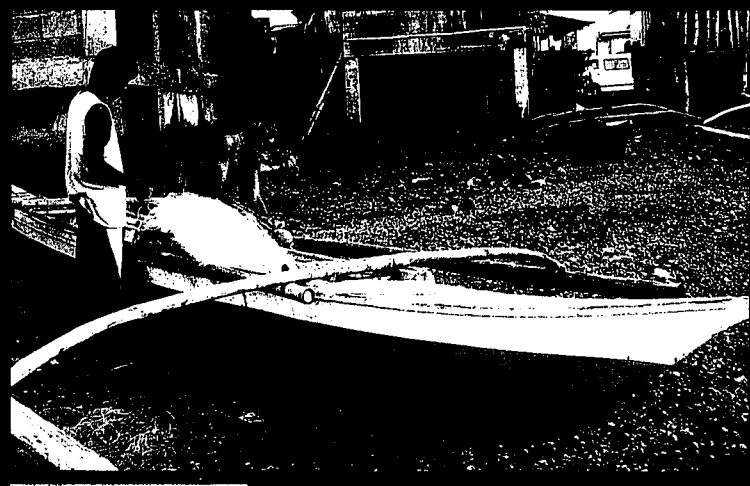
Poverty Reduction through Sustainable Fisheries

Emerging Policy and Governance Issues in Southeast Asia



Editors

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10 STATUS OF COASTAL AND MARINE RESOURCES: IMPLICATIONS FOR FISHERIES MANAGEMENT AND POVERTY IN SOUTHEAST ASIA

Alan T. White [a]

ABSTRACT

The coastal and marine resources in Southeast Asia are unequalled in density and diversity by those in other parts of the world. Fisheries from the region supply about 10 per cent of global fish catch. Over the last 20 to 30 years, these resources have been under threat of overexploitation, destruction, and extinction in some areas. This paper reviews the status of the most important coastal and marine resources in Southeast Asia; and highlights the primary threats to their sustainable use and existence. The dependency of coastal human populations on near-shore fisheries and resources is discussed in relation to the economic consequences of poor management of these resources. Finally, promising management strategies and governance systems from the Philippines are explored in terms of their implications on future research topics relevant to building sustainable fisheries. Research topics suggested include: 1) Continuous monitoring of the biophysical status of coastal resources so that policy makers are aware of the progress (or lack thereof) of protection and rehabilitation efforts; 2) Cost-benefit analysis of the management of coastal resources and fisheries; 3) Investigating the causes of resource degradation from pollution and other impacts on the coastal environment; 4) Understanding the tradeoffs between small and large scale fisheries in Southeast Asia; 5) Testing models for integrated coastal

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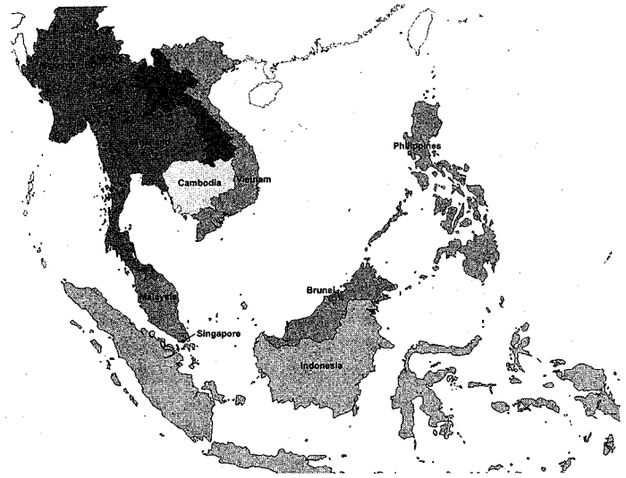
and ecosystem-based management including fisheries and economic development; 6) Testing ways to develop alternative economies for small-scale fishers that reinforce protection and management; 7) Augmenting and refining the integrated paradigms for management that put small-scale fisheries at the centre of a complex management problem; and, 8) Learning more about how to build capacity for management.

INTRODUCTION

The coastal and marine resources in Southeast Asia[1] are unequalled in density and diversity by those in other parts of the world (Figure 10.1). It is well known that these tropical coastal areas are rich in coastal and marine ecosystems comprised of coral reefs, mangroves, estuaries, beaches, and their associated fisheries. Fisheries from the region supply about 10 per cent of global fish catch. It is equally known that over the last 20 to 30 years, these resources have been under threat of overexploitation, destruction, and extinction in some areas. This paper aims to briefly review the status of the most important coastal and marine resources in Southeast Asia; and highlight the primary threats to their sustainable use and existence. The dependency of coastal human populations on nearshore fisheries and resources is discussed in relation to the economic consequences of poor management of these resources. Finally, promising management strategies and governance systems from the Philippines are explored in terms of their implications on future research topics relevant to building sustainable fisheries in Southeast Asia.

Figure 10.1 Southeast Asian countries all have coasts except for Laos

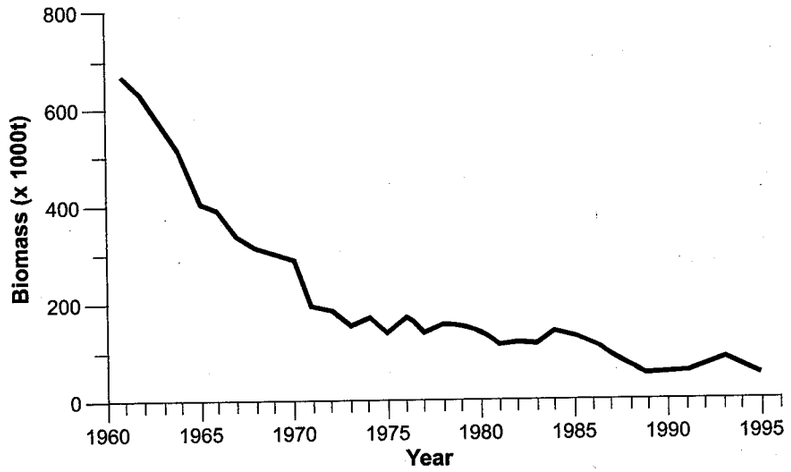


STATUS OF COASTAL AND MARINE RESOURCES

The condition of coastal ecosystems and fisheries in Southeast Asia is generally declining due to numerous factors as highlighted by many studies over the last 20 years (Burke et al 2002; Pauly et al. 2002; Stobutzki et al. 2006a, b). Fisheries trends in Malaysia, the Philippines, and Thailand have been assessed by Stobutzki et al. (2006a). A time series of scientific trawl survey data (spanning 12-49 years) was employed to study changes in the total biomass of demersal species over time. These trends are shown in Table 1. All countries in the study showed large declines in total biomass, ranging from 32 per cent to 96 per cent in relation to the estimated original biomass. The Gulf of Thailand is particularly ominous with only about 8 per cent of its original biomass remaining, as measured in the 1960s (Figure 10.2). This well documented case of fisheries decline in Thailand is due to the systematic and relentless commercial trawl fishing in the Gulf (Stobutzki et al. 2006a, b). In the Philippines, catch per unit effort for small-scale fisheries has also declined to less than 2 kilograms per fisher per day (Figure 10.3). In the 3 countries, exploitation ratios (fishing mortality: total

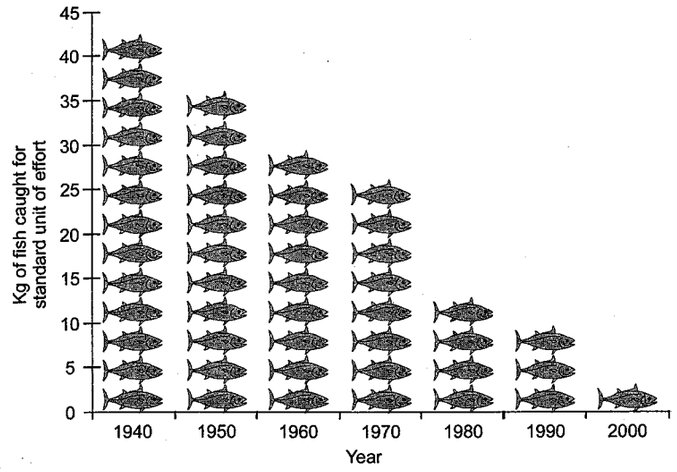
mortality), calculated from length frequency data, were generally >0.5, suggesting severe over-fishing (Stobutzki et al. 2006a), as seen in Figure 4. Environmental degradation through declines in water quality, modification, and loss of critical habitats are important contributing factors to the decline of fisheries in these 3 countries. An equally important cause of over fishing and fisheries decline is the increasing capacity, efficiency and mobility of fishers and fishing operations in general (Pauly 2006; Berkes et al. 2006).

Figures 10.2 The Trends in Estimated Total Biomass from the Scientific Trawl Surveys in the Gulf of Thailand



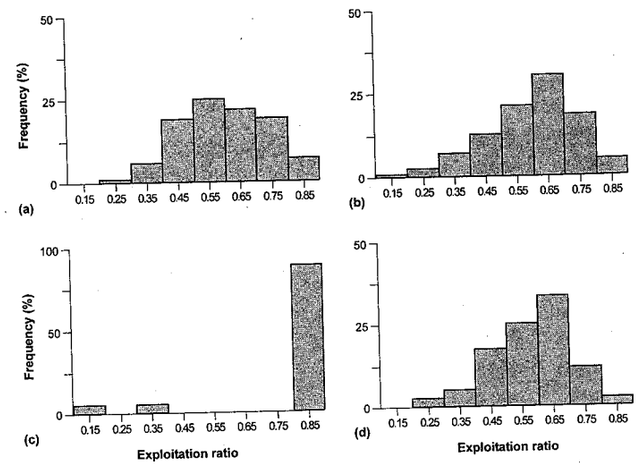
Source: Stobutzki et al. 2006a.

Figures 10.3 Average CPUE Since 1940s for Fishers Using Hook-and-Line from Six Provinces in the Philippines



Source: Green et al. 2004.

Figures 10.4 The Frequency of Exploitation Ratios (fishing mortality:total mortality) for Demersal Fish Stocks Based on Length Frequency Analyses in: (a) Malaysia; (b) Philippines; (c) Thailand; and (d) regionally. (Stobutzki et al. 2006a)



Source: Stobutzki et al. 2006a.

Table 10.1 Remaining Estimated Biomass of Demersal Fisheries in Malaysia, Philippines and Thailand

	Malaysia	Philippines	Thailand
Per cent of original biomass estimates	4-20	12-64	8
Baseline year(s)	1960s	Circa 1950	1965
Most recent data	1998	1996	1995
Notes:	Greatest declines in depths <50m	Various bays and important fishing areas	Gulf of Thailand

Source: Stobutzki et al. 2006a.

Coastal habitats that provide significant ecological and physical support to fisheries in Southeast Asia countries are coral reefs, seagrass beds, mangroves, and estuaries. All of these are impacted in numerous ways from coastal development that includes: urbanisation, ports, expansion of aquaculture, deforestation, fishing operations, and pollution, among others (Wilkinson et al. 2006). The net result is a decline in functional and quality nearshore habitat areas that continue to contribute ecologically to fisheries ecosystems.

The coral reefs of Indonesia and the Philippines alone comprise about 27 per cent of the global total and contain the highest coral reef, flora, and fauna biodiversity of any reefs (Burke et al. 2002). The status of reefs in the region varies with locality and according to management regime. In general, most reefs are under varying degrees of threat from destructive fishing and overfishing, sedimentation, pollution, and other direct human impacts (Tables 10.2 and 10.3) (Burke et al. 2002; Wilkinson 2004). In addition, in 1998, the first major El Nino-associated ocean warming in Southeast Asia caused large-scale coral mortality, affecting from 10 to more than 50 per cent of living corals in the region. Depending on their quality, oceanographic setting, and other factors, coral reefs contribute significantly to nearshore fisheries. In the Philippines alone, it has been shown that reefs contribute more than 10 per cent of the total national fish production and, in localised contexts, the proportion of reef-associated fisheries ranges up to 70 per cent (Russ and Alcala 1999). In addition, coral reefs are the largest tourism attraction in coastal areas and generate substantial revenues through reef viewing (White and Trinidad 1998; Cesar 1996).

Table 10.2 Coral Reef Extent and Relative Threat Status as Determined in 2002

	Reef area (km^2)	High threat	Low threat	Primary threats
Indonesia	51,000	47 per cent	14 per cent	Destructive and over-fishing, pollution
Malaysia	4,000	42 per cent	13 per cent	Destructive fishing, sedimentation
Philippines	26,000	70 per cent	2 per cent	Over and destructive fishing, sedimentation
Singapore	54	100 per cent	0 per cent	Coastal development, pollution
Thailand	1,800	52 per cent	23 per cent	Over and destructive fishing, development
Vietnam	1,100	74 per cent	4 per cent	Destructive and over fishing, sedimentation
Total/Ave.	83,954	64 per cent	9 per cent	

Note: Per cent threat was determined by the Reefs at Risk study that quantified all the important risk factors in each country and determined a relative level of threat. Factors considered were exposure to destructive fishing, overfishing, pollution, sedimentation, and human population density. The difference between high and low threats represents a medium threat level.
Source: Burke et al. 2002.

Table 10.3 Summary of Coral Reef Status in Southeast Asia for all Countries Combined

	Per cent of reefs
Destroyed	38
Critical stage	28
Threatened	29
Low/No threat	5
Total	100

Note: Reefs destroyed in the 1998 bleaching are estimated at 18 per cent and those recovered 8 per cent. Countries covered in this assessment also include Brunei, Cambodia and Myanmar and reefs in the South China Sea with a total reef area of 91,700 km^2 for Southeast Asia
Source: Wilkinson 2004

Seagrass beds occur both in association with coral reefs and in separate areas, but often adjacent to reef areas. Their extent more or less mirrors the extent of reefs although their exact area extent is not generally known because they are included in estimates of coral reef cover. Data on seagrass bed destruction varies with the level of threats associated with coral reefs in a given area. The major destructive stresses are from fish trawling in shallow waters, sediment pollution, increases in nutrients from land use runoff, port development and dredging (Fortes and Santos 2004; Wilkinson et al. 2006). Seagrass beds, like coral reefs, are generally declining in areas close to coastal development that cause direct destructive physical impacts or water quality degradation that lowers their threshold to adapt and grow.

Mangroves are the most threatened habitat in Southeast Asia, given the large-scale land use changes in coastal areas where mangroves grow or have grown in the past (Morgan and Valencia 1983; Valiela et al. 2001; FAO 2003). The decline in the coverage of mangroves for key countries is shown in Table 10.4. Mangroves, like coral reefs, contribute significantly to nearshore fisheries, and augment fisheries in coral reef and estuarine habitats. Selected species, such as some snappers, groupers and shrimps, depend almost entirely on mangroves as a spawning or nursery ground before they migrate into open water and become part of the reef or open-water fishery system. In Asia, mangroves have been severely affected by coastal land use changes in the following order of importance: shrimp culture, forest use, fish culture, diversion of freshwater, land reclamation, herbicides, agriculture, salt ponds, and other developments (Valiela *et al.* 2001; White and De Leon 2004).

Table 10.4 Change in Mangrove Coverage in Southeast Asia Since Early Estimates Made

	Early estimates		Recent estimates		
	Year	Area (km²)	Year	Area (km²)	Per cent Decline
Indonesia	1980	42,540	2000	29,300	31
Malaysia	1980	7,300	1995	5,721	22
Philippines	1920	4,500	1990	1,325	71
Singapore	1983	18	1990	6	67
Thailand	1961	3,724	1993	1,687	55
Vietnam	1945	4,000	1995	1,520	62
TOTAL		62,082		39,559	36

Note: Because baseline information is not old in some countries, actual decline may be more than measured given that baselines have been shifting for at least 100 years (e.g., the Philippines with an older baseline shows a larger decline).
Sources: FAO 2003; Valiela et al. 2001.

The estuaries of tropical Southeast Asia are usually associated with mangroves and often affected by the same threats as mangrove forests. The main difference is that estuaries, being water bodies, are more directly impacted by pollution carried by rivers from inland areas. Estuaries are highly productive ecosystems that contain a diversity of fish and invertebrate species that are highly vulnerable to changes in water quality, salinity and temperature. In this regard, when estuaries occur in areas of urbanisation and development of industry and ports, they are dramatically altered or even destroyed. In more remote or protected areas, they may still exist in fairly natural states although their extent has been much reduced over the last 50 years in all of Southeast Asia (Morgan and Valencia 1983).

THREATS TO RESOURCES

The specific threats to resources, which are generally well-known in the region, are noted above (Wilkinson 2004; Burke et al. 2002). For example,

threats to coral reefs and mangrove ecosystems are well-documented in various studies and field reports, while a broader perspective may be needed to fully understand the causes of these threats. The various threats to the coastal resources are both driven and mitigated by economic development. Development works both for and against the conservation and sustainable use of fisheries, reefs, and mangroves. Development of watersheds and shoreline areas has immediate impacts in terms of pollution and more intense use of coastal lands and habitats. Population growth and the relative incomes of people living in coastal areas are important factors in determining the plight of coastal environments. But the importance of these factors is controlled by the governance and broad economic context in which they exist. Finally, a key factor in determining the willingness of a country or community to protect and manage its resources is to the extent to which it depends on the health of its fisheries and coastal resource systems for its own well-being. We might expect that those countries that derive more immediate benefits from the sea would be more willing to invest in its protection and management. Unfortunately, the countries that are most dependent also have the lowest capacity to develop effective management systems and the smallest budgets to invest in protection and conservation measures. In this regard, the economic status of each country is shown in Table 10.5.

Table 10.5 Economic, Demographic and Fisheries Data of Selected Countries

	Population (2002) (millions)	GNP per capita (USD) (2002)	Marine capture fisheries (million t) (2004)	Fisheries/ aquaculture per cent contribution to agriculture GDP (2004)	Per cent earning <1$US/ day (2005)	Per cent animal protein from fish (1999)
Indonesia	225	570	4.23	10.2	7.4	53.1
Malaysia	24	3380	1.28	11.3	2.0	34.5
Philippines	83	1040	1.90	19.0	15.2	42.8
Singapore	4	24740	--	--	0	--
Thailand	62	2000	2.72	15.2	2.0	41.5
Vietnam	80	390	1.36	40.0	17.5	39.4
Total/ Average	478					42.3

Sources: Wilkinson et al. 2006; Stobutzki et al. 2006b

It is ironic that Singapore, with the highest per capita income and a very stable economy, has allowed its coral reefs to come under the highest level of threat (Table 10.2). Yet, this is probably understandable in light of its relative lack of dependence on the condition of its coastal ecosystems for food and livelihood — except for recreation. On the other hand, a country like Malaysia, that also is economically developed, is investing more in its marine resource management efforts with effectively managed marine-protected areas and a fisheries management system that is beginning to be effective (Wilkinson et al. 2006). Malaysia also derives a substantial portion of its agricultural economy from capture fisheries and aquaculture (Table 10.5). Finally, there are the countries that depend more heavily on coastal and marine resources for income, have higher levels of poverty, and also need more assistance to effectively manage their resources (e.g., Indonesia, the Philippines, Thailand and Vietnam). At the same time, we are likely to find some creative solutions to these issues in these countries where the motivation to stabilise fisheries and coastal resources is highest.

BENEFITS DERIVED BY COASTAL POPULATIONS FROM COASTAL RESOURCES

The benefits derived by coastal populations from the sustainable use of coastal resources are important to measure since understanding these benefits would motivate more investment in managing coastal resource systems. It is crucial to understand the socio-economic, ecological, and political dynamics of small-scale fisheries and how these resources are used. Likewise, it is also important to identify what contextual, institutional, and environmental factors affect their condition. Pauly (2006) has reviewed major trends in small-scale marine fisheries with emphasis on developing countries. He suggests that, despite the present problems in small scale fisheries of the world, suitably governed, they are our best hope for sustainably utilising coastal resources in general. This certainly applies to Southeast Asia where most coastal resource exploitation is driven by small-scale fisheries. And, indeed, it is these fisheries that provide the largest economic and social benefits to coastal societies in association with the coral reefs, mangroves and water, and environmental quality necessary to maintain fisheries in a viable state. In addition, it is consistent with this argument that these ecosystems

can equally provide benefit streams through other economic sectors, such as tourism and recreation, if managed in a holistic manner. It is thus useful to briefly look at the market and intrinsic economic values derived from these resources that accrue to communities and the economies in Southeast Asia (Tables 10.6 and 10.7).

The value of the region's sustainable coral reef fisheries alone is $2.4 billion per year (Burke et al. 2002). In addition, coral reefs are vital to food security, employment, tourism, research, and shoreline protection. The coral reefs of Indonesia and the Philippines provide annual economic benefits estimated at $1.6 billion and $1.1 billion per year, respectively, while mangroves and their associated fisheries make similarly large economic contributions. Although figures are not available for all countries in the region, estimates, depending on coastlines and the extent of habitats, will mirror the figures shown in Table 10.6. Table 10.7 provides an estimate for total annual economic benefits from all important coastal resources in the Philippines.

Table 10.6 Potential Sustainable Annual Economic Net Benefits Per km² of Healthy Coral Reefs in Southeast Asia

Resource use (direct and indirect)	Production range	Potential annual net benefits (US$)
Sustainable fisheries (local consumption)	10—30 tons	12,000—36,000
Sustainable fisheries (live fish export)	0.5—1 tons	2,500—5,000
Coastal protection (erosion protection)		5,500—110,000
Tourism and recreation	100—1000 persons	700—111,000
Aesthetic/biodiversity value (willingness to pay)	600—2000 persons	2,400—8,000
Total of all values		43,100—270,000

Sources: White et al. 2000; White and Trinidad 1998; Cesar 1996; Burke et al. 2002
Note: Data are based on estimates for Indonesia and the Philippines only

Table 10.7 Total Annual National Economic Benefits Derived from Coral Reefs, Fisheries and Mangroves in the Philippines, 1996

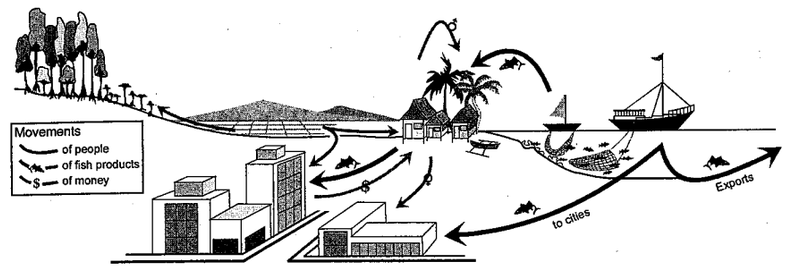
Ecosystem/resources	Area/yield in the Philippines	Value (in US$)
Coral reefs: fisheries, tourism and coastal protection	27,000 km2	1.35 billion
Mangrove forest: fisheries, wood* and other contributions	140,000 ha	84 million
Fisheries	Open marine water	1.25 billion
Municipal (less reef fish)	909,000 t	0.64 billion
Commercial	879,000 t	0.61 billion
Aquaculture	Brackish and marine	0.83 billion
	981,000 t	
Total		US$3.5 billion

*Wood is not included because there is legally little mangrove wood harvesting allowed
Source: White and Trinidad 1998.

The revenues derived from coral reefs in Indonesia and all coastal resources in the Philippines assist in the valuation of small-scale fisheries in association with the ecosystems upon which they depend. It is also necessary to understand the system that utilises these resources to inform management. Looking at the dynamics of coastal communities and their economies, and how these affect fisheries, Pauly (1997) has suggested in his portrayal of 'Malthusian over-fishing' that (Figure 10.5):

> *"the modernising and mechanising agricultural sector releases excess landless farmers, who migrate to urban, upland, or coastal areas; under this influx, traditional fisheries management collapses; the excessive fishing pressure is exacerbated by inshore industrial fishing, by the entry of the male children of fishers, and by the subsidy provided by young women working in cities to their brothers, fathers, or husbands in fishing villages. Upland deforestation, also involving new entrants, leads to sedimentation of rivers, and eventually, of coastal ecosystems, further reducing coastal fisheries yields."*

Figure 10.5 Schematic representation of the 'Malthusian overfishing' model of Pauly (1997), which states that the modernising and mechanising agricultural sector releases excess landless farmers, who migrate to urban, upland or coastal areas; under this influx, traditional fisheries management collapses; the excessive fishing pressure is exacerbated by inshore industrial fishing, by the entry of the male children of fishers, and by the subsidy provided by young women working in cities to their brothers, fathers, or husbands in fishing villages. Upland deforestation, also involving new entrants, leads to sedimentation of rivers, and eventually, of coastal ecosystems, further reducing coastal fisheries yields.

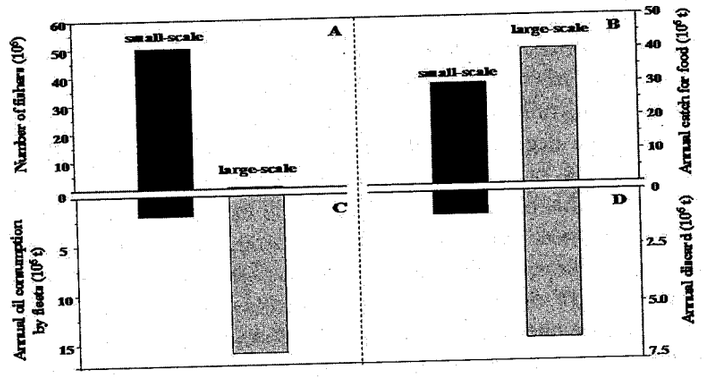


Malthusian overfishing, as described by Pauly, needs to be modified slightly to fit the Southeast Asian context because the "modernising and mechanisation of the agricultural sector" are not the primary source of excess labour in coastal areas in most of the region. Rather it is the growing populations and the inability of the broader economic sector to absorb excess unskilled labour that end up being dependent on coastal resources for sustenance and livelihood. But the Malthusian model helps us understand what drives the degradation of coastal fisheries and communities given the complexities of coastal development in Southeast Asia. There is much truth in this picture that highlights the need to focus on a scale of coastal management that includes the local communities, their economies, migration, gender roles, and their governance systems (Green et al. 2003). Another aspect of this picture is the marginalisation of small-scale fishers through increased competition between small and large-scale fisheries due to overfishing (Pauly et al. 2002). As Pauly and others have pointed out, any seeming progress in managing small scale fisheries to the benefit of coastal communities is often undermined by the influx of more labour (landless farmers and others) that, in turn, overwhelm the local governance of small-

scale fisheries. Another limitation is the natural productivity of tropical coastal ecosystems which cannot support ever-increasing numbers of fishers (new or old) (Pauly 2006; Longhurst and Pauly 1987).

In Southeast Asia, as in the rest of the world, there exists a tug of war between the small- and large-scale fishers. This has played out in recent years in Indonesia and the Philippines where laws have been changed in favor of rights for small-scale fishers and for local governments supporting their roles in the management process (Green et al. 2003; Satria and Matsuda 2004; White et al. 2005; World Bank 2006). There are many sound arguments for improved focus on small-scale fisheries management and more control over larger interests, both at the local and global scales. Figure 6 highlights the relative differences between the two sectors at a global scale that rings true for Southeast Asia. This dichotomy between large- and small-scale fishers and vessels has tremendous implications for the improved management of small-scale fisheries and coastal habitats because 1) resources are limited; and 2) the small-scale sector has more incentive to manage the resources given its relative dependence and marginal returns from resource extraction and management (with less discards compared to the commercial sector).

Figure 10.6 Relative Number of Fishers in Small and Large Scale Operations and their Catch, Use of fuel and Discarded catch



Sources: A. Berkes et al 2001; B. FAO 2000; ICLARM 2001; C. Berkes et al. 2001; Tyedmers et al 2005; D. Kelleher 2005.

The implication of this scenario is that coastal resource and fishery managers must accommodate the need for economic development that employs excess entrants into fisheries or other coastal resources use. The management regime should have a bias towards the small scale sector, consider the natural limits on the resources being used, and be cognizant of the relatively overexploited and degraded state of most coastal resources in the region. This is not a pretty picture but one that needs to be exposed if the economic and social benefits from coastal resources management are to be maintained and improved in years to come.

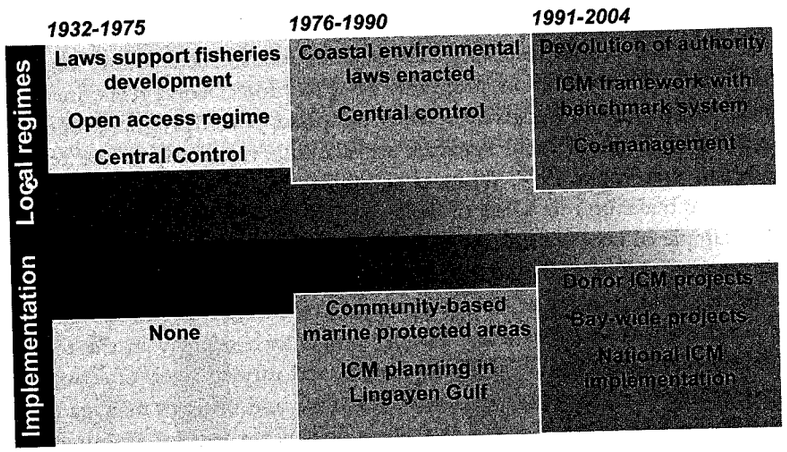
NEED FOR MANAGEMENT: STRATEGIES AND SYSTEMS IN THE PHILIPPINES

The need for coastal resources and fisheries management looms large in Southeast Asia. Numerous programs exist to protect coral reefs, manage fisheries, and restore mangroves. In fact, donor-supported programs together with national government agencies are working vigorously in the region (Christie and White 1997; White et al. 2005a). But to not lose sight of the trees that make up this forest of work in the region, it is useful to highlight an example of how coastal and fisheries management are addressed in the Philippines. All of the issues described above are present in the Philippines; there is certainly much at stake with coastal resources being destroyed and not maintained for sustainable use. Although each country in the region has a distinct legal and institutional system, and varying levels of economic development and capacity to implement coastal and fisheries management, the Philippines is highlighted as having one of the longest running and relatively successful coastal management programs in Southeast Asia (Courtney and White 2000; Courtney et al. 2000).

Coastal resources and fisheries management have a long history in the Philippines beginning in the late 1970s (White et al. in press). In brief, nearshore habitat and fisheries management in the Philippines started in the early 1980s with the advent of many small marine protected area (MPA) projects in association with various attempts to curb illegal and destructive fishing. These small and dispersed projects have increasingly revealed the need for a more integrated coastal management (ICM) governance within a decentralised framework (Figure 10.7). Although MPAs are seen as important

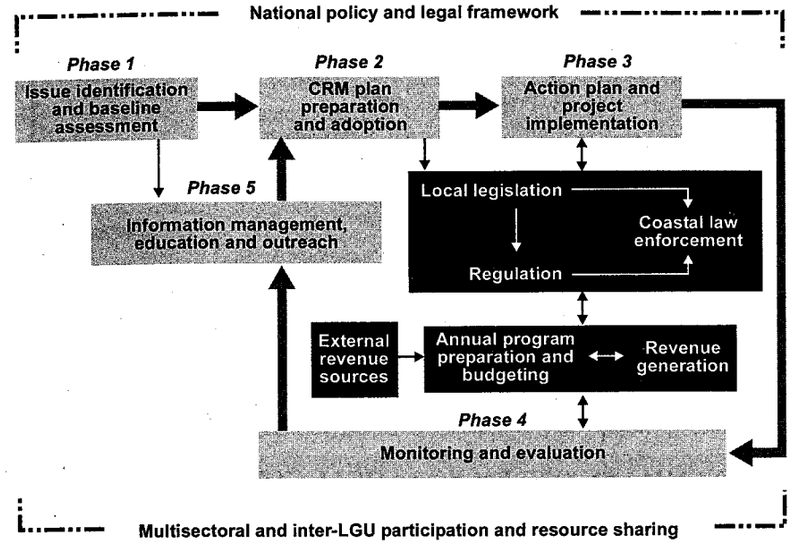
interventions to protect coral reefs and enhance nearshore fisheries, they have addressed only a small portion of the coastal management issues in the country and sometimes also inadvertently detract from the support required for broader area resources management for fisheries, pollution prevention, shoreline development, and mangrove conservation, among others (Christie et al. 2002). In addition, the integration of reproductive health (population) programs within ICM projects is being tested to slow population growth, a critical need, given the dependence of people on limited resources (White et al. 2005a).

Figure 10.7 Transition of Authority for Coastal Management from Central to Local Government and Implementations Through Time (White et al. 2006).



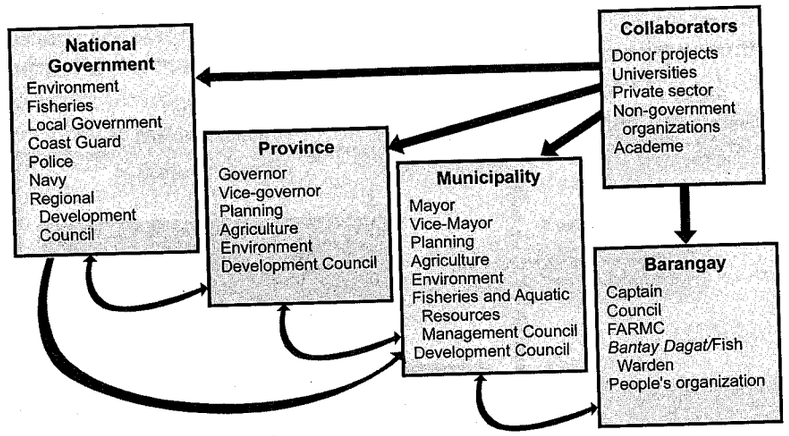
This larger ICM system is the local government planning and implementation framework as shown in Figure 10.8. Philippine coastal management case studies are usually undertaken within and through this framework. The framework incorporates municipal, city, and provincial governments, along with community support and involvement, in collaboration with the national government (Figure 10.9).

Figure 10.8 Five-phase Integrated Coastal Management Planning Process Adapted for Philippine Local Government



Source: DENR et al. 2001.

Figure 10.9 Institutions Affecting Coastal Management in the Philippines.



A BENCHMARK SYSTEM FOR LOCAL GOVERNMENTS

A system of ICM benchmarks is being adopted as the national ICM strategy and policy framework through the Department of Environment and Natural Resources (DENR). This benchmark system is now being utilised in more than 100 coastal municipalities (covering about 1/6 of the coastline) and cities after initiation in 2000 (DENR--CMMO 2003). The purpose of the ICM benchmark system is to standardise the approaches and results of each local government in their coastal and fisheries management efforts so that they can follow a common monitoring and evaluation framework. It is a simple system whereby each local government adopts a planning framework and process for addressing their coastal resource management (CRM) needs so, together with the national government, they can assess the extent and effectiveness of their management interventions. The basic benchmarks, with measurable results, to achieve the first level in the system are: 1) conduct of coastal resource assessment; 2) adoption of multi-year CRM plan; 3) establishment of coastal resources management organisations; 4) allocation of CRM annual budget; and, 5) implementation of at least 2 best practices as appropriate. Common best practices include: a) delineation and enforcement

of municipal water boundaries; b) planning and implementation of coastal zoning; c) implementation of specific fisheries management interventions; d) establishing functional marine protected areas; e) implementation of mangrove management; f) implementation of solid waste management; g) development of coastal environment-friendly enterprises; h) passing legislation as required; i) effective enforcement of coastal law; and j) others, depending on the area needs (DENR et al. 2001).

Municipalities and cities are thus the primary units of government for ICM in the Philippines. Indeed, this system effectively addresses the area's basic problem of resource management typically covering 20 or more kilometers of shoreline and with marine jurisdiction to 15 km offshore. As local governments are confronted with multifaceted problems in their coastal areas, ICM undertaken by these government units responds to local conditions. It should be noted that ICM is beginning to follow a process and adhere to a consistent set of benchmarks and criteria for evaluation (DENR--CMMO 2003).

The process of establishing MPAs is usually part of a broad community-based resource management program within the local government. This process may be facilitated by a local or national NGO or a local university, as in the case of Silliman University that assisted with the establishment of Sumilon and Apo Island Reserves. It could also be facilitated by a NGO. Case in point: the Coastal Conservation and Education Foundation, Inc. assisted in the formation Gilutongan and numerous other reserves in the Province of Cebu. Being part of a larger ICM program raises awareness about the need for an MPA. It also emphasises the need for broad area plans, of which fisheries management and MPAs are integral parts (White et al. 2005b). The broad planning phases described in Figure 10.8 also provide guidance for MPA establishment by encouraging a planning process that leads to implementation through a participatory process. In addition, a MPA management rating system and database are being adopted by most of the assisting organisations where the national government provides guidance for effective management and sharing information in a standard format. This system helps standardise the measurement of management performance among a diverse range of MPAs (White et al. 2004; 2006; www.coast.ph).

BOUNDARY DELINEATION FOR FISHERIES

A major issue triggered by the Philippine Fisheries Code of 1998 was the delineation of municipal boundaries for fisheries so that local governments knew exactly what area was under their jurisdiction. The delineation of the 15 km boundaries has implications for commercial fisheries (boats of more than 3 tons). Because of the increasing documentation of overfishing in nearshore waters and beyond, it has become paramount to formally establish the municipal boundaries so that these waters are reserved for small-scale fishers. However, boundary determination presented a problem, as to what land mass (islands or mainland shore) was to be used as a baseline to determine the boundary. Although the Department of Justice found fault with the delineation process in 2002, local governments have continued to delineate municipal waters. As delineation has proceeded, more municipal and city governments have begun to enforce the 15-km limit and ensure that these waters were reserved for the municipal small-scale fishers. This trend is continuing and promises to spread nationwide as part of local government ICM efforts. The weak link is that few municipalities have the capacity to patrol all their waters. In spite of this weakness, it is a healthy sign that open access is being restricted.

LOCAL GOVERNMENT LAW ENFORCEMENT

In response to the need for improved capacity for coastal law enforcement by local governments, several experiments in collaboration with law enforcement efforts have prospered. In the Central Visayas Region 7, for example, the Coastal Law Enforcement Alliance for Region 7 was formed in 2000. This alliance was comprised of all national agencies with some mandate over coastal law enforcement with the four provincial governments. The alliance operates at both the regional or sub-regional scales to address increasing problems with illegal commercial fishing within municipal waters. It also provides logistical and technical support for single or clusters of municipal governments that want to improve their fisheries law enforcement. The financial contribution for most enforcement comes from the municipal and city governments themselves. However, they still need technical guidance and mentoring to intensify their work.

Presently, several clusters of municipal governments in Cebu and Bohol have banded together to jointly patrol their waters, with the assistance of the Region 7 support group (Green et al. 2004). One group used a boat provided by DENR with fuel purchased by the municipalities, and personnel from both local government, the Philippine National Police and the Philippine Coast Guard. Such operations have netted the arrest and fines for commercial fishing boats operating illegally. Although this is only a beginning in a country with more than 800 coastal municipalities, it is setting a precedent for effective fisheries patrolling and management through local government initiatives jointly with key national agencies. Support for improved MPA surveillance is also being provided through these patrolling operations.

CO-MANAGEMENT OF MPAS WITH LOCAL GOVERNMENTS AND NGOS

Collaboration is an important factor in the success of MPAs. Although ordained legally by the municipal or city government, the actual implementation brings together a number of actors that make them effective and sustainable entities over time (White et al. 2002). The *barangay* community of Apo Island, for example, under the municipality of Dauin, has benefited greatly from its long-term association and mentoring with Silliman University. The community leaders and the Protected Area Management Board, some of whom reside on the island, provided day-to-day management (Russ et al. 2004). Gilutongan Island Marine Sanctuary is another example of collaboration where the key actors included the municipal government, diving tourism operators, an NGO — the Coastal Conservation and Education Foundation, and originally the USAID supported Coastal Resource Management Project. Also, several very active community members made a difference by providing vigilant enforcement to an area prone to illegal fishing at any time of day.

The private sector in the Philippines plays an increasingly important role in the success of MPAs and ICM in general. As the examples illustrate, academic institutions, NGOs, as well as the tourism business community, contribute in many ways such as providing technical guidance, mentoring, and funding. Also, they often bring tourists that are willing to pay entrance fees or purchase local products. Representatives from these sectors also sit

on management committees, making collaborative management the norm in the country (White et al. in press).

With a focus on fisheries management, the Fisheries Improved for Sustainable Harvest (FISH) Project, supported by USAID, is presently building on the foundation set by CRM in the 1990s. It makes use of the local government benchmark system and framework as a basis for a more ecosystem-based fisheries management approach. The FISH Project works in four "target areas" based on important fisheries and biodiversity resources. These field areas are comprised of clusters of coastal municipalities for which integrated fisheries management plans are being developed and implemented through a highly participatory and interactive planning approach. Ecosystem-based fisheries management systems being developed are comprised of networks of MPAs within an integrated framework. This regime incorporates extensive fisheries management interventions outside of the MPAs that include: 1) phasing out of the most destructive gears by agreement with fishers and local governments; 2) registration of all fishers in a move towards a simple licensing system; 3) improved law enforcement at the community, municipal, and cluster level; and 4) enhancing the design for and implementation of MPAs that achieve both fisheries and biodiversity objectives. Through the FISH project, managers are learning that links have to be created between ecosystem parameters and human communities that depend on the resources. The importance of ecosystem limitations must be understood. In this regard, the complexities of the local fisheries systems must be dissected, rationalised, and manipulated for effective management to be possible. The resource users are part of this process.

KEY LESSONS FROM THE PHILIPPINES

An important lesson from the experience of coastal and fisheries management in the Philippines is that effective management needs to start with the communities and their local governments. This is because, to a limited degree, each community and local government must navigate their own course before their program becomes sustainable. This observation is borne out of the highly participatory process that each management body engages in before field implementation begins. This also reflects the relatively decentralised legal and institutional setting of the Philippines where

municipal, city, and provincial governments have full authority over their coastal areas and resources. The only exception is when an area is within a national protected area. Even here, there is a high level of local control because the management council is mostly comprised of local stakeholders. Because of the highly participatory process of planning and implementation — although costly and time consuming — many areas are coming under sustainable use regimes. MPAs, such as Gilutongan, Sumilon and Apo Islands, and many others, see improvements in the condition of their coral reefs and fisheries while socioeconomic benefits to local stakeholders improve (Russ et al. 2004).

An important common ingredient in successfully managed areas in the Philippines is the presence of multi-sector collaboration and the role of capacity building at the local level. Collaboration ranges from the fishing community to the national government while key players are more often local, rather than national. Catalytic academic organisations, NGOs and members of the business sector often build capacity and draw the difference between success and failure in localised management. The research efforts of several universities have documented the real results of MPAs while serving as mentors for concerned communities and local governments. NGOs often bring technical assistance and funding to start projects that would never be initiated or go astray without their support. Thus, although each management process and area is unique, there are always partners that work together effectively and capacitate without usurping local authority.

The last and perhaps most important conclusion is that integrated coastal and fisheries management regimes are showing higher levels of success than those that simply focus on one issue or approach (White et al. 2005; Green et al. 2004; Wilkinson et al. 2006). The local governments that plan for their entire area and then prioritise issues and interventions do better and move toward sustainable management. The planning process helps them allocate budgets and integrate conservation, fisheries management, and even human reproductive health into their normal service. Integration across sectors, within and outside of coastal communities, and with a variety of field-tested interventions is a key to building management regimes that will endure in time, as shown in the Philippines.

RESEARCH TOPICS TO HELP BUILD SUSTAINABLE FISHERIES IN SOUTHEAST ASIA

There exists an extensive body of information and knowledge upon which to build more effective coastal resources and fisheries management in Southeast Asia. Some important areas where more knowledge can assist to improve fisheries management are discussed. It is emphasised that future research should be closely linked to the reality of coastal resources and fisheries management. It is difficult to understand the complexities of fisheries management, if one does not try to "do" it in some capacity. Traditional academic research will not add much value to what is already well-known. But when researchers immerse themselves in living projects that deal directly with these issues, then learning occurs. In the Philippines, it is suggested that potential research projects align themselves with existing projects such as FISH, the Integrated Coastal Resources Management Project of DENR, or with organisations like the Coastal Conservation and Education Foundation, among others, that actively work with coastal communities and the government to address common issues.

Research topics that can help address some of the issues raised in this paper include:

1. *Continuous monitoring of the biophysical status of coastal resources is essential so that policy makers are aware of the progress (or lack thereof) of protection and rehabilitation of resources.* Such information is critical input to public education on the plight and importance of coastal resources, and in the development of management polices. Such monitoring needs to occur at different scales so that both local and national audiences can benefit and learn from the results. More standardised and simplified methods are also needed so that monitoring is more consistent and results are easier to extract.
2. *Cost-benefit analysis of the management of coastal resources and fisheries is needed* to further convince policy makers about the revenues being lost, who loses these revenues, and the relative return from investments in coastal and fisheries management.
3. *Investigating the causes of resource degradation from pollution and other impacts on the coastal environment is needed.* This must be done in relation to the complexity of social and economic underpinnings as suggested by Pauly (2006) based on his Malthusian overfishing model.

4. *The tradeoffs between small and large scale fisheries in Southeast Asia need to be understood* in terms of whom benefits accrue to, efficiencies of fishing, appropriate allocation of fishing rights, and the value of export earnings versus locally earned income from fishing that provides local food.
5. *Models for integrated coastal and ecosystem-based management including fisheries and economic development need to be refined and tested* in as many situations as possible. Such research should be in conjunction with funded projects that attempt to implement such models (e.g., FISH and others). The models tested can be shared within and among countries in the region.
6. *Testing ways to develop alternative economies for small-scale fishers that reinforce protection and management as opposed to overexploitation is needed.* We need to better understand how to integrate non-extractive uses, such as tourism and research, into coastal communities so fisheries are not the only focus of employment and markets.
7. *Augmenting and refining the integrated paradigms for management that put small-scale fisheries at the centre of a complex management problem is crucial.* This process should use multidisciplinary approaches that include: anthropology, sociology, economics, biology and ecology, geography, and management sciences, as required to address these issues.
8. *Learning more about capacity needs and how to build the capacity* of institutions and individuals to support integrated forms of fisheries management is essential.

CONCLUSION

New directions are needed for managing fisheries in Southeast Asia if the situation of overfishing and decline is to be reversed. As has been agreed in many forums, it is worth repeating several basic actions that must become reality and have relevance for policy makers and research agenda. These as concluded by Luna et al. (2004) are:

- *Reduction and rationalisation of fishing effort.* Fishing effort must be reduced in small and large scale fisheries and in the short and long term. Many creative and integrated solutions are being discussed but there are few shortcuts.

- *Protection, rehabilitation, and enhancement of coastal habitats.* We know the degree of loss and we know how to protect and manage habitats. The test is in the implementation of comprehensive programs including marine-protected areas and integrated coastal management. Governments need be encouraged to invest in these programs.
- *Enhanced local stewardship and management of resources.* There are many management successes at the community and local government level. The problem is scaling up to programs that are widespread. This requires institutionalisation of local-based management approaches through integration of management in government to work with multiple stakeholders.
- *Supplemental/alternative livelihood for fishers.* It is essential to provide economies that support coastal people beyond fisheries. Economies that thrive on a clean and healthy coastal environment (e.g., tourism, recreation, sustainable use) provide two benefits: employment and conservation. This requires being open-minded about changing the status quo and tradition.
- *Capacity building and institutional strengthening.* This is true for all aspects of coastal resources and fisheries management: people management. This also implies that institutions need not be created. Rather, it is better to encourage collaboration among existing ones and let them to take on new roles and be flexible.

Finally, what we really want to do is to create and build "coastal community resilience." Resilient coastal communities will be stewards of their coastal resources and realise the links between stewardship and their own well-being. Resilient communities will have diversified economies so that problems in one sector will not undermine their overall well-being. As learned from the Tsunami of 2004, many coastal communities in South Asia are building back in a more resilient manner than in the past (U.S. IOTWS 2007). Many are learning that they must be aware of natural and human-generated hazards and risk. They must equally be stewards of their coastal resources and have a governance system that encourages these goals to be achieved.

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NOTES

1 For this paper, Southeast Asia will generally include: Indonesia, Malaysia, Philippines, Thailand, and Vietnam although several exceptions are made depending on the availability of data and from where case studies are drawn.

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