

Managing Coastal Resources in Cilacap, Indonesia, and Lingayen Gulf, Philippines—an ASEAN Initiative

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Cilacap and its dynamic Segara (lagoon) Anakan on the southern coast of Java, Indonesia, and the Lingayen Gulf area in northwest Philippines are typical of many areas experiencing intense multiple resource use conflicts, overexploitation of coastal resources and environmental degradation. Coastal settlements are generally densely populated with widespread poverty, especially among fishing communities.

The Segara Anakan is a nursery ground that supports both a lagoon and offshore shrimp fishery. Mangroves are extensive and are traditionally exploited by the coastal communities. Key management issues are the decreasing size of the lagoon due to heavy sediment input from upland activities, water quality problems, particularly pesticides runoff from upland agriculture and poor economic conditions of the coastal inhabitants.

Lingayen Gulf is a major fishing ground in the Philippines and an important aquaculture site for milkfish and oysters. In addition, coral reefs and seagrass beds are extensive and sandy beaches along the eastern side are popular tourist attractions. Significant management issues include destruction of coral reefs due to blast fishing, cyanide poisoning and trawling activities as well as rural poverty. Also, coastal water quality is undermined by indiscriminate dumping of untreated domestic wastes, pesticides and mine tailings from upland mining operations.

Efforts to develop integrated coastal area management plans for the two sites are currently being undertaken to resolve the aforementioned issues and provide some strategies for the sustainable development of the coastal resources as well as alternative livelihood for the coastal inhabitants. The mechanisms of plan development for both sites, including legal and institutional support, are discussed in the context of regional and local organizations/communities participation.

A regional effort in coastal area management (CAM) has been initiated under the ASEAN/US Coastal Resources Management Project (CRMP). This focuses on the application of integrated CAM planning as an approach in an attempt to resolve management issues, especially on multiple resource use conflicts affecting the coastal areas in the Association of Southeast Asian Nations (ASEAN) region. Two case studies using the above approach are presented in this paper.

Cilacap, Indonesia

Cilacap has a semi-landlocked brackishwater embayment known as the Segara Anakan Lagoon, connected with the Indian Ocean through two narrow passages in the eastern and western sides. Four rivers discharge into the lagoon - Citanduy, Cibeureum, Cikonde and Kayu Mati. The major source of sediment and freshwater discharge is the Citanduy River. High sediment discharge, $1.3 \times 10^6 \text{ m}^3$ annually is due to improper watershed landuse, erosion and natural causes. As a result, the water surface area of Segara Anakan has decreased from 6 400 ha in 1900 to 2 700 ha in 1986. It is projected that the lagoon will be totally silted within a period ranging from 4.5 to 31 years (Purba, 1988; ADB, 1988).

The Segara Anakan basin is about 96 000 ha and has 8 150 ha of water area and 24 350 ha of mangrove/tidal marsh/tidal swamps. Part of the latter (about 8 345 ha) was converted to paddy by 1972. About 83 530 ha are being utilized for various purposes such as farming (about 50%), mangrove harvesting (38%) and others (4%) (ADB, 1988). The mangrove resource of the Segara Anakan is the largest in Java and is economically important to the subsistence communities around the lagoon (Soemodihardjo & Suroyo, 1988).

In terms of fisheries resources, the lagoon is ecologically important as nursery and feeding grounds for many juveniles of commercially valuable species that are caught offshore. The majority of the penaeid shrimps caught in the lagoon are juveniles while mostly adult shrimps are caught offshore (Naamin, 1988).

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Annual catch in the lagoon ranged from 300 to 700 t of shrimps and fish. About 4 000 families are engaged in fishing contributing about 5% of the total Cilacap regency catch (ADB, 1988; ET-BAU & Sujastani, 1989). Total population in the 3 main villages in 1986 was 7 654. Majority are below the national poverty line of US\$100 per capita per year or equivalent to 320 kg of rice (Budihardjo, 1988).

Key management issues affecting the region are (White *et al.*, 1989):

- a. high discharge of sediments into the lagoon resulting from poor upland agricultural practices, flood control measures and natural causes;
- b. loss of mangroves and tidal swamplands which support traditional fisheries due to conversion to paddy and harvesting;
- c. overfishing and use of inappropriate fishing methods;
- d. agricultural runoffs, potential pesticides and heavy metals pollution including domestic wastes discharge in the lagoon;
- e. improper utilization of the mangrove forest;
- f. enormous silt load that causes the decreasing size of the lagoon; and
- g. declining socioeconomic or livelihood status of the poor inhabitants of Segara Anakan.

The identified management issues are being attempted for resolution through the formulation and implementation of an integrated CAM plan which also include several issue-oriented action plans. A planning team consisting of technical personnel and planners, is responsible for the formulation of the management plans. A Planning Steering Committee consisting of local and central government officials oversees the planning process and endorses the management plans and policies for adoption by the local government of Cilacap (Chua, 1989).

Issue-oriented action plans formulated are the following (IAWP, 1989):

- a. Mangrove habitat management plan. It covers zonation of mangroves for various uses and development and includes practical actions to implement the plan.
- b. Lagoon and offshore fisheries management plan. It covers the sustainable utilization of the fisheries resources within the lagoon and the offshore waters including guidelines on fishing gears used.
- c. Water quality management plan. It addresses sedimentation with cost-benefit analysis to prioritize management options.
- d. Land use zonation plan. It involves zonation of the whole pilot site for various development in agriculture, mangrove reserve, mangrove conversion, human settlements, etc.
- e. Socioeconomic and alternative livelihood development plan. It addresses socioeconomic issues affecting the communities along the lagoon and provides for alternative livelihood programs to uplift their economic well being.
- f. Marine protected area plan. It deals with the management and zonation of coral reefs, marine parks for tourism and preservation as well as traditional utilization and rehabilitation of the ecosystem.

Under each action plan are implementable projects which have been proposed in order to achieve the goal and objectives of the plan. Appropriate budget, duration, manpower and infrastructure requirement are included. Appropriate institutional framework defines the role of lead agencies which will coordinate project implementation and collaborating or implementing institutions who will be responsible in executing the proposed projects. Currently, at least 3 projects are underway on administration, zonation and aquaculture training (IAWP, 1990)

The action plans are integrated under the larger Integrated Management Plan for the coastal resources and land uses of Segara Anakan lagoon and vicinity. The Integrated management plan also covers zonation and policies including the institutional and legal framework required for implementation.

Lingayen Gulf, Philippines

Lingayen Gulf is one of the major fishing grounds and aquaculture production areas in the Philippines. The gulf has extensive coral reefs on the western side while sandy beaches are found along the coasts towards La Union.

Lingayen Gulf has an area of 2,100 km² with several estuaries and many sheltered coastal water bodies due to the presence of rivers and small islands. Being a rich fishing ground, inshore small-scale or municipal (marine) fish landings in 1985 were 8 900 t or 26% of the total marine landings in the area (Palma *et al.*, 1989). For coastal aquaculture, Pangasinan has an aggregate area of about 15 450 ha of brackishwater ponds while La Union has about 792 ha. Milkfish (*Chanos chanos*) is the dominant species cultured followed by penaeid shrimps and siganids. Total brackishwater production in 1986 for Pangasinan and La Union was 22 501 t representing 10.86% of the national brackishwater fish farming. Oyster production is the highest in the Philippines on a regional basis at 14 617 t in 1984. Majority of this came from Pangasinan (BFAR, 1986; BAR, 1989).

There are 11 and 7 coastal municipalities of Pangasinan and La Union that border the Lingayen Gulf. Total land area of the coastal municipalities is 1 755 km². Total population is about 2.5 million. A large part of the population resides in the cities and municipalities located in the coastal areas. Average monthly incomes were US\$128-180 per month. On the average, over 50% of the families are below poverty line as set by the National Economic and Development Authority (NEDA) of US\$1 650 yr⁻¹ (IRDC-NEDA, 1989a & b).

Coastal activities in the Lingayen Gulf include aquaculture, fishing and tourism. Aquaculture areas are mostly located in the 11 coastal municipalities of Pangasinan but concentrated along Lingayen, Binmaley and Dagupan districts. Farm size is generally small (<5 ha) (Palma, 1989). Fishing is an important activity in the coast with about 13 500 small-scale fishermen. Mean landings over the 5 year period 1980-1984 were about 6 000-8 700 t yr⁻¹ or about 40-70 kg month⁻¹ for each fishermen (Calud *et al.*, 1989). Overall, the fisherfolk population has been increasing since the 1950s resulting in very high fishermen and boat density. The gulf is experiencing biological overfishing due to excessive fishing efforts which had been noted in the mid 1970s (Fig. 1). With the declining fish catch and low income, a number of fishermen have resorted to use of destructive fishing methods like blast and cyanide fishing (Pauly *et al.*, 1988; McManus & Chua, in press).

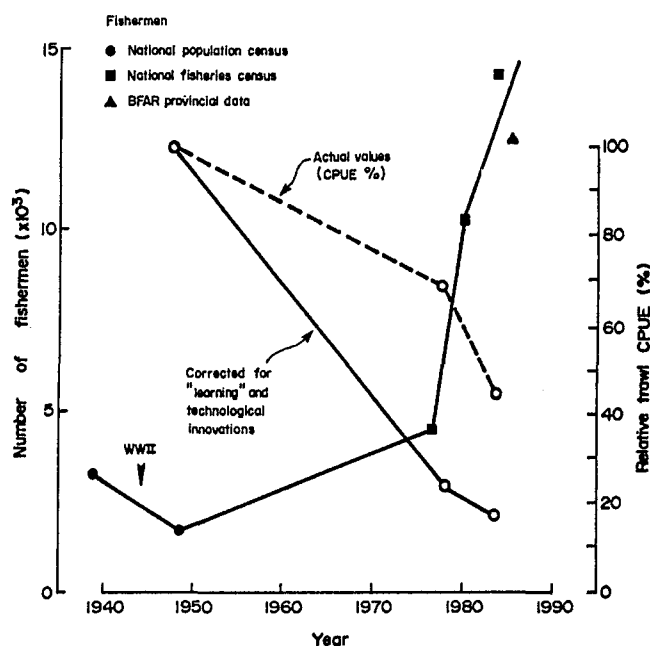


Fig. 1. The fisheries resources of Lingayen Gulf is considered biologically overfished. Note the decline in % catch per unit effort (CPUE) and the increase in the number of fishermen since 1950s (after Pauly *et al.*, 1988; McManus & Chua, in press).

Key management issues affecting the Lingayen Gulf are (Silvestre *et al.*, 1989):

- Overexploitation of the fisheries resources that resulted in low biomass densities, low catch/income levels and increased conflicts among commercial (trawlers) and municipal fishermen.
- Habitat degradation like coral reefs and seagrass beds which is attributed to the use of dynamite and cyanide as well as deteriorating water quality.
- Low aquaculture production due to the use of traditional management practices with low supplementary inputs, lack of capital and access to good source of water.
- Pollution and sedimentation due to uncontrolled human activities like discharge of untreated domestic and industrial wastes, upland mining activities discharging mine tailings.
- Socioeconomic problems of coastal communities due to poverty, lack of alternative livelihood opportunities, inadequate functional education, high population density and growth rate.
- Unregulated tourism development resulting in beach erosion or destruction of coral reefs.

A similar planning process to that of Cilacap is followed for the Lingayen Gulf in the development of management plans to address the above management issues. The planning team, however, includes community representatives and non-government organizations (NGOs) as well as government officials. Once the plans are approved by a Regional Development Council, they will be integrated into the regional development plans with the necessary national budgetary allocation for implementation (Chua, 1989; White, 1989).

Issue-oriented action plans formulated are the following (ICAMP, 1990):

- Fisheries management plan. It focuses on the sustainability of fisheries resources within the gulf and the enforcement of fishing regulations, boundaries and gear sizes, etc.
- Environmental quality management plan. It covers water quality, waste disposal and treatment, mine tailings and setting up of coastal water quality standards.