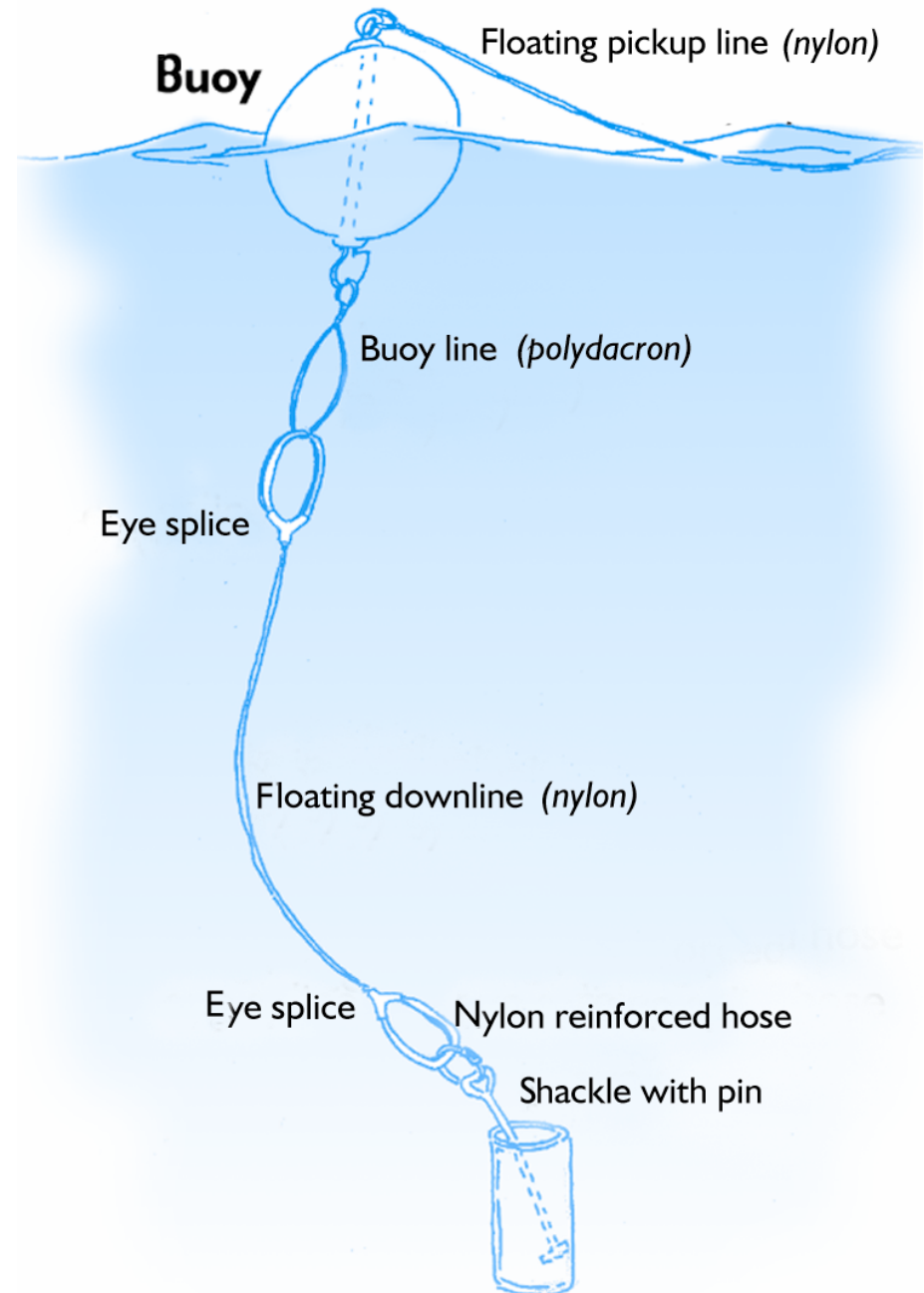
Circa 1984

# Buoys

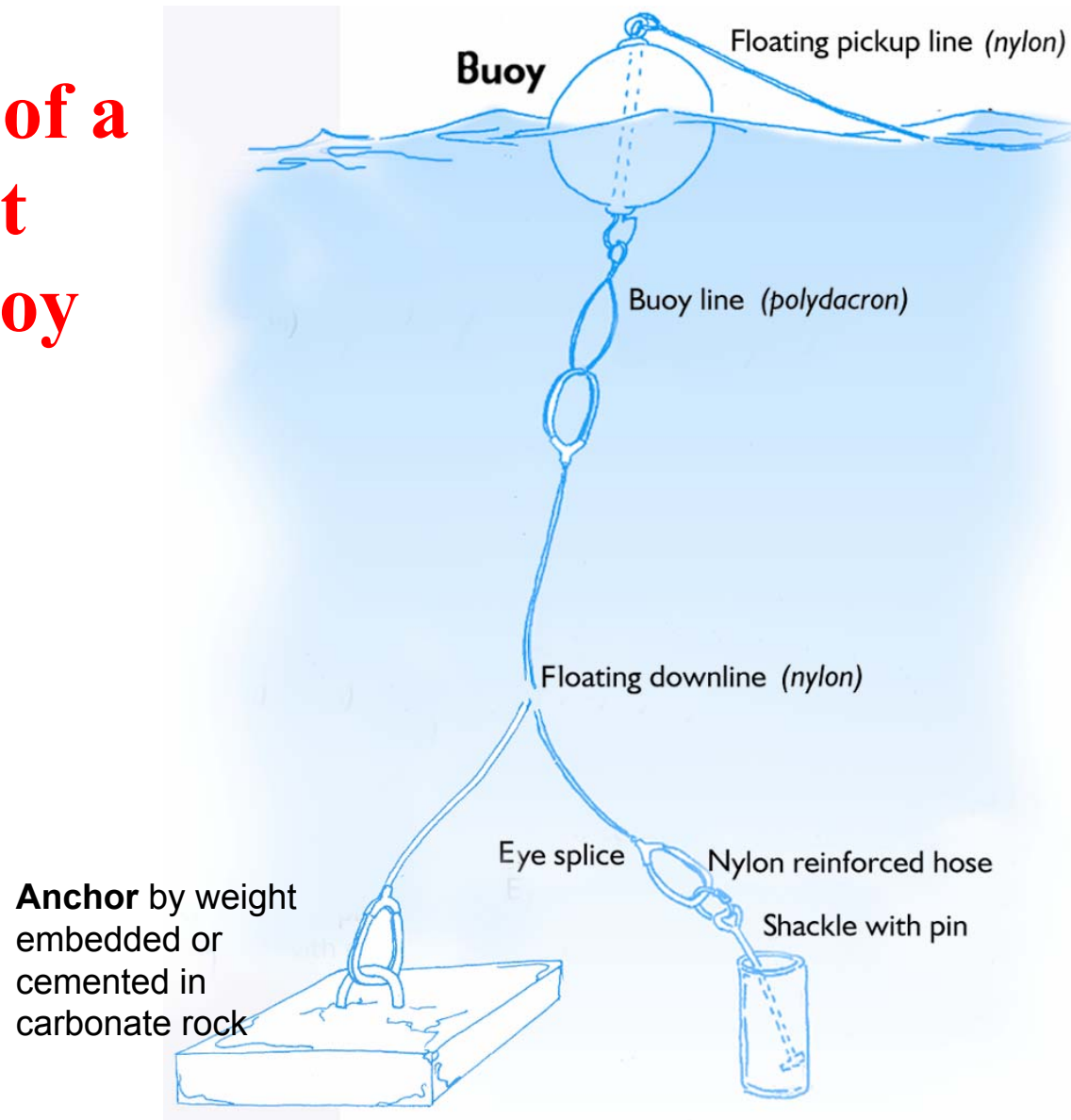
- To mark boundaries of MPA
- To differentiate zones
- To mobilize people participation in MPA establishment (a 'tangible' activity)
- To facilitate effective enforcement
- To permit MIE



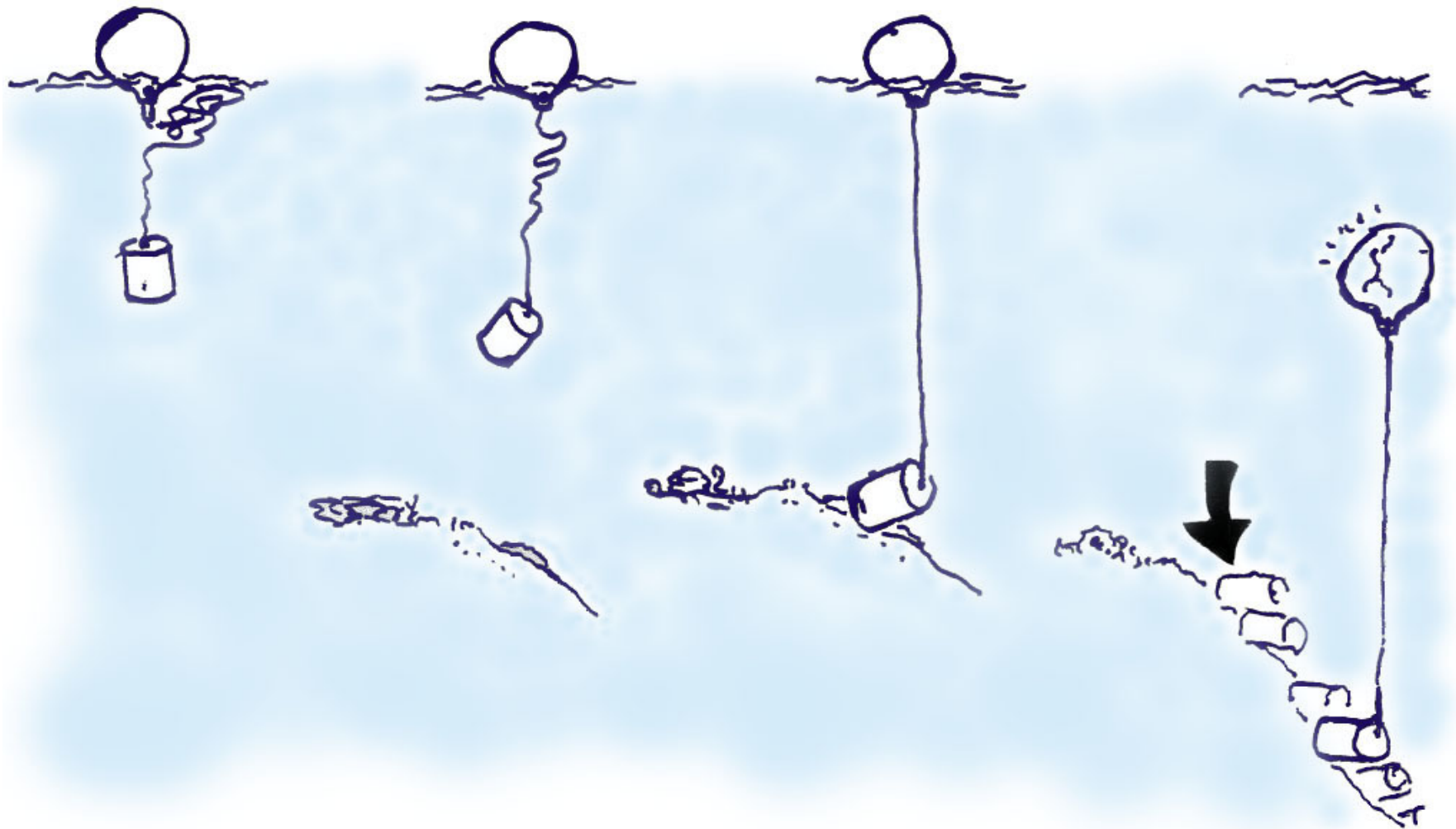
# Components of a permanent mooring buoy



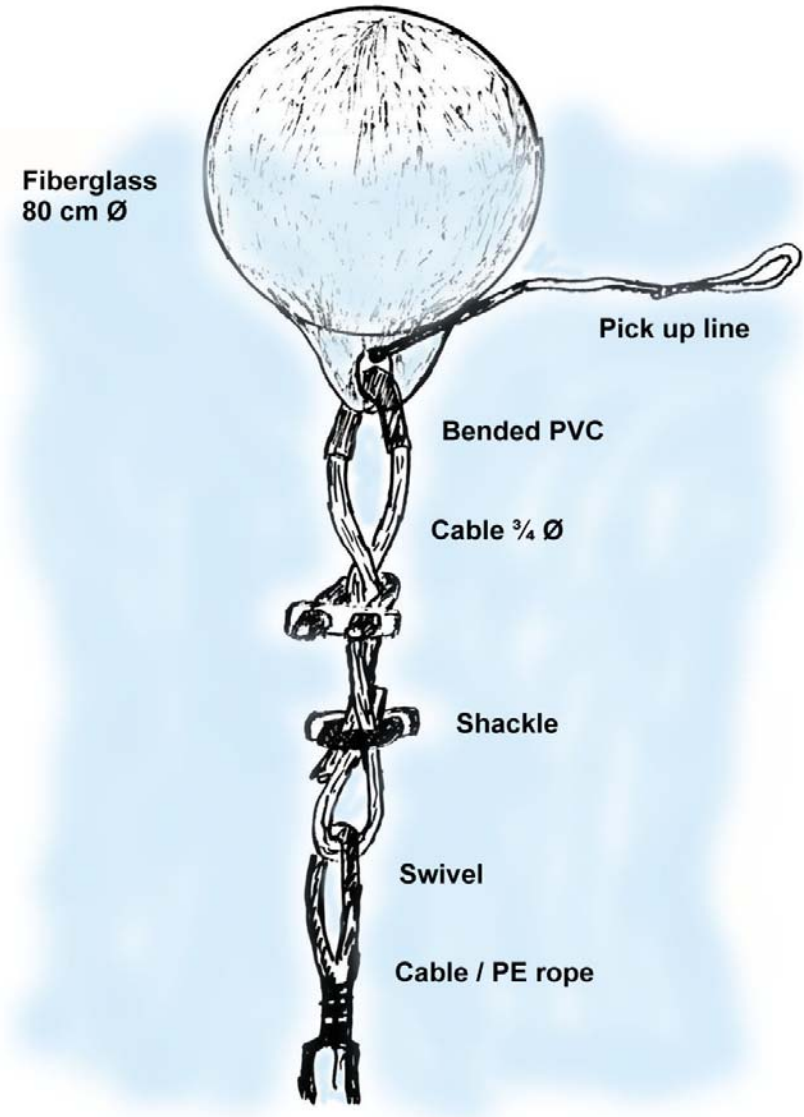
# Components of a permanent mooring buoy

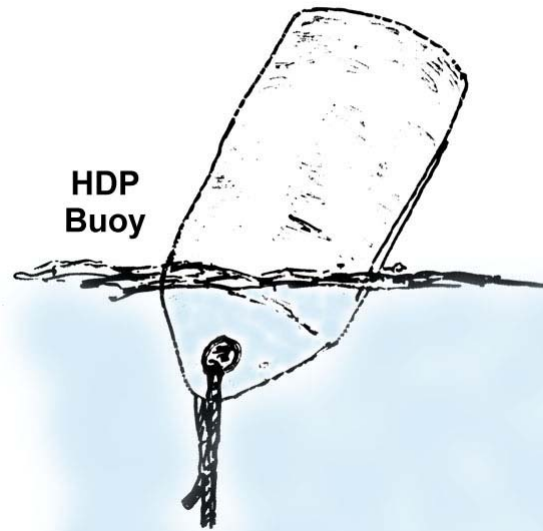


# Components of a permanent mooring buoy



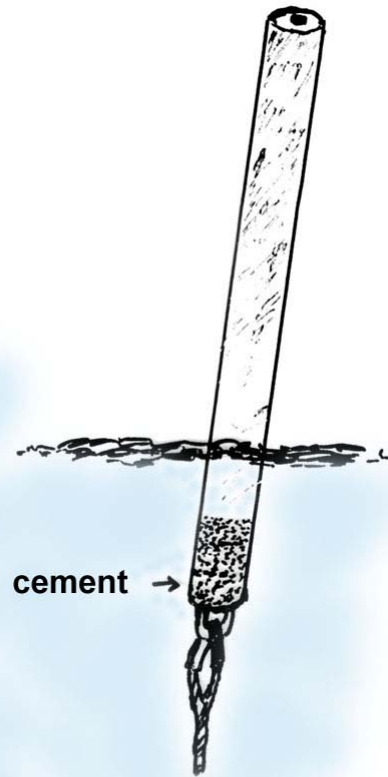
# Honda Bay / Tubbataha Buoy





HDP  
Buoy

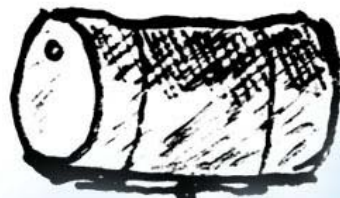
Port Barton  
Marine Park



cement →

Samar PVC Buoy  
and 'jerry can' anchor





**cement-coated  
net wrapped  
plastic drum  
buoy**



**cement-filled  
tire anchor**



**Connectible  
"G" floats**



# Sample outline of site management plan

**Chapter 1. Introduction (rationale, scope of plan, legal basis, overall goal, etc.)**

**Chapter 2. Profile of the MPA site or general area**

A. General information

1. Location (technical description, size, map, etc.)
2. Facilities (physical structures present in the area)
3. Current uses/activities in the area

B. Biophysical condition

1. Habitat condition (condition of coral reefs, seagrasses, mangroves, etc.)
2. Resource map (site map within larger municipal/city jurisdiction)

C. Socio-economic condition

1. Immediate community (all potential beneficiaries or users of area)
2. Issues and concerns

Sample outline ... (continued)

**Chapter 3. Goals and objectives for MPA management**

**Chapter 4. Management interventions (each with strategies and activities)**

- A. Habitat management (required)
- B. Management zones – spatial allocations and regulations (required)
- C. Constituency building – community organizing and education (required)
- D. Compliance and enforcement (required)
- E. User fee system (optional)
- F. Alternative/supplemental livelihood program (optional)
- G. Shoreline or foreshore management (optional)
- H. Solid waste management (optional)
- I. Others

**Chapter 5. Implementing structure**

- A. Management board (members and positions)
- B. Duties and responsibilities (specific roles and functions)
- C. Organizational chart

Sample outline ... (continued)

## Chapter 6. Monitoring and evaluation

- A. What will be monitored (reef substrate cover, fish stock, socio-economic, etc.)
- B. Methods to be used
- C. Institutional and scheduling arrangements (who will do it, how often?, etc.)
- D. Budgetary and equipment requirements
- E. Reporting and feedback mechanisms (schedules, formats, to whom, etc.)

### Annexes:

- A. Data figures and tables
- B. Monitoring and evaluation forms (MPA Report Guide)
- C. Photographs
- D. Ordinance

# Local Legislation and Law Enforcement





## General Kinds of Ordinance

**General Ordinance** – enacted by a legislative body in the exercise of its police power whose primary aim is the general welfare of the people by prescribing certain regulatory measures

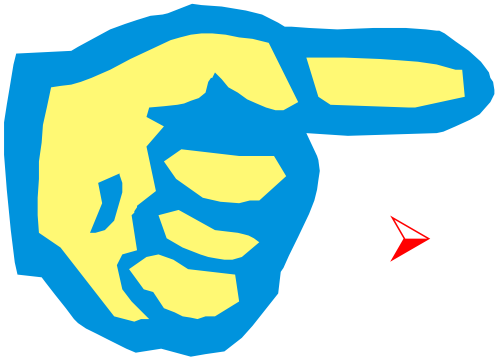
**Appropriation Ordinance** – enacted to appropriate local funds for purposes allowed by existing laws

**Tax Ordinance** – enacted to raise local revenues through imposition or levying of taxes, fees and charges subject to certain limitations prescribed by existing law

**Special Ordinance** – enacted for a special purpose

**Ordinance** – prescribes a permanent rule of conduct

**Resolution** – of temporary character, or expresses sentiments



## Requisites of a valid ordinance

- It must not contravene the Constitution or any statute
- It must not be unfair or oppressive
- It must not be partial or discriminatory
- It must not prohibit but regulate trade
- It must be general and consistent with public policy
- It must not be unreasonable

# Formal legislative process

**IDEA (needs/interests)**

↓

Who can propose ordinance?  
 - Members of the legislative body  
 - Mayor  
 - POs

↓

**Proposed Legislative Measure**

- Ordinance (to permanently direct or control)
- Resolution (temporary/expression of opinion/position)

**FIRST READING**

- Reading of the Title of the proposed measure
- Referral to appropriate committee
  - Committee Meeting
  - Committee Hearing
  - Committee Decision (either reject or accept)

If accepted, the committee will submit a committee report to the Sanggunian Secretary

**SECOND READING**

- Sponsorship speech (either the member who authored the proposed ordinance or the committee chair)
- Debates, Amendments, Revisions
- Voting  
 (If NO, the process ends)  
 (If YES, the Sanggunian Secretary shall make a clean copy for third reading)

**ORDINANCE**

**THIRD READING**

- Final voting  
 (If NO, the process ends)  
 (If YES, the ordinance will be certified by Sanggunian Secretary and attested by the Sanggunian Presiding Officer)

**Review of the Ordinance by Higher Legislative Council**

Brgy Ordinance – to be reviewed by Sangguniang Bayan

- Approve
- Disapproved (only if the ultra vires)

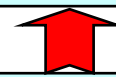
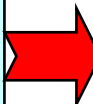
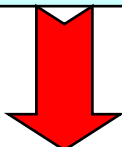
If approved, the ordinance shall be implemented

**Approval of the Ordinance by the Local Chief Executive**

Within 10 days, the LCE may

- Approve
- Veto (in whole or in part)
- Ignore (considered approved)

If approved, the ordinance shall be published or posted



## Essential parts of an MPA ordinance

- Title
- Declaration of Policy
- Definitions of Terms
- Boundaries of the MPA
- Management Arrangement and User Fees
- Formulation of Management Plan
- Appropriation
- Penalty Clause
- Repealing and Separability Clauses
- Effectivity Clause



## Patrolling scheme



Patrolling scheme formulation does not start only during Implementation or establishment of an MPA but commences right on the planning and consultation stages.

# Stages of patrolling scheme formulation

## Planning

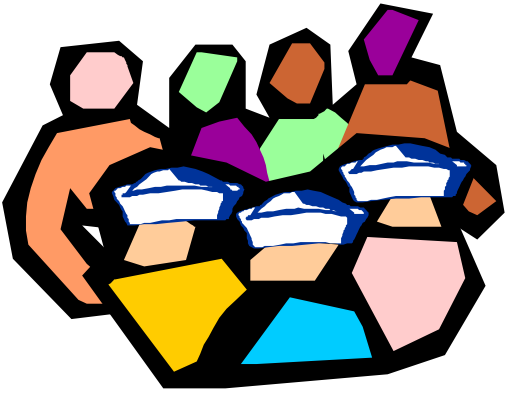
- Identify potential committed individuals who can take charge in the enforcement
- Involve where possible the *barangay* council and other units within the *barangay* such as FARMC, Tanod, Fish Warden, *Sangguniang Kabataan*.
- At the municipal level, evaluate the level of support incumbent officials can provide, including the PNP.
- In effect, the patrolling scheme commences right at the onset of MPA planning and zoning consultations. Absence of an element of enforcement and patrolling scheme during planning and zoning discussions may be in the longer term not so favorable.
- The pulse of local communities as regards these issues can be determined during PCRA, resource mapping and baseline data collection. This should be actively sought after during this activity.



## Implementation

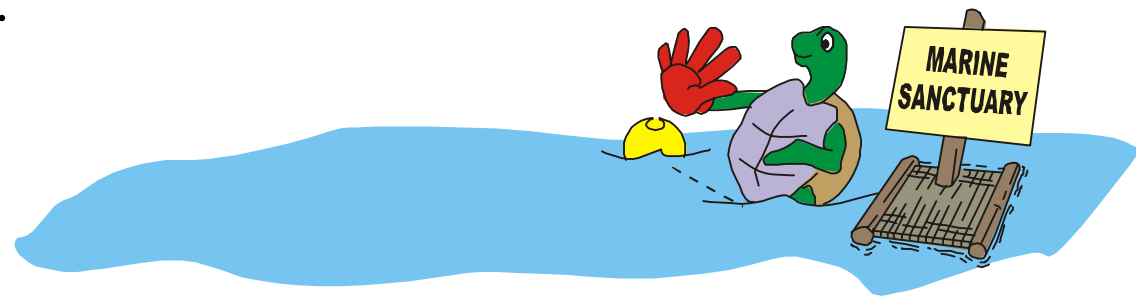
- Ensure the arrangements are clear (i.e., committee on enforcement; rotation basis of individuals or task groups, etc),
- Ensure provision and maintenance of equipment and infrastructure for enforcement purposes such as; binoculars, radio communication unit, megaphone, guardhouse, boat and gasoline.
- Encourage volunteerism among community members. But urge *barangay* council where possible to provide incentives
- Collect fees on the use of a designated area within the protected area.
- Ensure sharing scheme be agreed and bulk of the revenues be used for the maintenance of the MPA



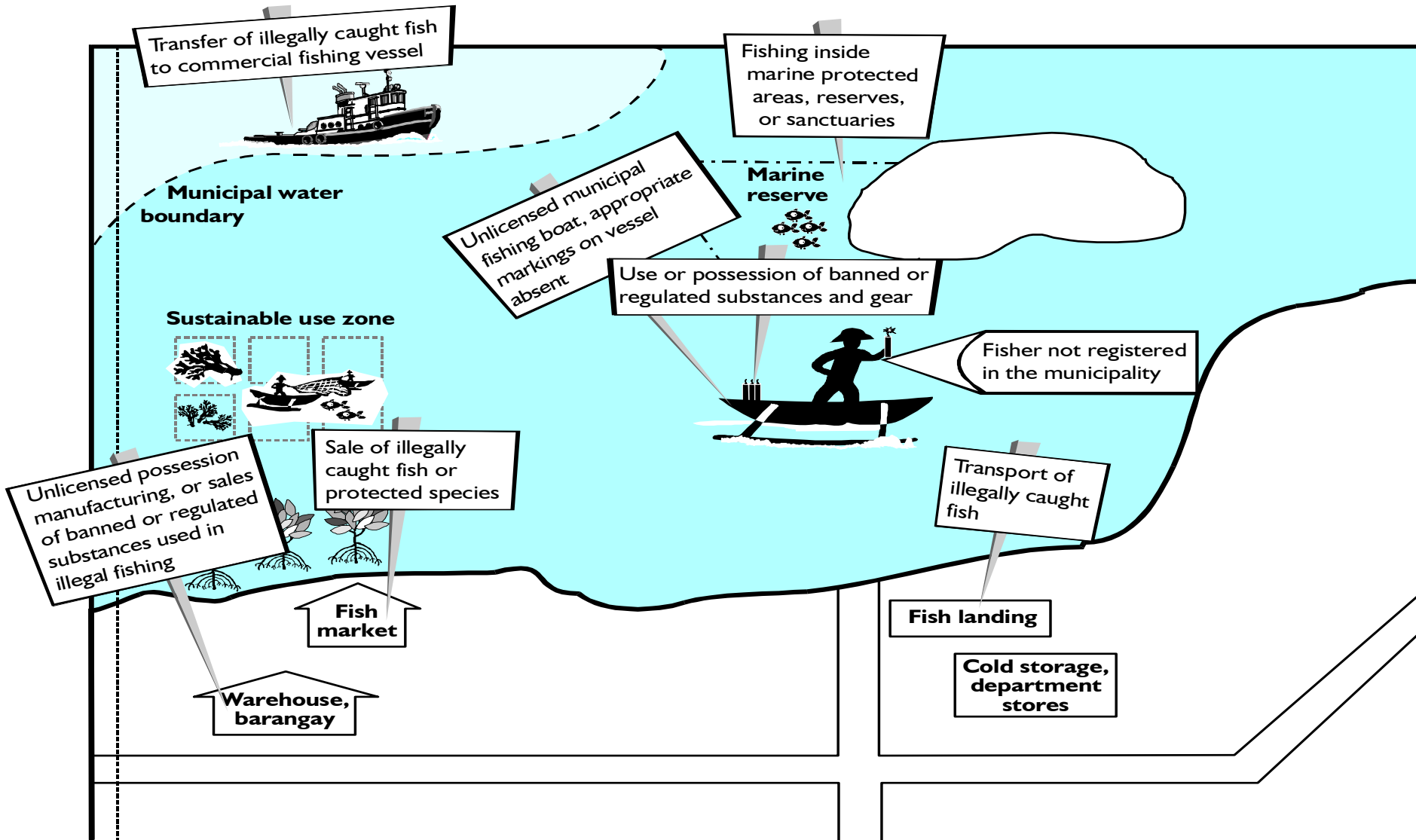


## Lessons from Gilutongan Marine Sanctuary

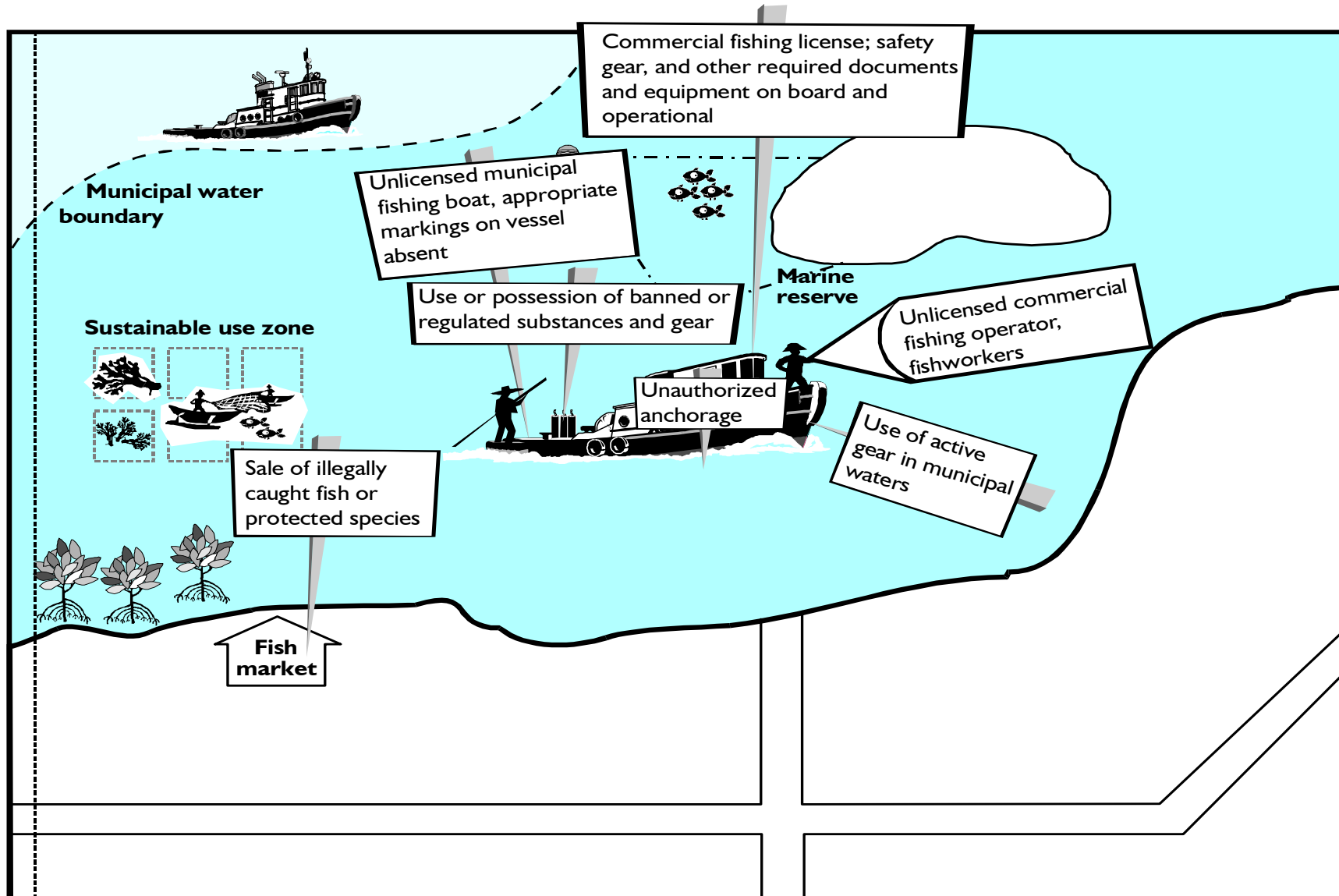
- Enforcement should be from the start community-driven, not solely a municipal initiative.
- Continuous education should be pursued. There is no other best law enforcement tools except continuous education.
- Patrolling and law enforcement arrangement should be tied with revenue collection and sharing scheme where possible. The same should be used for the management and maintenance of an MPA.



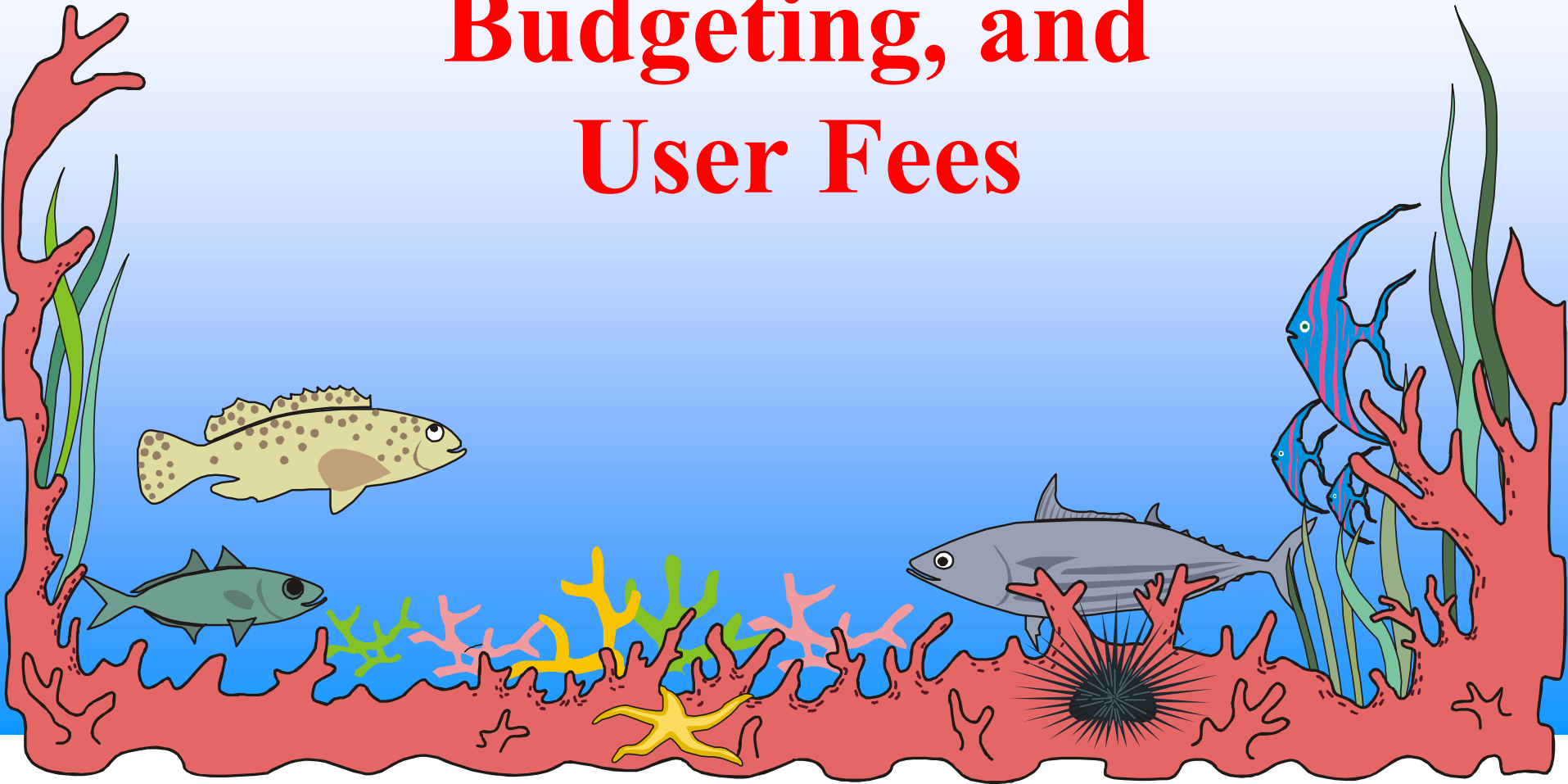
# Enforcement elements of municipal fishing violations



# Enforcement elements of commercial fishing violations



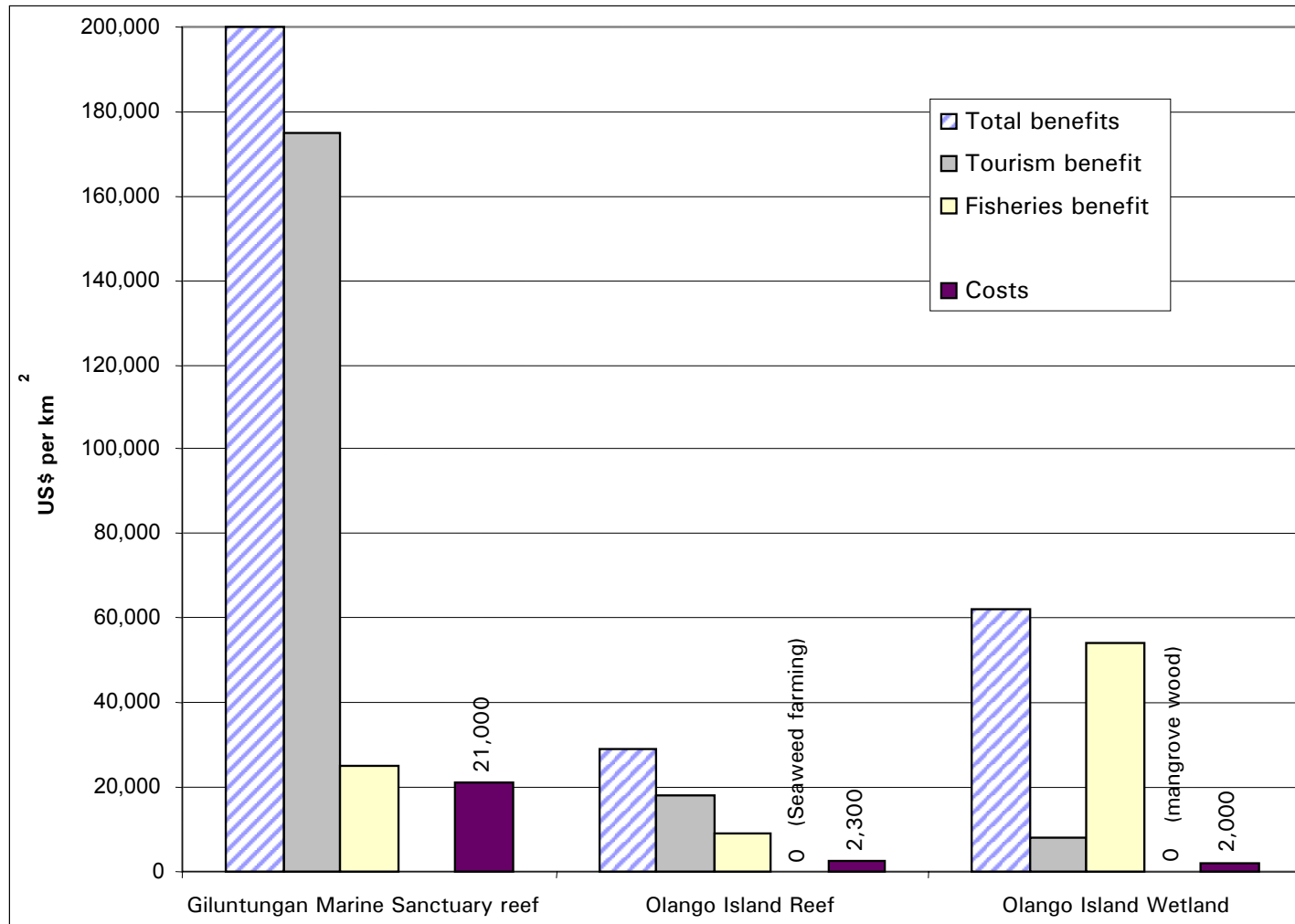
# Annual Programming, Budgeting, and User Fees



# Estimated annual costs required to support CRM in Olango Island

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

# Incremental annual benefits from Olango Island resource use per km<sup>2</sup> for different management regimes and the cost of management



# Gilutongan Marine Sanctuary background history

## 1991

- Gilutongan Marine Sanctuary was established
- No clear management plan
- No accurate technical description
- Community members have very limited participation and involvement in the marine sanctuary
- No clear basis or criteria in site selection
- Only one person was active in law enforcement



## 1993

- Barangay resolution was passed imposing collection of users' fees for those who use the marine sanctuary, but was stopped.

## 1995

- Implementation of the ordinance was stopped

## 1998

- Marine Sanctuary was re-established
- Municipal Ordinance was passed reestablishing the marine sanctuary
- PCRA was conducted
- Participatory Reef Assessment was undertaken regularly

## Issues identified from PCRA

- Overexploitation of fisheries resources and destruction of coastal habitats
- Lack of fishery law enforcement
- Lack of alternative livelihood
- Low awareness on the status and condition of the coastal area
- Continuous decline of fish catch among marginal fisherfolks
- Lack of electricity and potable water in the island



## Highlights of the First Ordinance

- Formally established the 15-ha. marine sanctuary
- Clear technical description of the site
- 20-meter buffer zone was agreed including the shoreline
- Prohibited the following activities within the sanctuary:
  - Anchorage
  - Spear fishing and other forms of fishing techniques
  - Collection or destruction of invertebrates, shells and other living organisms,
  - Entry of jetski, wave runner in the sanctuary area








607485 E  
1128922 N

608513 E  
1128922 N



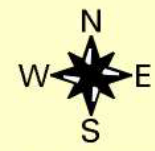
Legend:

-  Shoreline
-  Coral reef edge
-  Marine Sanctuary
-  Twenty (20) meter wide special management area (Buffer zone)
-  House

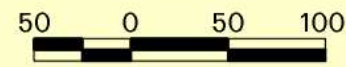
Gilutongan Channel

**Gilutongan Marine Sanctuary**  
14.89 ha

Gilutongan Island



Scale: 1 : 5000

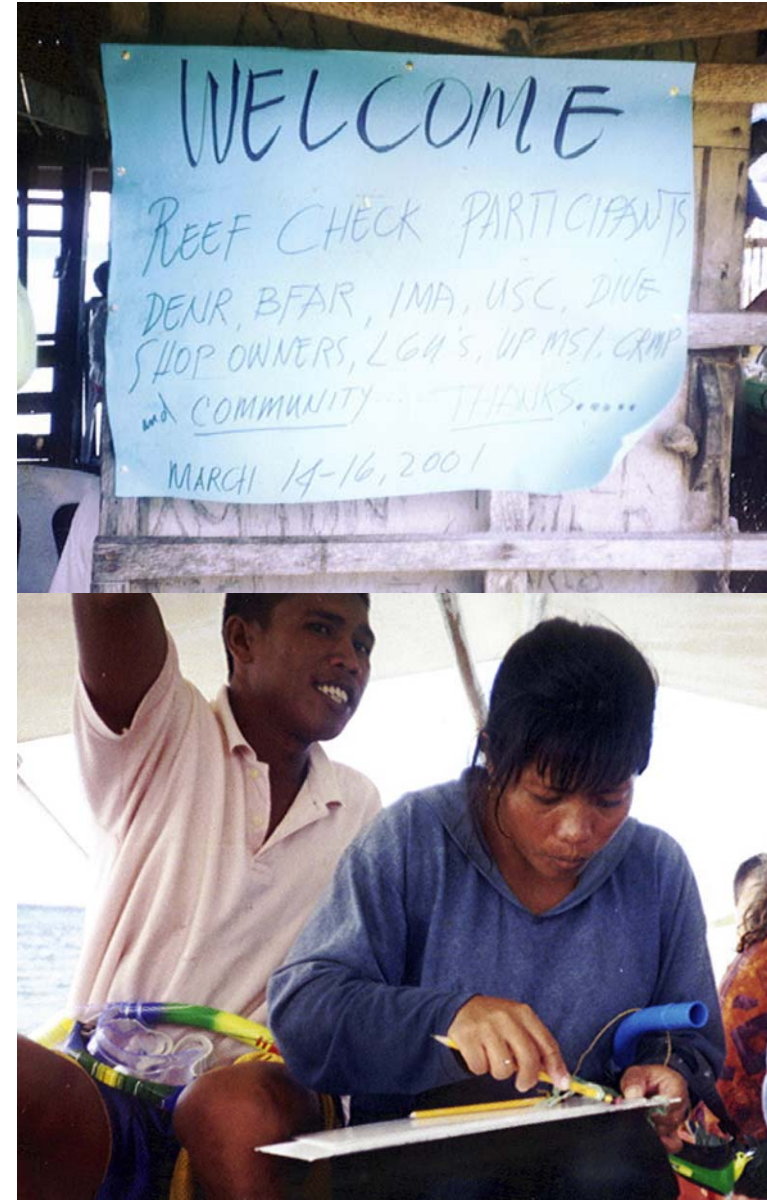


607485 E  
1128235 N

608513 E  
1128235 N

# Participatory reef assessment

- The Process
  - Undertaken by UP-MSI and CRMP
  - Involved representatives of the community, LGU, NGAs, NGOs local universities
  - Collected information on coral cover and fish species within and outside the sanctuary area
  - Undertook the same activity on a yearly basis







## Baseline survey results

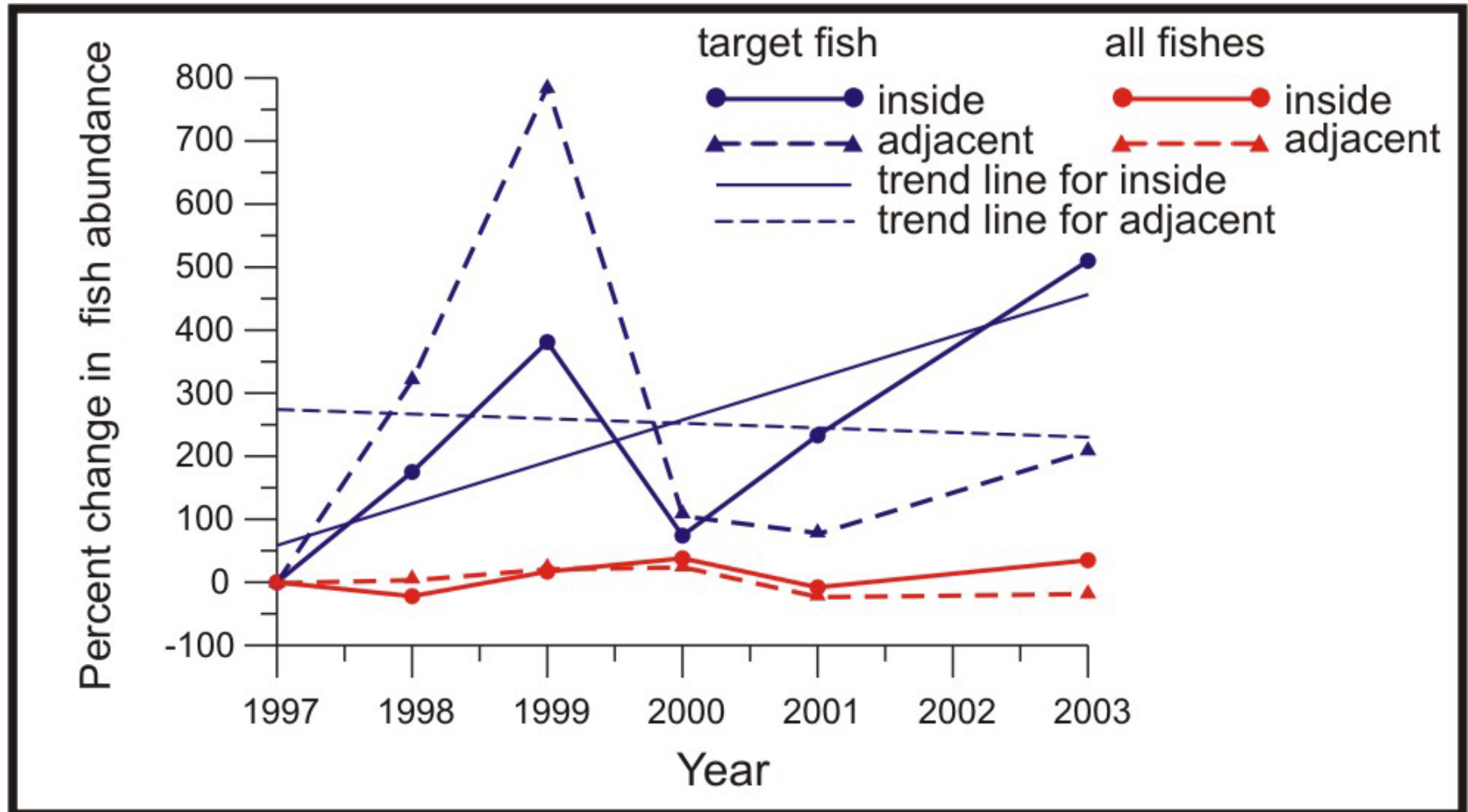
- Improved interest and enthusiasm among members of the community
- Live hard coral was 48% within the sanctuary, but coral rubbles were apparent
- Dead standing corals was 24%
- Very few fish species were observed
- Reports indicated that spear fishing and use of dynamite were still rampant
- About 3,000 tourists visit the island and more than 300 boats put their anchor within the sanctuary every month

## Results to-date

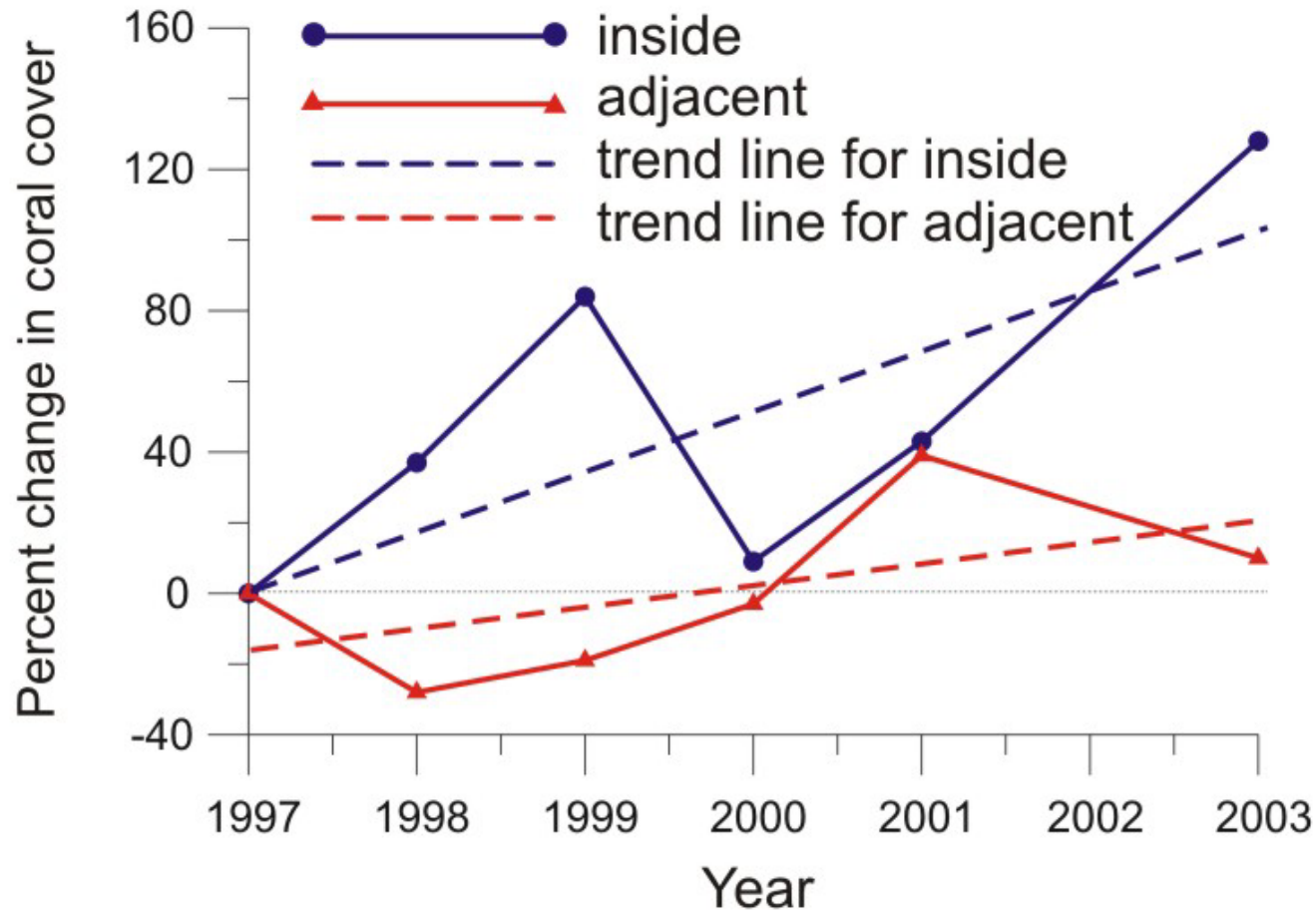


- Enforcement of laws: 24 hours a day
- Use: reduced the number of visitors to the island
- Quality of the environment: high improvement, a noticeable increase of fish catch outside the sanctuary
- LGU collection from user fees: PhP20,000 – 25,000/month
- Has provided other livelihood opportunities to other members
- New study site: has increased number of educational tours and cross-visit from various sectors interested to establish marine sanctuary

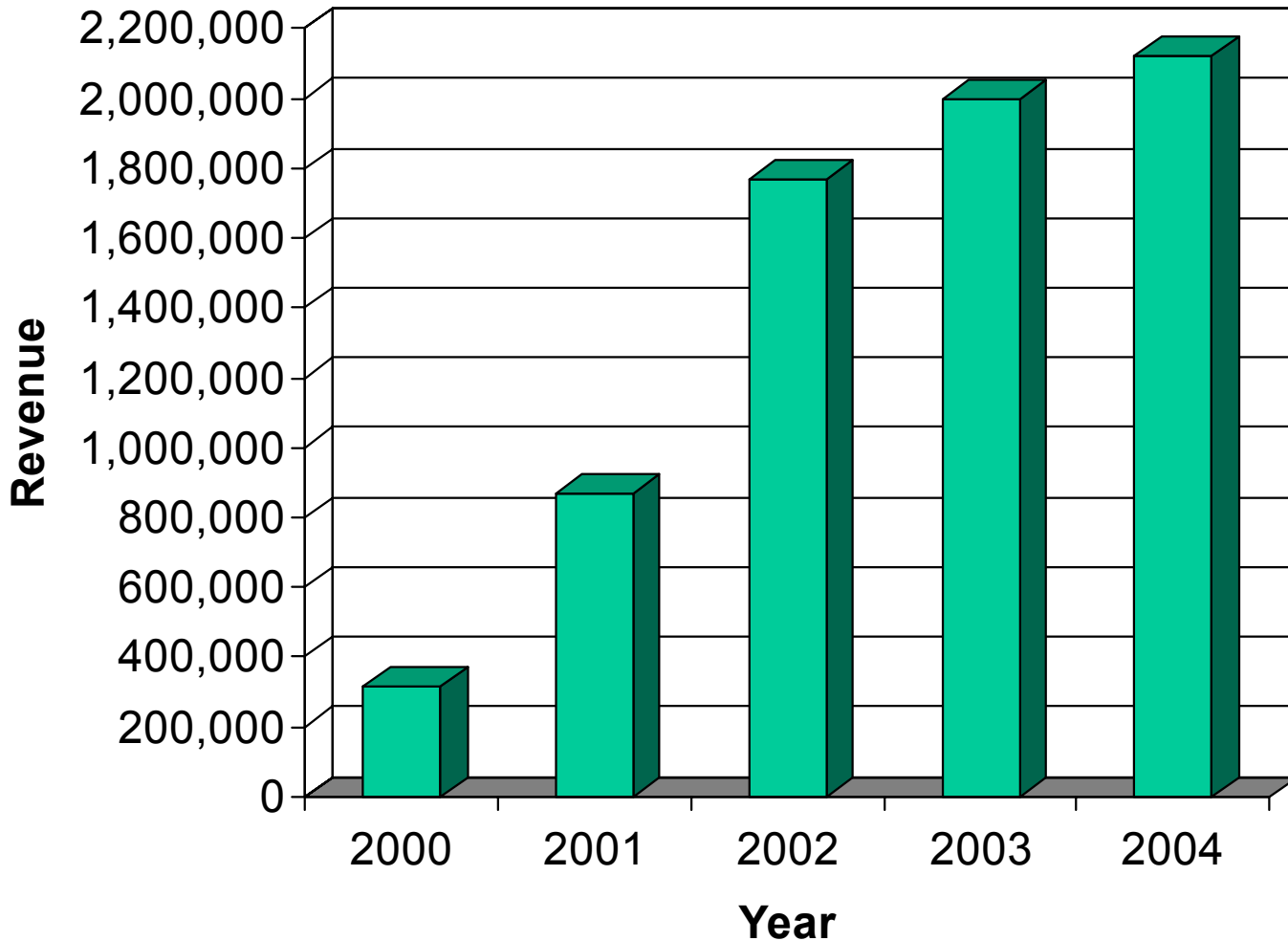
# Fish abundance (target species) inside and adjacent to the Gilutongan Marine Sanctuary



# Live hard coral inside and adjacent to the Gilutongan Marine Sanctuary



## User fees collected from divers and snorkelers visiting the Gilutongan Marine Sanctuary, Cordova, Cebu.

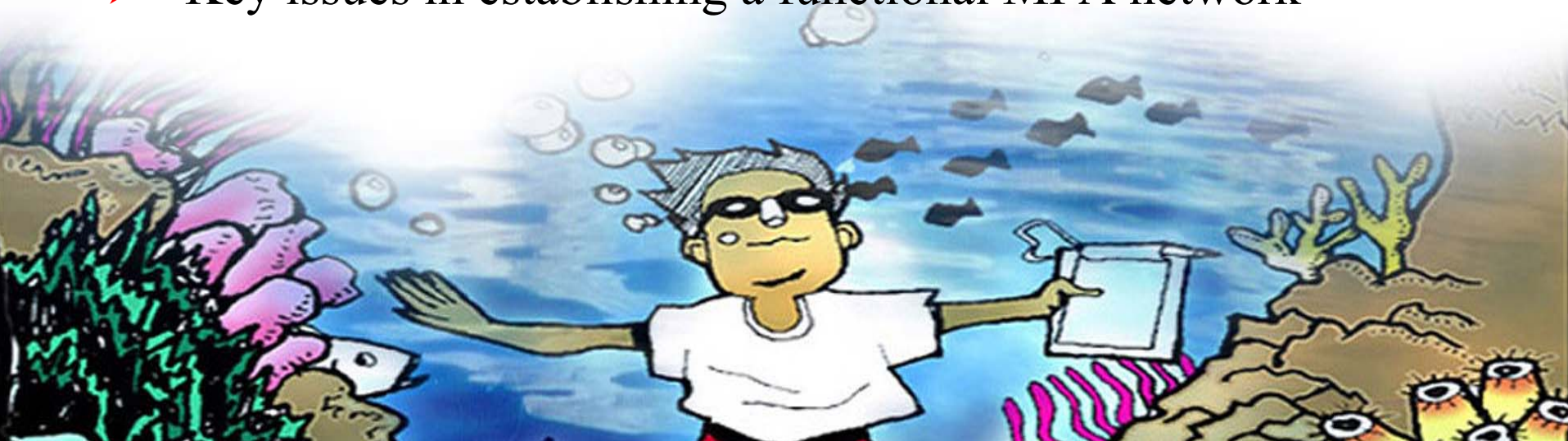


# Developing MPA Networks



## Objectives of Session 10

- Define “MPA networks”
- How connectivity in the marine environment works
- Know the difference between ecological, social and administrative MPA networks
- How individual MPAs can contribute to a MPA network
- Essential factors that permit a MPA to contribute to a network
- Key issues in establishing a functional MPA network

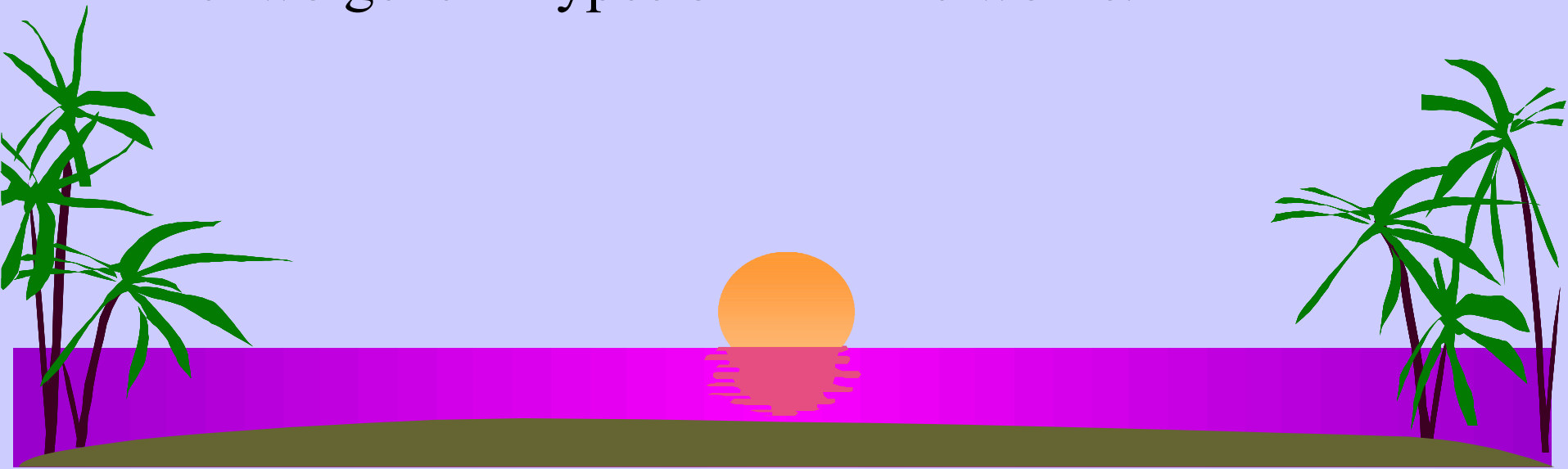


## Importance

1. Understanding the principles that help form a functioning MPA network will encourage practitioners to do better planning for the determination of location for MPAs and also in determining the size and exact boundaries of any given MPA.
2. Applying these principles will ensure that management and protection of coral reef and other nearshore habitats is more strategic and effective in achieving fisheries management and marine biodiversity conservation.

## What is an MPA network?

An MPA network is a collection of MPAs carefully chosen to achieve either (1) biodiversity conservation or (2) biodiversity conservation and fisheries enhancement. We can define the term “MPA network” more completely by taking a closer look at the two general types of MPA networks.



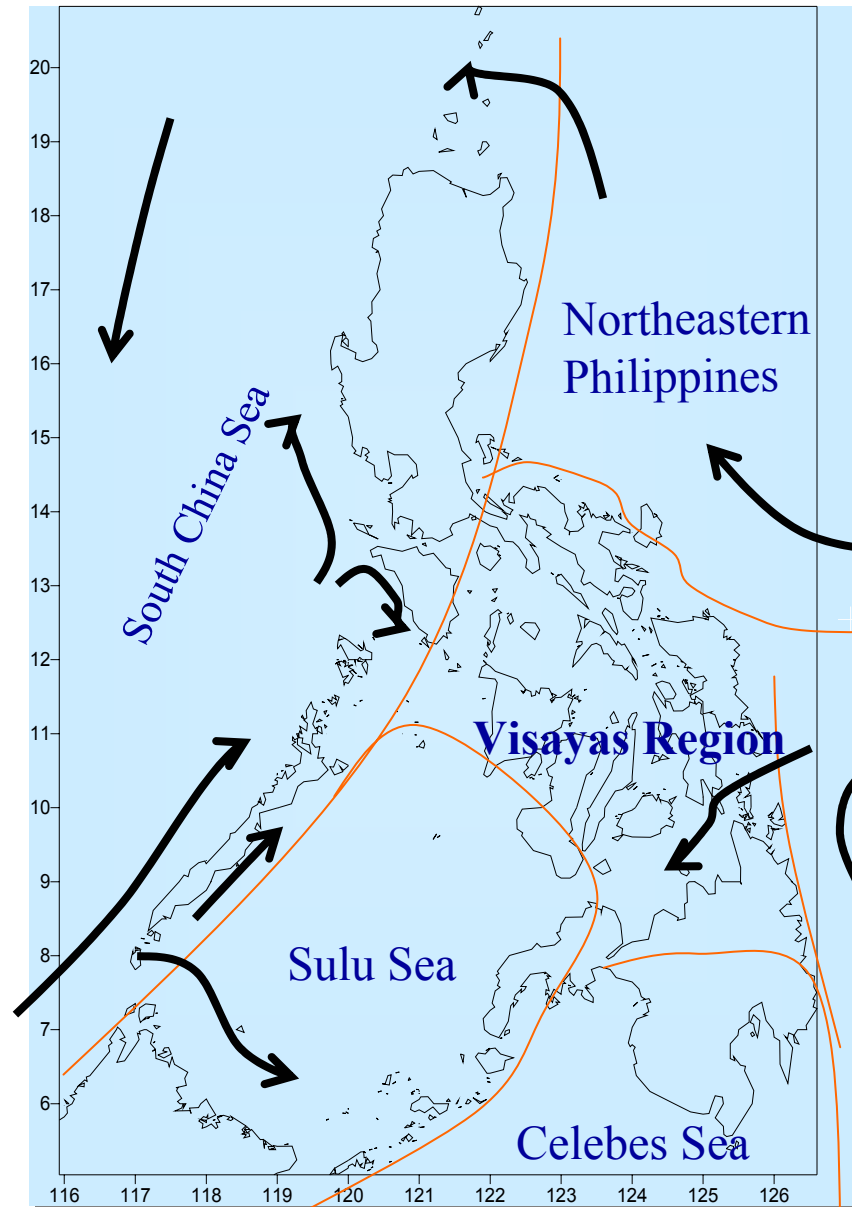
# An MPA network designed to conserve biodiversity is a group of MPAs selected on the basis of:

- Biogeographic representation
- Habitat representation and heterogeneity
- Presence of species or populations of special interest (e.g. threatened and vulnerable species)



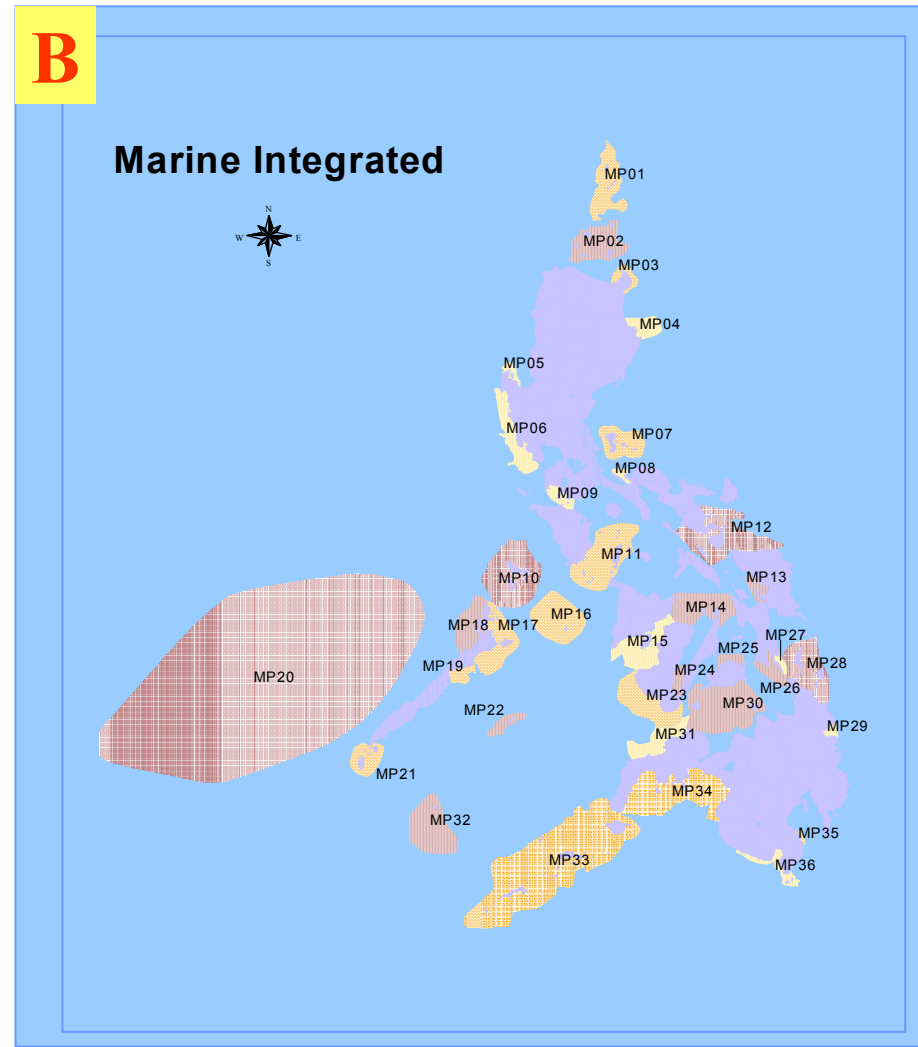
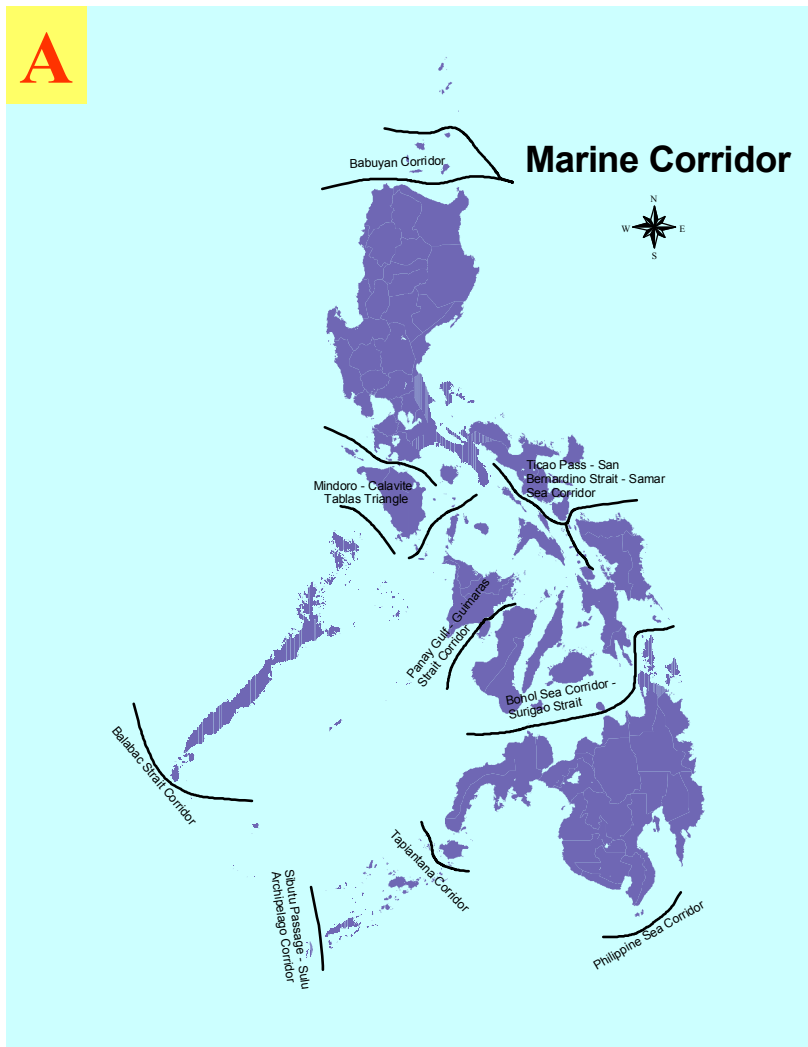
# Biogeographic, evolutionary and ecological influences

Marine biogeographic regions derived from the geomorphology of the Philippine archipelago based on the basins, bathymetric isoclines and major water circulation.



Biogeographic classification based on reef fish distribution (Aliño and Gomez, 1994)

Southeastern Philippines

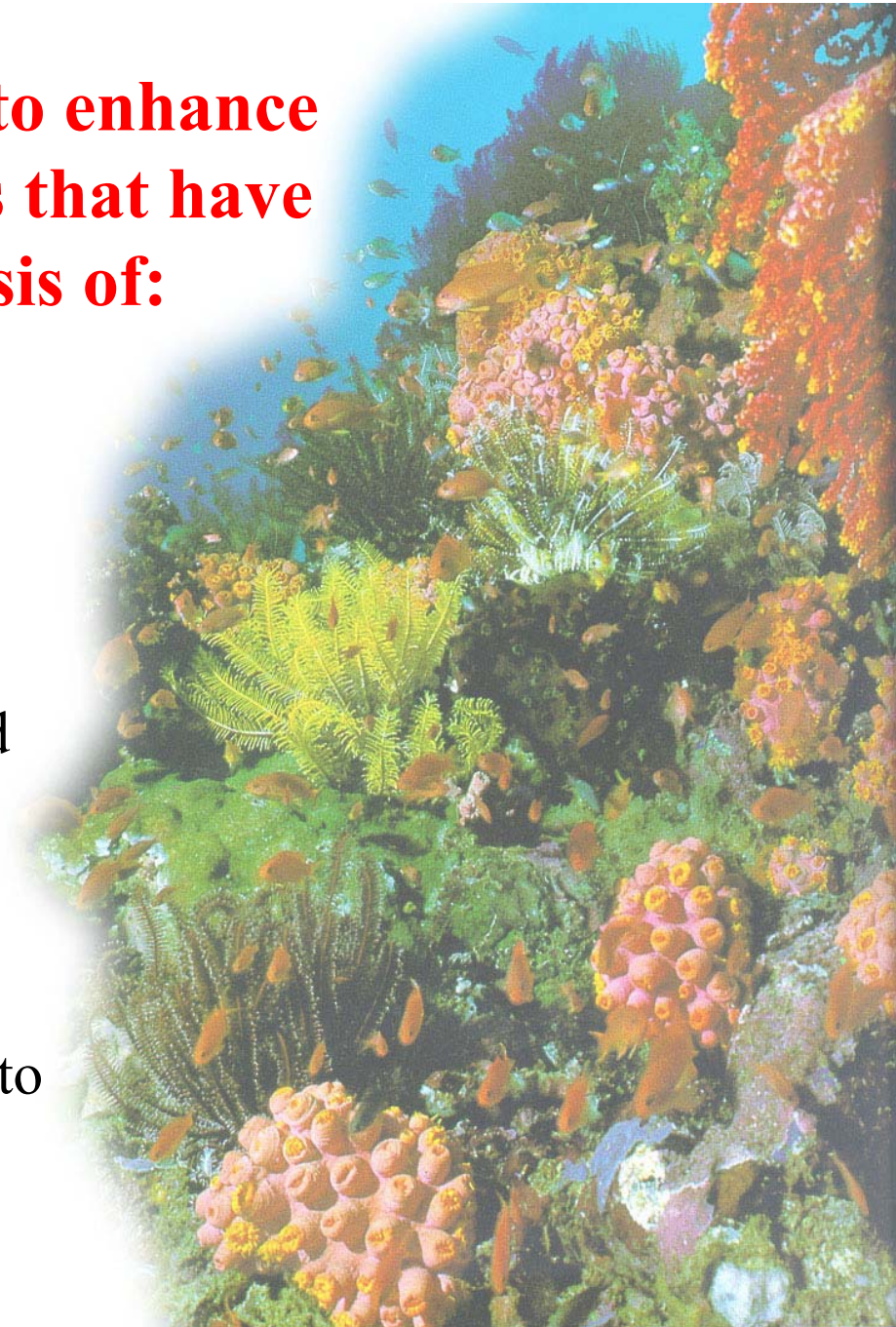


A. Marine corridors (MC) of the Philippines (see Ong *et al.* 2002).

B. The Integrated Marine Biodiversity Priority areas show highest priority (in red spots) such as the Kalayaan Islands – MP20, Tubataha MP22, Turtle Islands MP32 and Calamianes Islands MP10; very high priority (light red spots on yellow) on areas such as Sulu-Tawi Tawi Island Arc MP33 and the Moro Gulf area MP34; and high priority areas (fine red spots on white) such as Sarangani Bay MP36 and Davao Gulf MP35.

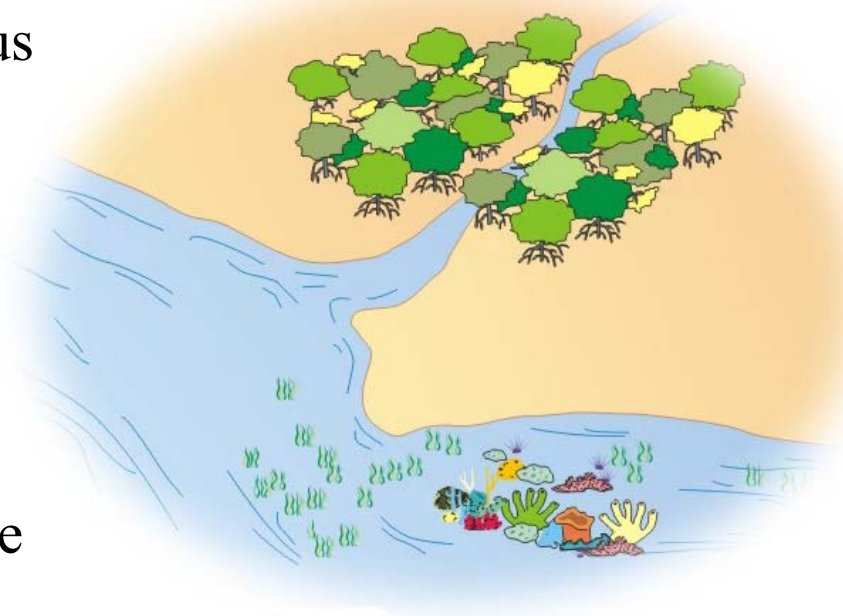
## An MPA network designed to enhance fisheries is a group of MPAs that have been selected on the basis of:

- Size of reserves necessary to protect viable habitats
- Presence of exploitable (target) species
- Vulnerable life stages of selected species
- Connectivity among reserves
- Links among ecosystems
- Provision of ecosystem services to people



## MPAs that interact are ecologically linked through various means such as:

- Connections of adjacent or continuous habitats such as coral reefs and seagrass beds
- Connections through regular larval movement in the water column and within the MPA sites
- Regular settlement of larvae from one MPA inside another MPA
- Movement of mature marine life from one site to another dependent on habitats or because of regular or random spill over effects from MPAs
- Protection of a particular species that tends to be widely dispersed and possibly over-exploited



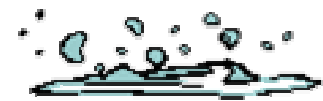
## Biophysical and ecological advantages of an MPA network



- Ensuring that the most valuable marine habitats are at least partially protected as reflected by habitat quality and species richness
- Ensuring that some of the larval dispersed from a given MPA will either end up settling back inside the MPA or a MPA within the dispersal range or spatial neighborhood of the typical species residing in the MPA  
Regular settlement of larvae from one MPA inside another MPA
- Ensuring that threatened, vulnerable or over-exploited species of a given area will have adequate habitat space to reside in through time and be able to continue reproducing as a result of the MPA network
- Ensuring that highly threatened species can continue to reproduce and disperse larvae into surrounding areas (e.g. giant clams, grouper, etc.)
- Enhancing fisheries production for a given management area because the larval production and dispersal, and fish spill over effects are maximized through planning to the benefit of both fisheries and conservation

## **The administrative and pragmatic advantages of a MPA network over MPAs that are randomly placed and not coordinated in any way might include:**

- Knowing that the investment in the establishment and management of the MPA network is maximizing its potential return to local stakeholders such as fishers and tourist operators alike
- Having an information base for the MPAs in an area that helps develop logical choices in how to expand MPAs effectively and how to efficiently manage the MPAs through strategic efforts based on the network design
- Providing a rationale for individual MPA stakeholders or communities to coordinate with each other to share their experiences and to enhance each other's efforts in managing and protecting their respective MPAs



# General factors and criteria to consider in determining sites for a MPA or a series of MPAs are:

- Relative naturalness: Areas still in good condition;
- Representativeness: Areas that are unique, include important ecological functions and/or species;
- Biodiversity: Areas with high diversity of species/ecosystems;
- Vulnerability: Areas with rich resource/biodiversity that are relatively vulnerable to disturbance or destruction;
- Fisheries value: Areas that are strategic to enhance fisheries;
- Tourism value: Areas that could, if protected, enhance appropriate recreational uses and tourism revenues;
- Social acceptance: Acceptability of all stakeholders; and,
- Practicality of management: Relative ease of management.



## More specific criteria that may weigh a decision towards an area with more potential for fisheries enhancement are:

- Habitat quality: Areas with generally superior habitat quality or relatively better than the average for the general area (e.g. coral cover, seagrass, water quality etc);
- Fish habitat: Areas that maintain higher than average abundance, density and species richness of fishes or contain spawning aggregations of fish;
- Oceanography: Areas that have favorable currents that tend to aggregate larvae and organisms inside the sanctuary and with periodic flushing of water inside the area;



**More specific criteria...** (*cont'd.*)

- **Biodiversity:** Areas with higher than average biodiversity and range of animals on the food chain from large to small;
- **Size:** Areas that cover at least 10 hectares and preferably 20 or more hectares of critical fisheries habitat;
- **Social acceptance:** Areas that will not arbitrarily remove the most desired fishing ground from a community to not create unnecessary conflicts for management;
- **Practicality of management:** Areas where no fishing and extraction can be enforced given the resources that will realistically be available for protection; and,
- **Quality of management:** Areas where the rules are sufficiently enforced to ensure that fisheries benefits will ensue per the MPA management rating system level 3.

## Attributes of a functional network of MPAs include:

- Individual MPAs will at least achieve the above criteria for MPAs in general and those contributing to fisheries enhancement;
- Individual MPAs will be managed effectively at level 3 or above;
- General management area shall be analyzed from the perspective of critical habitats, fisheries, oceanography and existing MPAs as a first step in planning for an area wide network of MPAs;
- Site specific area (multi municipal to barangay level) shall be analyzed from the perspective of critical habitats, fisheries, oceanography and existing MPAs as a second step in detailed planning for MPAs priority sites and networks;
- Existing MPAs that maximize fisheries enhancement should be identified;



**Attributes of a functional network... (cont'd.)**

- New areas that will contribute to fisheries enhancement should be identified;
- 5-10% of critical habitat for a given planning area should be included within an MPA;
- MPA management bodies will be capacitated to improve the management of their MPA and linked to other MPA management bodies in the network area;
- MPA management bodies together with their local governments and other assisting organizations will be engaged in planning and implementing their MPA network for area of concern; and;
- A MPA network will be within the context of integrated coastal management plans and regimes of one or more municipal governments with provincial assistance.

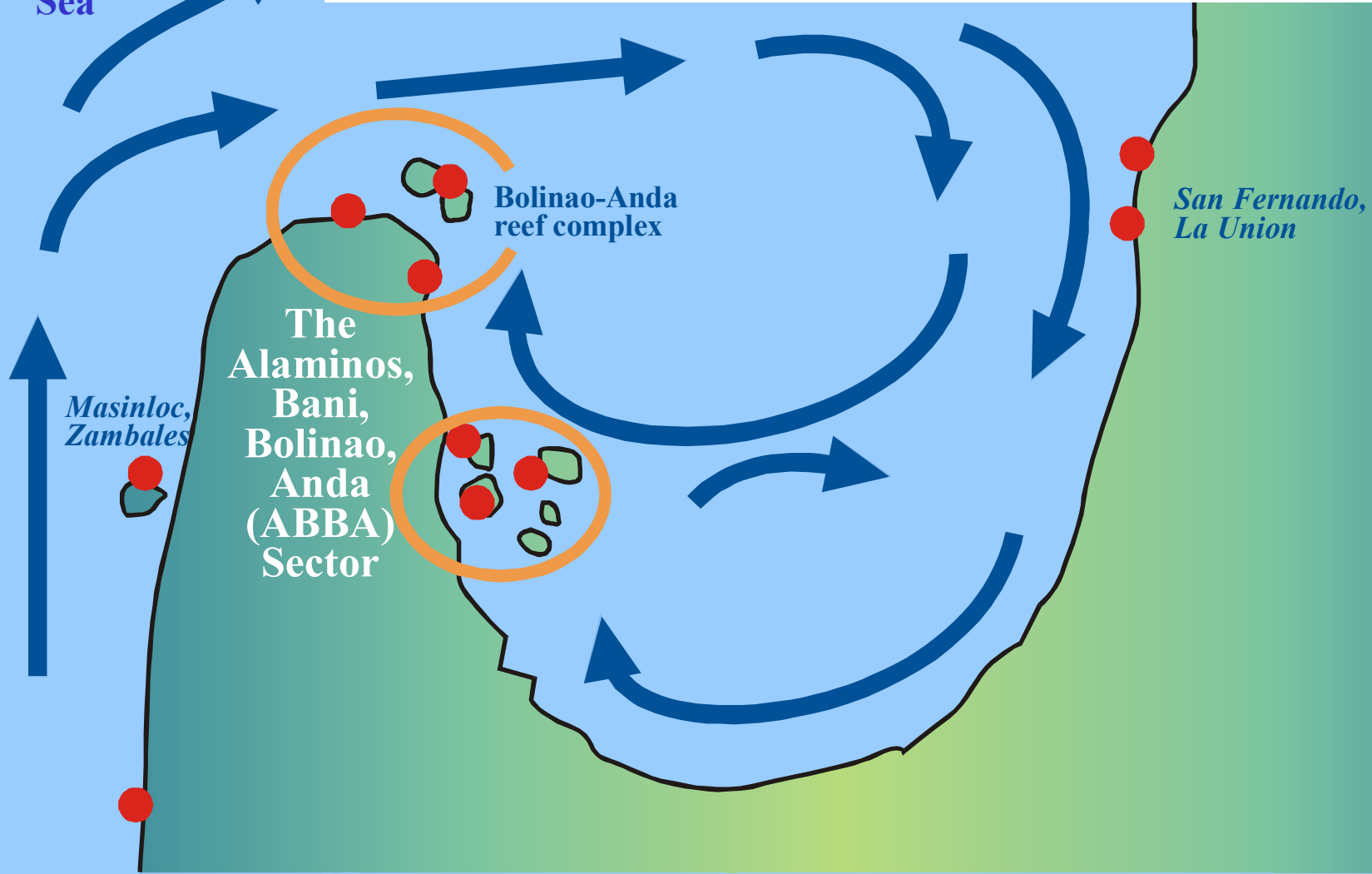
## **In summary, the basic attributes of an MPA network will thus be:**

- Each MPA effective in its own right following above criteria;
- MPAs protect critical fisheries habitats;
- MPAs each contribute to fisheries enhancement;
- MPAs cover a critical minimum area of the larger planning area;
- MPA management bodies effective and linked to larger planning area;
- Management system horizontal and vertical for sustainability; and,
- Network links multifaceted—both environmental and social.



In Lingayen Gulf, entrainment features like wakes and fronts that facilitate high recruitment is considered in the design of a network of MPAs. Marine sanctuaries that have good recruitment and spawning areas functions combined with other enhancement interventions provide opportunities for synergistic outcomes. The convergence of local community efforts, traditional ecological knowledge and wisdom together with science based inputs can also be derived through complementation and cost sharing of network partners.

South China  
Sea



# Evolving network of MPAs in Danajon Bank focal area



## Marine Protected Areas of Coron Bay focal area



## Field approaches and process

The basic approach to improving the management of MPAs, identifying and planning for new MPAs and eventually forming a network of MPAs for a given planning area will generally follow the coastal resource management (CRM) planning process being implemented in local governments in the Philippines.



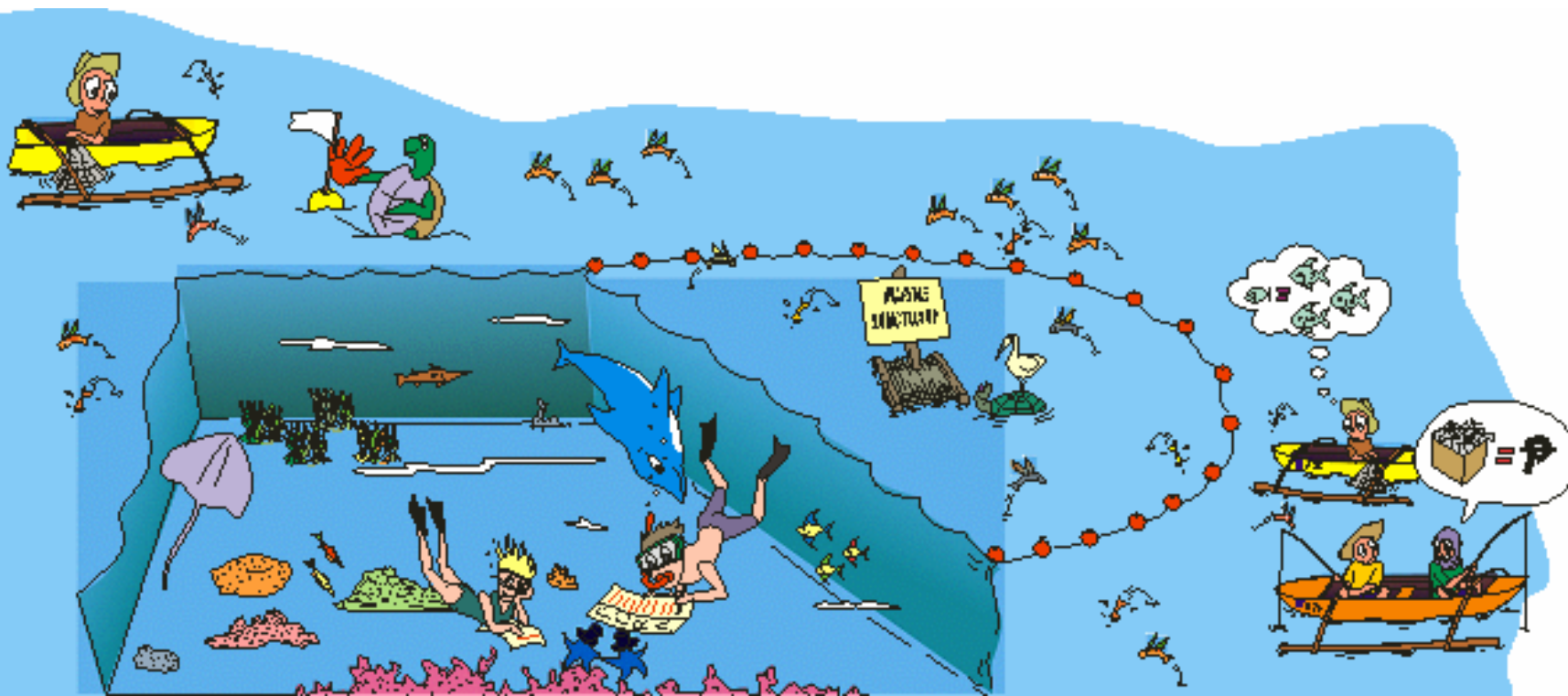
## CRM Process

1. Collection and analysis of existing secondary information on planning area;
2. Review status of CRM in each municipality per book by DENR—CMMO (2003);
3. Review status of all MPAs in planning area by completing the MPA Report Guide (White *et al.* 2004);
4. Review status of CRM plans for each municipality and determine what gaps exist for improving fisheries management in general and for MPAs;
5. Prioritize MPAs, existing and proposed new ones, for management planning and implementation within and among municipalities of planning area;
6. Improve CRM plans that include MPAs and MPA networks for single and multi-municipal areas together with all concerned stakeholders; and
7. Assist with implementation as appropriate and possible through multi-sector approaches that maximize available resources.



## Creating MPA networks that are sustainable

MPA networks are not created rapidly but evolve over time with good planning. The above guidelines can assist to improve MPAs, make them more functional and provide guidance towards building a context that will allow MPAs and the organizations that assist them to link and support one another so that a network can evolve.



The marine protection zones of the municipality of Tabina, Zamboanga del Sur shows a combination of Municipally led marine sanctuary and village level led co-management arrangement. It is part of the Illana Bay Regional Alliance 9 network..



# Strategic interventions to encourage MPA networks

- Provide support for MPA monitoring and evaluation that addresses biophysical and management needs using the existing protocols (Uychiaoco *et al.* 2001; White *et al.* 2004);
- Summarize all relevant data in a geographical (maps) and graphic manner for feedback to communities and for use in planning and education through simple reports and other means to keep the data alive and useful at the local level; Review status of all MPAs in planning area by completing the MPA Report Guide (White *et al.* 2004);
- Train and capacitate local stakeholders to perform the tasks of planning, implementing, monitoring and evaluating a MPA using tested PCRA and other tested protocols referred too above;
- Conduct targeted research studies on the effectiveness of existing MPAs, locating new MPAs, social acceptability of MPAs, oceanography of area, location of fish aggregation areas and others deemed relevant for planning and education;



## Strategic interventions... (cont'd.)

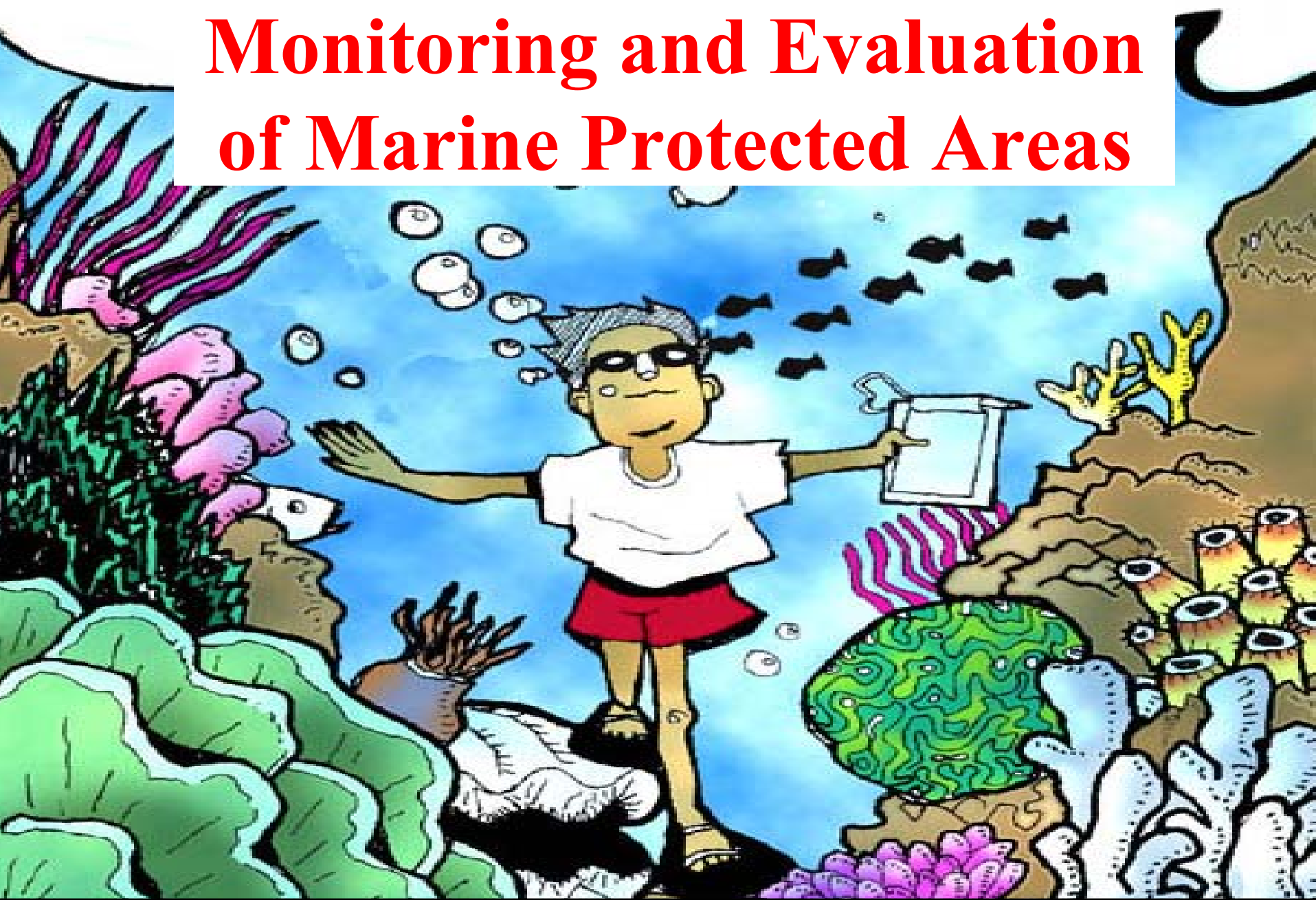
- Mentor all targeted MPA management bodies in a systematic but strategic manner to ensure that management is progressing to a higher level per the MPA rating system;
- Sponsor workshops and informal meetings among MPA managers, management bodies and other important stakeholders to help establish social networks for MPA implementation and support; and,
- Link all existing and future MPA work (data, results, MPA establishment etc.) with national programs to support MPAs such as the Protected Area and Wildlife Bureau of DENR, the MPA Database of CCEF and Partners and others that may assist in making local efforts more sustainable.



## MPA networks — Final key points

- 1. An MPA network is also a network of people managing the component MPAs, benefiting from the network and promoting the networks' viability and longevity;**
- 2. Not just any collection of MPAs can be called a MPA network. A MPA network is a collection of MPAs that *interact* in some meaningful manner (e.g., source or sink of larvae and propagating organisms, protection for quality habitat and threatened or endangered species, etc.) that enhance fisheries and biodiversity conservation (Palumbi 2004); and**
- 3. An effective MPA network is composed of individual MPAs that each satisfies the requirements of an effective MPA as highlighted in this training course.**

# Monitoring and Evaluation of Marine Protected Areas



**USAID**  
FROM THE AMERICAN PEOPLE



*Session 11*

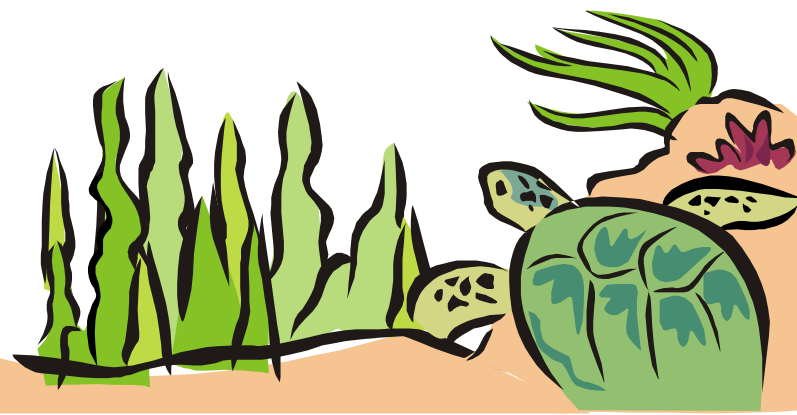
*Marine Protected Area Establishment and Management*

Information is something we all need in every day life in order for us to make informed decisions about things.

When using the adaptive management cycle this is even more important.

Many Sanctuaries have been implemented but very few have been properly monitored.

Much money is spent on implementation but again very little on evaluation of these inputs.



## Resource assessment

- Assess trends and information and feeds into adaptive management cycle
- Finds out what a resource has, its main features and what is important
- Assesses an area in preparation for planning to occur

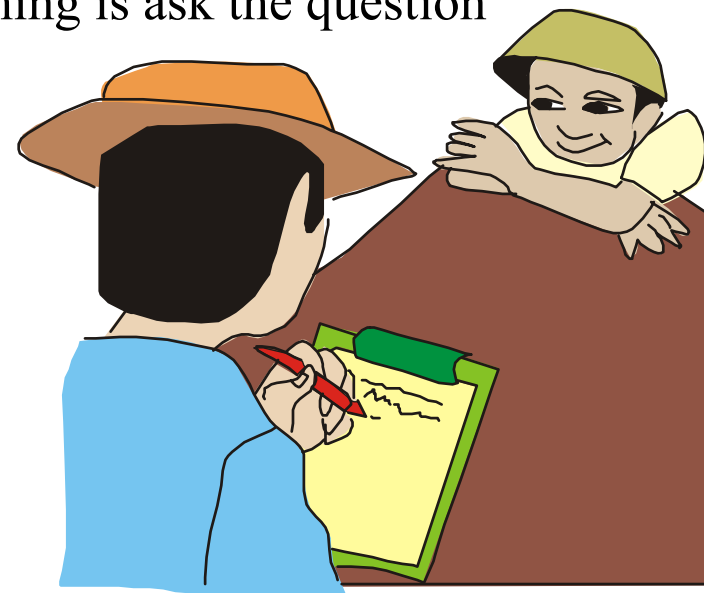


## Research

- Understanding factors that predict the abundance of the fauna and flora in the area
- Looking for signals of activities that are influencing the area and ‘noise’, the impacts of these activities and their links
- Assessing causes and changes in an area

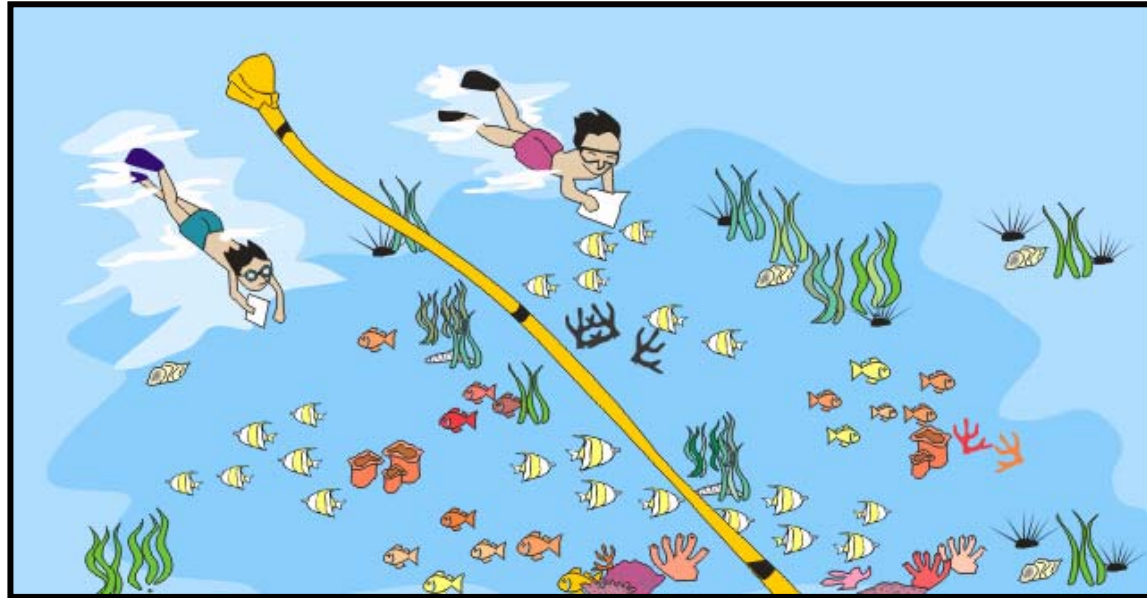
# Monitoring

- Assess effectiveness of management
- Assess/Measure the impact of a specific management intervention
- Looking for temporal changes in both qualitative and quantitative indicators
- Evaluating the success or failure of certain interventions and developing conclusions for future implementation
- In conducting assessments of marine sanctuaries there are several techniques which can be used, as facilitator you must be able to choose which is the best for the situation and each will be different for different areas
- The most important though before you do anything is ask the question why are we going to monitor this area, if you are again clear with your objectives then you will be easily guided as to what is best.
- It is also advisable to again include your key leaders from the area in the whole process from deciding which tool to use to actual implementation of the research.



# Research overview

- Selecting representative
- Numbers of areas and timeframes
- Manta tow
- Community-based fish visual census
- Community-based fish catch monitoring
- More technical and scientific monitoring, through the use of diving teams etc.
- Community perception survey
- MPA Rating System



# Conclusions

- Pick the tool based on objectives, why are we doing the monitoring?
- Copious amounts of participation
- Include community in research team
- Feed the information back and validate it properly and solicit feedback
- Publicly publish the results in *barangay*
- Long-term sustainability, budget and user fees
- Re-define/adjust your plan based on findings of the monitoring

