Chapter 6
The big picture: Can integrated coastal management help?

The variety of problems facing coastal areas and resources necessitates the use of integrated management approaches[29, 122]. Single issue or sector interventions will always miss important contributing causes to coastal management issues. Thus, the emerging comprehensive management is the only approach. The question is whether we can afford the cost and what are the real benefits of integrated coastal management (ICM). Let us look at the potential gain from ICM based on the various values presented in this book. Once we see how large the potential gains are, it is easier for us to determine how much we should invest in management. First, what do we mean by ICM and what interventions are essential within the framework of ICM.

ICM starts with planning, information collection and analysis. All integrated management must involve the various stakeholders in the planning and implementation phases. The perceived and real issues need to be prioritized and solutions sought which are consistent with environmental, social and political realities. The planning process must be open and participatory in nature so that consensus is the driving force behind implementation.

In the Philippines, interventions which are essential for implementation within ICM plans are:

1. Enforcement of basic laws such as those banning destructive fishing methods and other activities which are blatantly damaging to the coastal environment;

2. Formulation and enforcement of detailed municipal ordinances regarding fisheries management, shoreline development, marine protected areas, reforestation, land use and more; and

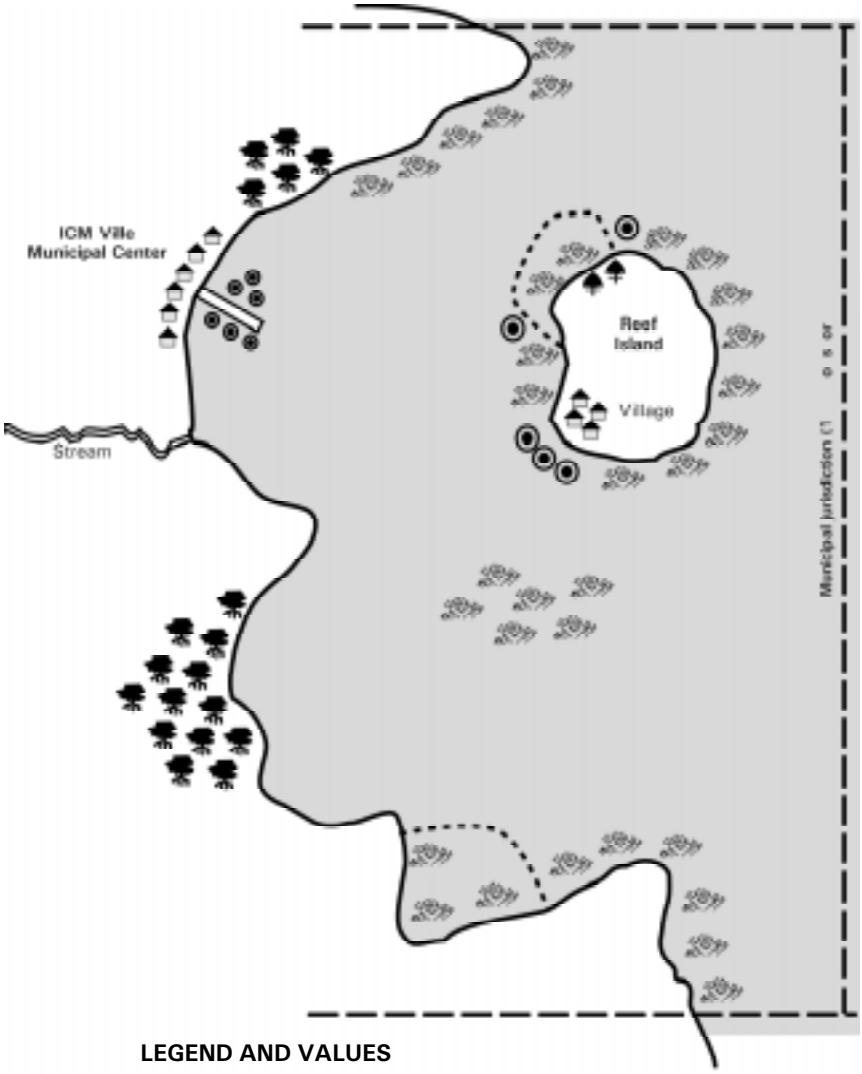
3. Considering varying licensing and economic rent arrangements to control access to coastal resources and to generate revenue for local government units and communities.

Proven models exist for maintaining coral reef productivity for economic benefits from fishing and tourism for small island communities[30, 119, 121, 129]. These examples all involve the implementation of marine reserves and sanctuaries in various forms. The results of these initial experiments and, now, practical interventions are very encouraging[96, 122]. It is presumed that much more frequent use of marine reserves in the context of integrated coastal management (ICM) programs will lead to positive ecological and economic development on a wide geographic scale[119]. Documentation of the status of coral reef condition within marine sanctuaries such as in Mabini, Batangas, since 1990 has shown remarkable improvement due to improved management both inside and outside the sanctuary areas[118, 120, 125].

COMPOSITE POTENTIAL GAINS FROM INTEGRATED COASTAL MANAGEMENT

Based on the examples and information in this book, we can now add up the values for the various resources for a typical coastal area assuming a reasonable condition of the coastal resources at stake. A hypothetical bay can be used as an example of the resources and values at stake (Figure 6.1). Our example bay has some coral reef habitat, some mangrove forest and open-water space for marine fisheries. For simplicity purposes we will assume that our bay is still relatively undeveloped and the income of people living in the area is derived from sustainable use of resources in the bay and that they have no other sources of income. The question to be answered is what level of investment in management and protection of these natural resources is warranted given the value of these resources to the local coastal users.

Figure 6.1. Typical coastal municipality and area, its resources, habitats and potential values (Table 6.1 for details).



LEGEND AND VALUES

- Mangroves 1 km^2 (US$120,000/km^2/year)
- Coral reefs 5 km^2 (US$50,000/km^2/year)
- Open-water fishing area 10 km^2 (US$1,000/km^2/year)
- Marine sanctuary boundary
- Beach resort
- Municipal boundary
- Shoreline
- Anchor buoy

The values of the resources in this hypothetical bay are summarized in Table 6.1. These values can be compared with the potential cost of management and protection. Based on these resource values, we can justify management costs of less than or equal to the resource values. Of course, in reality, the amount we usually spend on management is only a very small fraction of the resource valuation if the amounts in Table 6.1 are realistic.

Table 6.1. Annual revenues (values) of coastal resources in a hypothetical bay* (shown in Figure 6.1) and the associated costs of management.

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

[a]US$1 = 40 pesos in 1998

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

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

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

If we take a national perspective and add up the contribution of these basic marine coastal resources to the national economy, we will be impressed with the annual contribution of these systems (Table 6.2). The annual benefits from the existence of our natural coastal resources are conservatively estimated at US$3.5 billion for the whole Philippines in Table 6.2. Since the national expenditure on management from all sources (government, non-government, donor and others) combined is less than 1% of this amount, we can see that significant increases in spending for protection and management of resources are warranted.

The estimates shown in Table 6.2 are very conservative which means that the annual contribution of these ecosystems together with fisheries to the Philippine national economy is at least US$3.5 billion every year. It is likely to be much higher in reality since we are not putting economic values on all the ecological functions known to come from coral reefs, mangroves and healthy fisheries. Also, it should be noted that the Philippines has already lost a significant portion of the original value of these systems because of degradation

Table 6.2. Total annual national economic benefits derived from coral reefs, fisheries and mangroves in the Philippines, 1996.

Ecosystem/resource	**Area/yield in the Philippines**	**Value** (in US$)
Coral reefs	27,000 km^2	1.35 billion
Fisheries		
Tourism		
Coastal protection		
Mangroves	140,000 ha	84 million
Fisheries		
Wood*		
Other contributions		
Fisheries	Open marine water	1.25 billion
Municipal (less reef fish)	909,000 t	0.64 billion
Commercial	879,000 t	0.61 billion
Aquaculture	Brackish and marine 981,000 t	0.83 billion
Total		**US$3.5 billion** (P140.56 billion)

US$1 = 40 pesos in 1998

*Wood is not included because there is legally little mangrove wood harvesting allowed.

Note: All numbers in this table are derived from information presented earlier in the book.

of the marine environment. Although difficult to estimate, we could safely guess that more than 50% of the natural production of these systems has already been lost. We know this is true for mangroves which have been reduced by 70% since 1920. We know that fisheries are being overfished; thus, the total fish catch is less than its natural potential.

Yet, because the current economic value of these resources is still extremely high by any standard, we can justify investing in their management. Even if we only invested 5% of the national economic rent equivalent of these resources, it would amount to about US$175 million or more than P7 billion every year. This should be considered as an absolute minimum to ensure some level of management of these natural resources. Unfortunately, the amount invested in management is much less and thus reflects the deteriorating condition of these resources. They warrant more and could benefit from economic policies which tax users and revenue flows so that stewardship is paid for through more sustainable means. Protection of these resources for the future is not free. ICM approaches can begin to lead us in the direction of improved field and economic management policies which may stabilize the condition and natural benefits from our coral reefs, mangroves, fisheries and water quality.

CONCLUSION

We have illustrated the use of economic valuation in planning for and managing our coastal resources and environment in this book. Most of the monetary figures quoted or derived are based on the actual or projected change in productivity of coastal ecosystems and their products. Through this means we are able to see what is being lost from the destruction of coral reefs, mangroves and fisheries and lowered water quality. And we are able to quantify the potential economic gains from management. Other economic valuation methods used are the loss of potential earnings, opportunity cost approaches and contingent valuation or willingness-to-pay. Although we have not analyzed the subtleties of these various methods, it should be clear that economic valuation tools are

essential in forming policies for environment management. As a society, we like to equate our actions to objective criteria. These valuation methods can be used to achieve an economic (monetary) equivalent of value of what we as a society are losing or gaining from our actions.

In Chapter 2, we showed that coral reefs are the most productive ecosystem in the world and provide immense benefits to those who take care of them. When we destroy reefs, we destroy income for various beneficiaries on the order of US$50,000/km^2/year of healthy coral reef. Although this figure varies tremendously depending on the local situation both ecologically and socially, it provides us with ammunition to support the management and conservation of all of our coral reef resources. The potential fish catch alone from a healthy coral reef is enough to justify sizable management costs.

In Chapter 3, we highlighted mangroves as being a very productive ecosystem which is highly threatened in the Philippines. The benefits from mangroves are not as easy to quantify as from coral reefs, but as we learn about their natural ecological roles and their various human beneficial products, we begin to realize that mangroves are a powerhouse resource which needs to be protected and managed. There is really no justification to remove any mangroves and in fact many abandoned and degraded mangrove habitat areas should be brought back to life. The average annual conservative return used for Philippine healthy mangrove forests and habitats is US$600/ha/year. A simple calculation for all the abandoned fishponds in the country which were once thriving mangroves, will tell us that we can afford to replant mangroves and to maintain their continuous benefits.

In Chapter 4, we looked at the large fishery resources of the Philippines in the context of habitat destruction and overfishing. The sad story for fisheries is that although the country depends heavily on fishing for food, livelihood and export income, fisheries are beginning to decline. There is clear evidence that overfishing or too much effort per unit area and catch is occurring in all the important fisheries of the country. The consequences are that the

overall catch is decreasing and catch per unit effort (person, boat or horsepower) is decreasing and that profits to all concerned are declining. And, because commercial fishing effort with 30% of the catch only employs 6% of the fishing workforce, there is a severe misallocation of capital invested in the commercial fleet which leaves few fish for the small-scale and municipal fishing sectors. Our valuation analysis shows that much more effort and funding needs to be invested in management of fisheries of all kinds. The loss in economic rent of probably more than US$0.5 billion annually for the small pelagic fishery alone should alert us to the real situation. Total losses are much higher than that if all fisheries are considered. This situation could easily justify support for a much improved fishery management force in the country.

In Chapter 5, we analyzed the importance of coastal water quality in maintaining viable fisheries and habitats such as coral reefs and mangroves. We discovered that increasing pollution of coastal waters will erode our gains in other areas such as destructive fishing and implementation of better fishery management practices. Water quality is the bottom line for all coastal ecosystem health. The losses from pollution will be equal to all the potential benefits from the other systems of concern. One way to measure the potential losses from pollution is to estimate the willingness-to-pay of polluters for losing their ability to dump into the ocean or a river for free. This willingness-to-pay was estimated for the whole of Lingayen Gulf polluters to be approximately P366 million annually. This amount is probably a conservative estimate of what is actually lost in terms of decreased fish catch and lowered tourism appeal in the Gulf.

Finally, in this chapter, we looked at the composite picture for coastal resources in the country and what is required to improve management. Integrated coastal management (ICM) is proposed as an approach which will begin to integrate the needed actions into a more holistic management framework. It is agreed by most concerned policy makers and managers that piecemeal and single sector approaches are no longer viable. The analytical tools discussed are essential for planning watershed management areas which consider threats of pollution, land use and human settlements in general with all their various impacts. An economic analysis helps us

put the various costs and benefits into perspective for realistic plans. The values of coral reefs, mangroves, fisheries and water quality, can be used as driving forces in making arguments to improve the manner in which we develop coastal lands. Most coastal development impacts usually end up in the sea either smothering reefs, replacing mangroves or killing fish through all the channels that link these systems together.

Several conclusions which can be derived from the information in this book for consideration in planning for integrated coastal management are:

- Most ecological benefits of coastal ecosystems can be valued in monetary terms and considered in the valuation of the resource for planning and management;

- It is essential to analyze the actual present and future benefits derived from our coastal resources in terms of both ecological and human-derived benefits;

- The benefits derived from any coastal ecosystem will vary from place to place and in time, thus requiring some basic information about the situation of concern;

- All coastal ecosystems are inherently productive and valuable; and if we do not have the luxury of time to collect basic information on the area and its resources, we should rely on studies from other locations or even countries to provide guidance;

- The natural and real economic benefits from coastal resources in the Philippines have been grossly underestimated, and this has contributed to the massive destruction of coral reefs, mangroves and fisheries in recent years; and

- The cost of effectively managing our coastal resources is generally a small fraction of the annual potential revenues accruing directly from healthy coastal systems.