Coastal Resources Management in Indonesia: Legal and Institutional Aspects

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Abstract

This research explores legal and institutional aspects of fisheries and coastal resources management. The analysis is based on the principles of integrated fisheries management which includes seven key management factors: (1) information systems; (2) natural resources assessment; (3) natural resources allocation; (4) natural resources utilization and protection; (5) process of production; (6) marketing; and (7) MCS (monitoring, control and surveillance) systems. This study includes three locations, namely Ameth Village (Nusa Laut Island), Sulamu Village (Kupang Bay) and Kampung Laut (Segara Anakan).

Findings indicate that fisheries and coastal resources management in Indonesia is not yet effective. Laws, regulations and policies have been issued by the Government of Indonesia as legal bases for developing marine fisheries management. The General Guidelines of State Policy (GBHN) of 1993 and 1998 provide policy guidelines of fisheries and coastal marine resources management. Since 1993, implementation and development of integrated fisheries management have been intensified in several coastal and marine areas of Indonesia. However, several problems still exist as a result of conflicting interests among stakeholders and overlapping jurisdictions over marine resources among government institutions and agencies. These problems include coastal and marine resources depletion, degradation of aquatic habitats and marine pollution.

The principles of integrated fisheries and coastal resources management have been developed, but such actions did not really address the roots of the problems, i.e., conflicts of interest and overlapping jurisdictions among stakeholders, including governments, the coastal communities and the private sector. Decentralization is not apparent. The role of provincial and district (*regional*) governments in managing coastal and marine resources is not significant yet. Even though (*de facto*) regional and local governments are engaged in several marine activities, they do not have jurisdictions (*de jure*) over marine resources. The involvement and participation of local community still needs improvement. The revitalization of environment-friendly traditional values and practices is required to improve management that promotes ecological and economic benefits for local communities and national interests.

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INTRODUCTION

Pressures on coastal and marine resources in Indonesia have increased in the past years. Erosion, pollution and sectoral and use conflicts have become major problems in most of the country's coastal zone. These problems are associated with the negative impacts of land-based activities such as, deforestation, pesticide in agriculture, and waste disposal. The situation is further aggravated by inappropriate fishing practices such as the use of dynamite, poisonous chemicals, and small mesh size gill nets. Other contributing factors include pollution from marine transportation, coral reef mining, and exploitation of mangroves by local communities and big business.

The coastal environmental problems are more severe on the west coast, particularly northern and southern Sumatra, Bali, and the Java Sea. Intensive mariculture projects, coral mining practices, and destructive fishing in these areas are causing serious damage to reefs, mangroves and fish populations. Pollution has become a major problem, particularly industrial and household waste from the densely populated islands of Sumatra and Java. In contrast, eastern Indonesian waters face less pressure from land-based activities. Most parts of this region are still in good condition. However, a number of investors have built intensive mariculture projects and exploitation of fish stock exceeds sustainable levels. Competition between big business and local communities is apparent. Community access to coastal and marine resources is threatened.

More than 60% of Indonesia's population lives in coastal areas. The population is estimated to be 251 million by 2020 with an annual growth rate of about 1.5%. The contribution of marine-based activities to the national economy has increased from 12% in 1987 to 24% in 1992 and is expected to accelerate economic growth over the next five years. The pressure on coastal and marine resources will increase significantly as marine-based activities are expanded to support development. Marine resources management is difficult because implementation of existing laws concerning coastal and marine resources is poor. The existing laws are not a sufficient legal basis for integrated coastal and marine resources management. In addition, the absence of clear mandates among institutions makes for ineffective coastal and marine management. Each institution focuses on particular resources and deals with its own interests. Indonesia needs to develop environmental management policies that promote sustainable development through the optimum use of coastal and marine resources and effective environmental protection. Policies must satisfy both national and local interests.

Critical Issues

A number of laws concerning fisheries and other marine resources along with regulations have been established and provide some legal basis for government institutions to manage coastal and marine fisheries resources. The existing laws and regulations allow the private sector, communities and other legal entities to use coastal and marine resources. However, implementation is hampered by legal constraints, misinterpretation, conflicts of interest, and overlapping jurisdictions. The result is a climate of uncertainty and inconsistency on law enforcement. Lack of coordination and cooperation among government institutions further hampers the process of promoting integrated fisheries, coastal, and marine resources management and there is often conflict among stakeholders regarding licenses and permits. The result is over-capitalization in the industry and overexploitation of marine resources. This will accelerate the degradation of coastal and marine resources and imperil the absorptive capacity of the marine environment. The net result is likely to be depletion of stocks, aquatic habitat destruction, and widespread pollution.

Regional governments do not have a mandate to manage coastal and marine fishery resources. They cannot directly take the necessary actions to deal with problems. In reality, the regional governments do engage in coastal and marine fishery regulation, but such actions have led to legal and technical constraints. The one legal instrument used by the regional governments is Article 9 Paragraph 1 of Act No. 24, 1992 on Spatial Planning. This Article states that the regional governments do have a mandate to carry out spatial planning in marine areas. However, while the Act itself has been passed, the implementing regulations are still in preparation.

This confusion over the status of existing written

marine laws and regulations has encouraged coastal communities to apply their own unwritten traditional laws (*hukum adat* or *adat* laws). Implementation of *sasi* law in Haruku, Saparua and Nusa Laut Islands is a classic example. The *adat* laws are legally recognized by the Indonesian legal system. For example, Articles 3 and 5 of Act No. 5, 1960, explicitly recognize *adat* law and state that the existing *adat* law can be implemented in the field of *agraria* as long as it is in line with the existing written laws and regulations. While national laws and regulations promote integration of *adat* laws and try to accommodate traditional rights (*hak ulayat*) of coastal communities, they have to be adjusted to the existing written laws and regulations so their implementation does not contradict national regulations and policies.

Several recent studies on legal and institutional aspects of coastal and marine fishery resources management may have given readers the wrong understanding of unwritten *adat* laws. The application of many different *adat* laws without considering the national interest may bring about serious legal and social problems. The development of coastal communities is the responsibility of regional governments, which have tried to mobilize communities to participate in managing resources.

Poverty has forced many members of coastal communities, most of whom are small-scale fishers, fish-farmers and coastal farmers, to engage in destructive and illegal practices such as dynamite fishing, poison fishing, coral reef and sand mining, mangrove cutting, and coastal land clearing. This has led to conflicts of interest among local resource users. These conflicts involve conflicts of *adat* laws. Efforts to integrate and incorporate the traditional values and norms of *adat* laws into the national legal system is not an easy task and will require in-depth analysis of legal and institutional aspects of integrated coastal and marine resources management, including analysis of private and public interests.

Fisheries, coastal and marine resources management are frequently discussed. However, discussions tend to lack comprehensive data and information. Two crucial problems rarely discussed include overlapping jurisdictions and conflicts of interest. The existing laws and their implementing regulations provide government agencies and institutions with a mandate to carry out certain activities related to exploration, exploitation, management and conservation of coastal and marine resources. These laws and regulations were issued in accordance with the national legal system. Unfortunately, they are not easily integrated or effective. Each party tends to see laws and regulations from a different sectoral perspective and with different interests in mind.

According to Act No. 5, 1974 on Basic Provisions of Regional Government, the regional governments do not have jurisdiction over fisheries, coastal, and marine resources. In reality, regional governments do engage in marine related activities such as issuing licenses for fishing vessels under 30 GT, coastal aquaculture, cage culture, marine tourism, mangrove protection, mitigating marine pollution, collecting fees and taxes from several marine activities, and solving socioeconomic problems of coastal communities. In this regard, the regional governments have used Article 9, Paragraph 1 of Act No. 24, 1992 on Spatial Planning as the legal basis to support their marine activities, including fisheries. This situation has created uncertainty over jurisdictions of regional governments over coastal and marine resources.

Article 9, Paragraph 1 of Act No. 24, 1992 stipulates that the regional governments have a legal right to conduct spatial planning in coastal and marine areas with outer boundaries delimitated by another Act. However, the Act referred to in Article 9 has not yet been promulgated by the Ministry of Home Affairs. This Act proposes a marine management area of 12 nautical miles from the shoreline. However, this proposed limit has not yet accommodated various traditional maritime boundaries, which are determined by *adat* laws. Within these management areas, *adat* communities exercise their traditional rights (*hak ulayat*) for the purpose of fishery resources exploration, exploitation, management and conservation. Application of two different sets of laws frequently leads to conflicts. These problems could be addressed through the development of co-management arrangements.

Scope and Area of Study

The purpose of this study is to examine the development of integrated coastal resources management, focusing on co-management and community-based approaches. The study will include the following:

- Review and analysis of the legal, institutional, and policy framework;
- Review and analysis of the patterns of coastal resources management, including the use of space;
- Review and identification of the role of interested parties, including governments at the national, regional, and local levels; and
- Review and analysis of cultural aspects such as religion, traditional values, beliefs and practices.

The study was conducted in three locations: Ameth Village, Nusa Laut Island, Maluku; Sulamu Village, Kupang Bay, Nusa Tenggara Timur; and Kampung Laut, Segara Anakan, Central Java. These areas were selected based on:

- The presence of a government development program;
- The presence of a coastal resources management scheme;
- Overlapping jurisdictions and conflicts of interest;
- The existence of *adat* laws influencing community participation;
- Representation of specific coastal and marine environments;
- Availability and commitment of government officials; and
- Access and availability of communication facilities.

Methodology

The primary data gathered through field observations and interviews include all data and information regarding coastal and marine fisheries management, particularly those with legal, institutional, social and cultural aspects. The secondary data include all reports and publications on coastal and marine resources management and legal materials were gathered through library studies and interviews. Field research was conducted twice in Segara Anakan, Kupang Bay and Nusa Laut Island. The field research was carried out in February and in May 1998.

The qualitative method analyzed data based on interpretations of the contents of acts and regulations, traditional laws, and legal mandates of government institutions and agencies. The descriptive method analyzed data on the implementation of acts, regulations, traditional laws and legal mandates in the field. These were reflected in the economic and cultural life of fishing communities. By comparing results of qualitative and descriptive analysis, problems and constraints of coastal and marine fisheries management could be identified and solutions recommended.

The legal approach used in this study can be described as:

- Judicial normative
  more qualitative than descriptive, leads to data analysis and discussion, for example, on legal principles, history, background and content of an Act and its implementing regulations; and
- Judicial empiric more descriptive than qualitative, directs data analysis and discussion to the implementation of laws and regulations in the field.

Using the legal approach, we would know how a law and its regulations should be executed and how it is actualized in the field. In this way, the gap between *das sollen* (the law as it should be) and *das sein* (the law as it is implemented) can be identified.

The institutional approach outlines the legal mandate provided by the laws and regulations. This mandate covers tasks and functions as well as competencies and responsibilities of a stakeholder managing coastal and marine resources. The approach emphasizes inter-institutional relationships, overlapping jurisdictions, and conflicts of interest that occur because of decentralization and deconcentration.

A systems approach views coastal and marine

resources management as an integrated system. To understand the application of this approach, the meaning of integrated coastal and marine resources management must be clear. In this study, the following definition is used: coastal and marine resources management is a conscious process of decision-making whereby these resources are allocated over time and space to optimize the attainment of society's stated objectives, within the framework of its science and technology, political and social institutions, legal and administrative arrangements.

Characteristics of Marine Resources

Mangroves

Indonesia has the largest concentration of mangrove forests in Southeast Asia with an estimated area of 3.8 million ha. Mangroves are mostly found in Irian Jaya, Sumatra, Maluku, Kalimantan, Sulawesi, Java, and Nusa Tenggara.

There are at least 89 species dominated by the genera *Rhizopora, Avicenia, Sonneratia, Bruguiera, Xylocarpus, Ceriops,* and *Exoecaria*. Mangrove forests grow well in the estuaries and deltas of large rivers forming the main supporting ecosystem for marine and coastal areas. These forests function as breeding areas for numerous fish species and invertebrates. The long submerged roots of mangrove trees help prevent erosion and coastal damage. The forests are a source of income from fishing, firewood, timber and medicinal extracts for local communities. Unfortunately, illegal harvesting of trees, particularly for firewood and building materials, has significantly decreased forest cover. The degradation is also caused by intensive mariculture, which has expanded rapidly in the past few years. In 1982, mangrove forest cover was estimated at 4 251 011 ha. In 1987, it was 3 235 700 ha which represents a 30% loss. Only a small part of Indonesia's mangrove is considered to be in excellent condition (Moosa et al. 1996). The degradation of mangrove forests has accelerated due to the increase in timber exports and the extension of mangrove production concessions to small and large-scale businesses.

Coral Reefs

Coral reefs abound in Indonesian waters, particularly in shallow and calm waters. There is an estimated 75 000 km^2 of coral reefs including fringing reefs, barrier reefs, and atolls. Coral reef ecosystems have high organic productivity. Unfortunately, most coral reef ecosystems are threatened by practices such as coral mining, dynamiting and poison fishing, pollution from industrial and household areas, and sedimentation from land-based activities. In 1996, 73% of reefs in Indonesia were considered damaged. Only 22% were considered to be in good condition while only 5% were excellent. The heaviest damage occurred in the Seribu, Bali, and Morotai Islands.

Seaweeds and Seagrasses

There are at least 7 families and 13 species of seaweeds found in Indonesian waters. They cover the coastal areas of Sumatera, Java, Bali, Kalimantan, Sulawesi, Maluku, Nusa Tenggara and Irian Jaya. Seagrass fields are also found in most coastal areas. These areas are highly productive and host to various organisms. They are an important food source and their dense root systems stabilize the bottom. They act as nursery grounds for several commercially important species.

Fisheries

In the 1980s, potential fish production was estimated at around 6.6 million tons per year, consisting of 4.5 million tons per year from territorial waters and 2.1 million tons per year from the exclusive economic zone (EEZ). According to the Research Institute for Marine Fisheries (RIMF) and Directorate General of Fisheries (DGoF) (Moosa et al. 1983, 1996), the annual potential fish production per year in 1982 included:

- Demersals (2.5 million tons)
- Small Pelagics (3.5 million tons)
- Large Pelagics (441.0 thousand tons)
- Skipjacks (275.0 thousand tons)
- Tuna (161.0 thousand tons)
- Penaeid (69.0 thousand tons)
- Other crustaceans (25.0 thousand tons)
- Coral reef fish (48 thousand tons)

In 1983, fish production in EEZ waters was 250 500 tons or about 25% of total potential production. According to Moosa et al. (1996), total fisheries production was around 40% of maximum sustain-

able yield. However, overfishing has occurred in some regions, mostly along the west coast and overexploitation of shrimp fishing is apparent in the Arafura Sea.

In order to conserve endangered species, Indonesia has taken measures to protect a number of marine animals, including mammals, birds, and reptiles.

Marine Transportation

Marine transportation is vital in an archipelago. Loading and unloading tonnage measures the amount of marine transportation. The highest concentration is in Riau, loading 56 618 800 tons and unloading 14 059 000 tons. Marine transportation potentially creates pollution that threatens marine and coastal ecosystems. Marine transportation may not relate directly to fish production, but pollution can damage fish habitats, particularly coral reefs and their ecosystems. Therefore, fish production is obviously influenced by the way marine and coastal environments are managed (CBS 1995).

Social Aspects

In 1992, the population of Indonesia was 179 322 million. This figure increased to 200 000 million in 1998. The growth rate during that period was 1.7% annually. Population density in 1992 was 93 per square kilometer and this increased to 102 persons per square kilometer in 1995. However, the population is not equally distributed. About 58% of the population live on Java which constitutes only 7% of the territory. With a population of 114 987 million, the density in Java is 870 persons per square kilometer. In Irian Jaya, which is 22% of the area, the population density is only 5 persons per square kilometer (CBS 1995).

CBS indicated that life expectancy was 61.5 years with a mortality rate of 68 per 1 000. Those with access to potable water was 42%, health treatment 43% and sanitation 44%. The literacy rate was 61%. Sixteen percent of those over 5 years of age never attended school (CBS 1995). Livelihoods were based on farming and fishing (54%), services (38%), and industry (8%). Income per capita is US$ 560 with a Gini Index of 0.31. There were 1 889 542 marine fishers in Indonesia in 1995. The north coast of Java has the highest number of fishers and East Java has more than other provinces (CBS 1995).

Patterns of Resource Management

Fishery Resource Management

Traditionally, fishing has been carried out by coastal communities equipped using small boats. The use of larger vessels (20-30GT) was adopted recently and has increased fish production in the past few years. It has also extended fishing areas across national waters. Extension is also stimulated by the practice of fishers to fish on a seasonal basis. With increased mobility in larger vessels, the potential for conflict between local communities and fishers from different areas increases. Starting in 1992, DGoF produced a fisheries management plan based on seven management zones. These zones include:

- Malaka Straits;
- Natuna Sea and South China Sea;
- Java Sea;
- Flores and Malaka Straits;
- Maluku Sea, Halmahera Sea, and Tomini Bay waters, Banda Sea and Arafura Sea;
- Sulawesi Sea and Pacific Ocean; and
- Indian Ocean.

The fisheries resources management plan applied by the DGoF is called *Pengelolaan Bersama* (Collective Management System). Implementation is carried out by the Forum of Coordination for Fisheries Resources Use, also known as *Forum Koordinasi Pengelolaan Pemanfaatan Sumberdaya Ikan* (FKPPS). The forum consists of representatives from national and local governments, the private sector and local fishers. The main activity of the forum is to organize fisheries use for the mutual benefit of all stakeholders and monitor the implementation of action plans established by the FKPPS. The plans are based on regular meetings conducted by FKPPS. FKPPS involves institutions such as the DGoF, local fishery agencies, scientific commissions, companies, and communities. Problems faced by an area or sector may be put forward during a FKPPS meeting

and collectively, members try to find the best solution. Technical meetings address some of the following issues:

- Estimates of fishery resources, fish types, and their distribution;
- Allocation of fishery resources and quotas;
- Preparation of resource allocation plans;
- Monitoring *andon* and migrating fishers;
- Agreements on fish aggregating devices;
- Agreements on conservation areas;
- Protecting fisheries resources;
- Resource access; and
- Management constraints.

Estimates of Fishery Resources, Fish Types and Their Distribution

Estimates of fishery resources, including fish types and distribution, are provided by the Commission of Research and Fishery Resources Development (CRFRD) in order to assist fisheries management. Information provided by CRFRD is used by FKPPS and other organizations established by CRFRD to determine and assess fisheries resources.

Allocation of Fisheries Resources and Quotas

Allocation of fisheries resources is determined by FKPPS through a meeting that involves all members including local fishery agencies and fishing companies. Agreements usually provide data and information on the potential resources, catch, total production, and further development plans. This information helps determine the allocation of resources.

Preparation of Resource Allocation Plans

Distribution of fishers and catching activities are not equal, resulting in an imbalance between the capacity of certain areas and actual fish production. Some locations are intensively exploited while others are not. In order to maintain a balance harvest, the government encourages fishing companies and local fishers to fish in under-exploited waters. To encourage partnerships, Decree No. 509, 1995 from the Minister of Agriculture concerning Core Community Business Development (*Perusahaan Inti Rakyat*) was issued to develop partnership in fisheries management between big businesses and small-scale fishers.

Monitoring *Andon* and Migrating Fishers

The development of marine fishing activities has created two types of fishers: migrating and *andon* or permanent fishers. Migrating fishers are those who use relatively large vessels and fish in other provinces then return to their ports of origin. *Andon* use smaller vessels (5-10GT) and work from temporary bases.

Agreements between migrating and *andon* fishers are usually approved by the Collective Management Board and an FKPPS meeting. In order to formulate an agreement, the following steps are usually undertaken:

- The migrating fishers must bring a letter of recommendation from the local fishery agency (LFA) nearest their home port to the LFA nearest their intended catching area; and
- *Andon* fishers must bring a letter of recommendation from the LFA nearest their home port.

Andon fishers then report to the LFA official or local government official in the area they intend to fish and the local government official issues a letter of recommendation. The system provides for maximum production as well as equity. Unfortunately, it is not effectively implemented because local fishers tend to ignore these administrative systems.

Agreements on Fish Aggregating Devices (*rumpon*)

The use of fish aggregating devices (FAD) (*rumpon*[1]) among fishers has increased in the past few years, a trend that may cause environmental damage and conflict in the years ahead. In order to control the *rumpon*, the Ministry of Agricultural issued Decree No. 51, 1997 on its installation and use. The decree regulates the licensing system of *rumpon* installation and use by fishing companies and fishers. This regulation is not well imple-

[1] A *rumpon* is a fish aggregating device made up of a line with coconut leaves tied at the end.

mented. Findings indicate that local fishers still practice illegal fishing by using *rumpon* in the waters near their village. This threatens local community interests.

Agreements on Conservation Areas

Certain commercial fishing regulations are designed for areas with limited resources and areas where use of fishery resources is prohibited in order to protect them. Unfortunately, in the absence of effective law enforcement, illegal fishing of endangered species continues.

Protecting Fisheries Resources

Policies on fishery resource use is intended to lead to effective law enforcement. DGoF and the Navy have established joint programs. The Department of Agriculture (DA) assigns Coast Guards, but the control system is ineffective. The use of destructive fishing methods such as dynamites, poison, and prohibited nets has increased. Illegal fishing by foreign fishers is also a serious threat.

Legal issues are addressed in FKPPS technical meetings, particularly in relation to the following laws and decrees:

- Law No. 9/1985 on Fisheries;
- Law No. 5/1990 on Conservation and Ecosystem of Natural Resources;
- Government Regulation No. 15/1984:

    a) Management on Fisheries Resources in Indonesia's EEZ,
    b) Cooperation with foreign companies and issuance of licenses for resource use,
    c) Ministry of Agriculture established TAC, fishing allocation, numbers of fishing vessels and fishing gear, and
    d) Fishing Fees;

- Government Regulation No. 15/1990 on Fisheries Licensing: Central and Local Government;
- Ministry of Agriculture Decree No. 01/1975;
- Ministry of Agriculture Decree No. 607/ 1976 concerning fish zoning;
- Ministry of Agriculture Decree No. 509/ 1995 concerning Core Community Business Development;
- Ministry of Agriculture Decree No. 51/1997 concerning *payous* use and installations; and
- Ministry of Agriculture Decree No. 8056/ 1995 concerning the use of fish transport vessels.

Resource Access

In order to protect the interests of fishers, especially small-scale fishers, the government has established the following policies:

- Ministry of Agriculture Decree No. 607/ 1976 on fishing grounds. This regulation is intended to protect the fishing grounds of small-scale fishers. Large-scale fishers are prohibited from entering the fishing grounds of small-scale fishers, while small-scale fishers are allowed to enter those of large-scale fishers;
- Ministry of Agriculture Decree No. 509/ 1975 on partnership fisheries management. These regulations deal with management principles that promote small-scale fishers' interests;
- Ministry of Agriculture Decree No. 51/1997 on FAD installation and use;
- Simplifying the licensing so that the fishers can operate directly in the area benefiting them
- Establishment of fishers organizations (HNSI and Fishery Cooperatives); and
- Training conducted by DGoF and Local Fishery Agencies to enhance fishers' skills.

Management Constraints

Differences in traditional laws (*adat* law) between areas create conflicts among fishers. An application of *adat* law can give advantages to the fishers of one area but to the disadvantage of another. To expand the number of small-scale fishers and improve their income, the government has established training programs, technology packages, pilot projects, loans, and developed partnership activities using a PIR (*Perusahaan Inti Rakyat*) pattern and others.

Case Studies

Sulamu Village, Kupang Bay

Kupang Bay is in Nusa Tenggara Timur waters. Nusa Tenggara Timur is divided into two regions. The first includes Kupang Bay and Semau Island. The second comprises Rote Island. According to Ministry of Agriculture Decree No. 18/KPTS/II/93, Kupang Bay is designated as a Marine Park. Kupang Bay is also proposed by the Coral Reef and Environmental Management Project (COREMAP) as a pilot project for coral reef rehabilitation. This project includes: Sulamu, Semau, Northwest Rote, and Southwest Rote.

Sulamu is part of Sulamu District, Kupang Regency, Nusa Tenggara Timur. The community consists of two migrant groups. Timors, the original inhabitants, are gradually leaving the island. Immigrants from Rote depend on a land-based economy, while the Bajos rely on a marine-based economy.

In 1997, Sulamu village had 3 556 inhabitants. Two-thirds work as fishers and the rest are farmers or breeders. The level of education is low due to the custom of employing school-age children to help in the fishery. Health and sanitation in farmer communities tends to be of higher quality than in fishing communities. The economic condition of the farmers and breeders is much better than the fishers.

Among the fishers themselves, lifestyles are different. Fishers who own boats and fishing gear have higher incomes than other fishers. Among the boat-owning fishers, different economic levels also exist. For example, motorized boat owners have higher incomes than non-motorized boat owners. Average monthly income per capita is Rp. 92 773.00 (US$10), while fishers with boats and/or gear have monthly incomes ranging from Rp. 300 000.00 (US$32) to Rp. 3 000 000.00 (US$317).

Natural Resources

The coral reefs in Kupang Bay are located mostly 500 to 1000 meters along the northern shore of the bay. Coral reefs have been degraded by increased nutrients, sedimentation, and from explosive devices. The reefs are dominated by *Acropora* and *Montipor*a. There were 160 species of hard corals in Kupang Bay. Hard corals cover 45 to 59% of the reef area.

Demersal species and ornamental fishes are generally abundant. Shellfish harvest has declined during the past five years in Kupang Bay due to inappropriate fishing techniques. COREMAP reported that there were no large serranids recorded during their 20-hour dive. Kupang Bay has potential resources such as: *napoleon wrasse*, *kerapu*, *gargaheng*, *kabaak*, *lorak*, *lobster*, *kombong*, *tongkol*, *nipi*, *tembang*, *mano*, *kepala batu*, *hidung muda* and *peperek*. There are other marine resources such as *batu laga*, *batu lola*, sea cucumber and seaweed.

Mangroves grow well on the north and east coasts of Kupang Bay. The COREMAP team recorded 17 species of mangroves in certain locations of the bay. Mangroves in this area have decreased drastically due to increased use for firewood and building materials. Remaining mangrove forests are usually found away from populated villages.

Social Aspects

More than 300 000 people live around Kupang Bay. Semau Island, which comprises six small regions, is inhabited by 9 000 people. The 1990 census in seven locations indicated that Sulamu is the most populated region.

Portuguese monks succeeded in establishing a mission here in the sixteenth century. Since then, people from many islands have come to live around Concordia. In the eighteenth century, the Dutch encouraged Helong groups from Timor to move to Semau Island. Large-scale migration occurred in the nineteenth century from Rote Island to Kupang Bay. In addition, large numbers of Bajo, Buton, and Bugis fishers and traders migrated to Kupang Bay. The Rote, Bajo, Buton, and Bugis tribes have used the resources of the Bay in various ways.

A number of ethnic groups live in this area. Migrants from Rote Island are mostly Christians, while Bajo, Buton, and Bugis are Muslims. Educational levels in this area are relatively low. In 1995, the Research Institute (PSL) of the University of Cendana found that 66% of the population in 12

villages in Kupang Bay had graduated from elementary school, 8% passed secondary school while 6% passed high school. There was a 20% drop out rate. People in the local communities do not seem to be interested in completing formal education or training in fishing techniques. They believe that traditional practices are satisfactory. Health facilities are reasonably good, particularly in areas near Kupang.

Management Patterns

Resource Access

The main economic resources for the Rote communities are coconut plants, excavation of mountain rocks for building material, and planting *turi* trees (*Sesbania grandifloria*) for cows. The dry season, which lasts for eight months from April to November, makes it difficult to manage land resources. Some Rote family heads become fishers, but only to supplement their income.

In contrast, the Bajos are highly dependent on marine resources. The Bajos are well known as itinerant fishers and for sailing long distances from their native villages. Fresh catches are usually sold at Oeba Market in Kupang instead of being processed. There is no market in Sulamu. In addition, there is no fish processing capacity at the household, medium or large-scale levels. Fish drying and smoking are done for daily consumption. This does not provide opportunities for a value added industry.

The bargaining power of the fishers is weak resulting in the selling price being determined by the buyers. The fishers normally refrain from sailing during the west monsoon and use this time to rest and mend their fishing gear. During this period there is almost no activity related to fishing.

Compared to the fishers, farmers have more secure access to their fields through ownership rights. Land ownership for farmers is normally clear, while most fisher communities have no written law on land ownership. Fishers are generally unconcerned about land ownership since they spend most of their life at sea. Fishers build their own boats and make other gear. A boat building business was established to supply local and other village fishers. A 20 meter boat costs Rp. 7 million (US$739).

According to Rahardjo et al. (1997), Sulamu fishers were using 38 rowing boats on loan from the fishery services, 22 tree-trunk canoes, and 29 motorized boats. Almost all non-motorized boats (98%) are owned, but only half the motorized boat users own their boats. From the same research, 31% of fishers use fishing nets, 41% use hooks, 28% use other gear, and 1% use fish traps (*bubu*). Fishing net owners consist of:

- 60 gill net monofilament;
- 60 *pukat anyo*;
- 20 *lampara*;
- 20 gill nets;
- 10 long lines;
- 60 *binca-binca*;
- 15 *tonda-tonda*; and
- 15 *pancing buang*.

Access to Kupang Bay is open to members of Sulamu community and other nearby villages. There are no rules granting special authorization or limiting community rights to use coastal and marine resources. Any member of the community has the right to use the coastal and marine resources without responsibility to protect it or be concerned with other parties' interests. There is no requirement for fishers or small-scale fishing businesses to obtain a license. A license is required for medium and large scale fishing businesses and is given by authorized institutions, i.e. Ministry of Agriculture Fishery Service. Kupang Bay is under the authority of the Ministry of Forestry because Kupang Bay has been determined as a marine and tourism area.

Coastal resource management and law enforcement is not effective. Kupang Bay is threatened by the widespread use of poison and dynamites for fishing. These destructive activities have damaged the coral reef ecosystems. Coral mining is also practiced by communities around the Bay. Degradation of coral reefs is compounded by poor water quality due to the increase of household wastes from residential areas.

Government institutions are unable to prevent destructive practices and there is little the commu-

nity can do by itself. In some cases, the use of dynamite has been reported to the police, but violators are seldom prosecuted. Communities practice dynamite fishing in their area to such an extent that Kupang Bay is known as "the center of dynamite fishing". This has not attracted the attention of law enforcement agencies and there seems to be no effective way to solve the problem.

Bajo fishers in Sulamu normally fish far offshore near the Maluku Islands and are not as affected by the damage to coral reef ecosystem in Kupang Bay. The Bajo community in Sulamu recognizes a religious prohibition (*dirarangan*) that prevents Bajo fishers sailing on Fridays, particularly from morning to 1400 in the afternoon. As good Muslims, they expect everyone to attend Friday prayers from 1100 to 1330, but this prohibition is becoming less stringent. Sulamu community members, both Bajos and Rotes, are less inclined to recognize religious principles as ways of managing and controlling coastal and marine natural resources. Fishers, especially the Bajos, consider the sea an open asset that can be used by everyone. The sea is not considered something that requires attention and special treatment to guarantee the security and sustainability of its resources.

Prevention and prohibition of destructive activities in coastal areas are considered the responsibility of the government. In the mixed communities around Kupang Bay, it is difficult to call upon any common traditional values with regard to marine resources management that bind the community in some concerted action to protect the natural resources. Some public figures of Bajo and Rote origins tried to formulate an agreement to control the fishing between certain hours and with specific gear, however, the agreement did not work well and had lapsed by the 1980s (Rahardjo et al. 1997). They agreed that Rotes be allowed to use *dai sasoro* while the Bajos were allowed to use *pukat senar* and *bubu*. The agreement did not last long because outside fishers using bigger boats and better gear came. The introduction of boats and fishing gear on a loan program through the cooperative also worked against the agreement. Another problem that hampered the agreement was unclear borders allowing local communities and outside fishers to arrange fish catching with the fishers in Sulamu.

There is a negative view in the Rote community about the Bajos. They are considered "less clean". There is also a perception that Bajos are outsiders. Although the Rotes are also immigrants, they regard themselves as native people because they came earlier and Rote Island is located near Sulamu. There is also an opinion in the non-fishing communities that fishing is a less respected job. Religious differences are also an issue between the groups. There is always potential for conflict, but open conflict is rare. Conflicts between Sulamu fishers and outside fishers are few, since Sulamu fishers don't use the natural resources in Kupang Bay. The habit of Bajo fishers to sail far into Australian waters does not encourage them to defend their fishing areas around Sulamu from outside threats.

Constraints

Punggawa are local businessmen operating in or living around Sulamu. They usually provide capital for *sawi* (fishers) in the form of loans to purchase or hire boats and fishing gear. The *punggawa* also handle direct marketing to consumers. *Punggawa* have created an exploitative work system for the fishers using loans to get cheap prices. They often determine the price by manipulating the quality standard and do not give fishers the opportunity to fully repay their liabilities.

A *juragan* is a manager of a group of fishers in a fishing expedition. He owns a boat and fishing gear and leads the operation. *Sawi* are hired fishers and work for the *juragan*. *Sawi* are usually paid a percentage share of the catch. Some fishers use a union system where there is no difference between *juragan* and *sawi*. In this way, all the fishers in a union have the same shares. In some cases, *juragan* and *sawi* work without a *punggawa*, but in most cases the *juragan* and *sawi* work for *punggawa*. For most of the fishers, the patron-client system of *punggawa, juragan* and *sawi* is not profitable and creates competition between groups of fishers. Every group is competing to reach the target determined by the *punggawa*. The competition is generally aimed at having the *punggawa* distribute capital to highly productive groups of fishers. In some cases, this system induces the fishers to work hard, but it also encourages selfishness. The competition can also increase the conflict among fishers, particularly

among subsistent fishers and fishers owning higher capacity motorized boats and better gear.

A *papalele* is a middlemen trading between a *punggawa* or between a *punggawa* and consumers, particularly household consumers. In some cases, the *papalele* practices price manipulation by delaying the purchase of fresh fish for several hours after the boats land in the morning in order to get a lower price, particularly from small-scale fishers. The *papalele* often buy second quality fish as the premium quality is purchased by big companies and restaurants. Fishers are forced to sell cheaply since they do not have refrigeration equipment.

Enormous collector ships often come to Kupang Bay and this creates more problems for fish management. Collector ships owned by large national companies act as receiving stations. They make transactions in the middle of the sea under collector ship prices. They can often buy fish for less than 50% of the landed price because small fishers have ity for the fishers is shark fins (Rahardjo et al. 1997). (Table 3.1).

Opportunities

Sulamu fishers, the Bajos in particular, are a hard working, seafaring people. Their skills could help expand fishery sector development in Indonesia. They need training, capital, and appropriate fishing technology in order to increase their income. Development should not only focus on the catch, but also on postharvest. Attention should be paid to economic and trading relationships between fishers and those funding the industry.

Local government and NGO support in recent years have helped the fishers in Sulamu. The local government has provided loans and training. NGOs, such as Yayasan Alfa Omega provided education and training. However, this aid did not create any fundamental change in the local community structures.

Ameth Village (Nusa Laut, Lease Islands)

Ameth village, in Saparua subdistrict, is one of the small villages in Nusa Laut Island in the Lease Island. The Lease Islands are part of Maluku

Table 3.1 Fish Production (Rahardjo et al. 1997).

Marine Living Resources	Trend of Production	Trend of Demand	Price Trend	Pricing Determination Process
Shark's fin	Decrease	Increase	12 500 to 300 000 kg	Buyer
Batu Laga	Decrease	Increase	50 000/kg	Seller
Kerapu fish	Increase	Increase	15 000/piece	Seller
Batu Lola	Decrease	Increase	12 500/kg	Seller
Sea Cucumber	Decrease	Increase	12 500/kg	Seller
Napoleon fish	Decrease	Decrease	10 000/piece	Seller
Lobster	Fix	Decrease	5 000/piece	Seller
Seaweeds	Decrease	Fix	250/kg	Local buyer
Gergaheng fish	Fix	Fix	7 500/piece	Buyer
Kombong fish	Fix	Fix	1 000/piece	Buyer
Tongkol fish	Fix	Fix	1 000/piece	Buyer
Red fish	Fix	Fix	1 000/piece	Buyer
Red Kakap	Fix	Fix	1 000/piece	Buyer
Nipi fish	Fix	Fix	1 500/piece	Buyer
Tembang fish	Fix	Fix	1 000/6 pieces	Buyer
Mano fish	Fix	Fix	1 000/8 pieces	Buyer
Kabaak fish	Fix	Fix	1 000/4 pieces	Buyer
Dusu fish	Fix	Fix	1 000/piece	Buyer
Lorak fish	Fix	Decrease	1 000/piece	Buyer
Stone Head fish	Fix	Fix	1 000/3 pieces	Buyer
Young Nose fish	Fix	Fix	1 000/piece	Buyer
Peperek fish	Fix	Fix	1 000/4 pieces	Buyer

Province. This province has the largest area of water in Indonesia (765.27 km^2 or 90% of the total). The Lease Islands consist of Pombo Island, Haruku Island, Saparua Island, Maulana Island, and Nusa Laut Island. The islands are part of Central Maluku Regency and are located east of Ambon which has two sub-districts: Haruku and Saparua Islands. The topography of the Lease Islands is generally sloping with some hills rising to 50 meters. The coastal area is the center of economic life for residents. A small part of the hilly area has a rough topography with cliffs at the edge of the shores.

From October to February, the monsoon blows from the west, northwest, and north and carries relatively low rainfall. In this season, the water is calm and the wind is weak, therefore the fishers have little difficulty with the weather. From April to August, the monsoon blows from the east and southeast with high rainfall (3 000 mm). From May to August, strong winds cause high waves (4 meters) and conditions are unsafe for fishing. The transition period occurs around March and September when wind direction and wave action are uncertain.

Natural Resources

Lease Islands has a wide area of coral reefs with high levels of biodiversity. The reef ecosystem is very sensitive to physical and chemical disturbances. The condition of the reefs in this area is considered good, but damage occurs in some locations due to the use of dynamites, tunnel nets, and boat traffic. Disturbance from sedimentation and chemical waste remains at tolerable levels.

In term of its mangrove resources, it has quite a high index (0.66). The level of mangrove diversity is around 0.51 with genera *Rhizophora* and *Avicenia* dominating the coastal area. Mangroves have several uses for coastal communities; however, the continued use of mangroves for firewood threatens their existence in this region.

Seagrasses grow in its shallow waters and function as nursery and feeding areas for numerous fish species and other organisms such as sea cucumbers. There are two types of seagrasses in the Lease Islands: *Thalassia hemprichii* and *Enhalus acoroides*, with a density of 100 to 400 grasses/m^2. The condition of seagrasses in this area is good and is evenly spread along the coast.

Social Aspects

The Lease Islands consist of three populated islands: Haruku, Saparua, and Nusa Laut. Basic demographic characteristics are shown in Table 3.2.

Most people living on the Lease Islands are farmers, fishers, traders, and government officials. In 1975, 75% of Haruku residents were farmers. Secondary crop cultivation such as corn, peanuts, tubers, coconuts, coffee, and cloves are the main commodities. Livestock breeding and raising chickens are supplementary activities for income or family consumption. The coastal and marine resources are not used extensively by local communities. The fishers use traditional methods and fish in reefs and mangrove areas.

Ameth Village represents the physical and social characteristics of the Islands. The area covers 6 000 km^2 and has a population of 1 580 people. Population growth from 1991 to 1995 was 2.9% annually. Migrants have come to Ameth in the past few years, being encouraged by the prosperity of the village and the construction of education facilities, specifically a secondary and high school. The dependency ratio is 23 per 100 person of productive age. The largest age group is 15-19 year olds. Like other villages in Maluku, education levels in Ameth are

Table 3.2 Demographic Characteristics.

Island	Area in km^2	Population	Density
1. Haruku**	479	24 651	51
2. Saparua*	243	37 114	179
3. Nusa Laut	36	6 087	174
Total	758	67 852	

Note: **1996 *1994

low. Forty percent graduated from elementary school, 27% secondary school, 26% high school, and 5% university. The dropout rate is 2%.

The main livelihoods in the village are farming (43%) and fishing (36%). The average income of the two sectors is almost the same, about Rp. 74 000 (US$8) per month. Other community members work in trade, transportation, and government services. The contribution of these activities to the community economy is larger than fishing and farming. The economy of Ameth is relatively poor with a per capita income of Rp. 14 707.

The education and health care facilities are better than other villages on Nusa Laut. There is a playgroup school, two elementary schools, and a secondary and high school. There is a public health center and three family planning centers. The village medical staff includes one physician, five nurses, two midwives, and three trained traditional medicine men. The good schools and health care facilities attract villagers from the surrounding area. The housing and sanitation is good. One hundred and forty-seven of 231 houses are permanent (63%), 63 houses semi-permanent (27%) and 21 non-permanent houses (9%). The most effective transportation in Ameth is by sea.

Management Patterns

Resource Access

Farming and fishing are done alternately according to the season and weather conditions. Until recently, fishing did not contribute much to the income of the local community as compared to the service sector. According to a COREMAP research (1996/1997), income from the fishery sector averaged about Rp. 73 500 (US$8) monthly or Rp. 883 300 (US$93) annually, an amount only slightly less than the agriculture sector. In contrast, the service sector averages Rp. 283 500 (US$30) monthly or Rp. 3 402 000 (US$360) annually.

The early inhabitants came from Seram Island. During the Dutch colonial period, migrations were ordered as part of a policy to move inland communities to coastal areas. Gradually, marine resources provide a secondary source of income after clove, sago trees, and other crops. The economic pattern remained land-based, especially after cloves became an important commodity. The shift to a sea-oriented life was a long process starting from the fall of clove prices in world markets. Economics forced the local community to turn to the sea for their livelihoods.

About 50% of the population has graduated from primary school. With low levels of formal education, insufficient skills and low technology, fishers are unable to harvest the full potential that their fishery resources offer. Each household has two *rumpon*, a third of the households own one or two nets and fishing rods, only 2% own one or two *bubu*. Boats owned by fishers are traditional non-motorized boats. Such traditional equipment can be used only when the winds are relatively light restricting how much fishing can be done. In addition, post-harvest facilities are also lacking.

Ameth Village and the capital city of Saparua District can only be reached by sea. In Ameth, there is only one motorized longboat with a capacity of 40 passengers and 5 tons of goods. The long boat operates only on market days in Saparua, i.e. Wednesdays and Saturdays. This is not sufficient for exchanging goods and services with surrounding villages. Fishers need daily access to markets to sell their catch.

Constraints

Ameth has a traditional natural resources management system known as *sasi.* To implement, the community establishes a *kewang* - a person or group of people responsible for maintenance and enforcement. So far, *sasi* is only applied to land-based natural resources as the community depends very little on the sea. Attention to coastal and marine resources was only made in early 1990s when the price of clove — the island's main commodity — dropped. Plants specifically protected by this system include coconut, nutmeg, and clove, but in execution is applied to other plants such as tubers, bananas, and *Colocasia antiquorum*. Prior to the execution of *sasi*, *matakan* was applied. *Matakan* is a prohibition sign to notify villagers not to damage or to pick plants believing that anybody who deliberately or otherwise violates the rules will fall into disgrace or have an accident.

Traditionally, the village head controls *sasi*. In practice, he delegates his authority to his assistant or *kewang.* The tradition depends on the values passing on to the next generation. It also depends on the charisma and authority of the leaders. *Sasi* may be an effective way to control the use of certain resources, but it lacks clear management systems. In addition, it is not applicable to marine and coastal resources management, which requires institutions and rules recognized by both local communities and outsiders.

There is one rule for the community of Ameth Village related to marine living resources management, particularly mangrove forests. This rule fines those who take from or damage the mangrove forests. The usual fine is the delivery of 3 m^3 (or more) of building stones. Enforcement is not effective even though the stones are used for village development. Another system in the community is *pela*. This is a rule bridging the diversity in the local community through *adat* alliance. *Pela* is still maintained through a *panas pela* ceremony held once in 5 or 20 years depending on a collective decision. The ceremony is aimed at reminding people of the alliance between the existing villages. Villages with *pela* are not bound by religion. Many Muslim villages have *pela* with Christian villages. The *adat* alliance is reflected in activities such as building places of worship and helping communities suffering from disaster. As with *sasi*, there are no formal rules or traditions relating to marine living resources.

Like other villages in the area, Ameth bases its management on traditional rights (*hak ulayat*) and traditional marine rights (*hak ulayat laut*). The community has the right to use the management area for village development. Usually, the local community uses it with activities such as *bameti*, *sosoki*, fishing rods, and other gear. Areas beyond the edge of the *tubir* (slope) are considered high seas and may be used by anyone. In the case of *hak ulayat* limitation, there is no boundary line that prohibits other villagers from fishing. There are no fines for violating *ulayat* areas.

Although Ameth already has several *adat* laws relating to natural resources management on the land, there are few such laws for marine resources. The community has little capacity to use marine resources effectively. The boundaries of an *ulayat* area are not set, so when violations occur, there are no defined or consistent sanctions. The shift from land to sea-oriented resource use is hampered by the community's lack of capital and knowledge of marine resources management. A related issue is the lack of definitive national laws that the community can rely on. The local community cannot prevent exploitation of marine resources if someone has a permit issued by a national agency.

Furthermore, other than being unwritten, the existence of *adat* law depends on how it is being transferred through generations and as well as on the leadership of the *adat* leader enforcing the said rule. It seems that it is ineffective to make this rule as a pattern in natural resources management and marine living resources. The sustainability of marine living resources cannot be guaranteed only by unwritten formal rule but also requires rule and legal institutions which can be used as basis for natural resources development.

Opportunities

Although *sasi* is not an *adat* law regulating marine resources, it does provide an opportunity to manage resources in keeping with local cultural traditions. The *adat* head is a key figure who can influence people. The *kewang* is an institution enforcing community rules. *Pela* is another form of inter-village cooperation. The advantage of *pela* is it can bridge the differences among local communities and conflicts of interest between groups may be solved. *Pela panas* ceremonies could be a model for cooperation in marine resources management. *Hak ulayat* also helps in inter-area cooperation. Each village can manage the resources in their own area according to their own potential.

Another advantage is that strong emotional ties make it easier to agree on and enforce rules and institutions due to the relatively homogeneous ethnicity and religion in the Ameth community, *adat* laws and institutions relating to natural resources management are a powerful tool for sustainable natural resources use.

Kampung Laut, Segara Anakan

Segara Anakan is part of Cilacap District, Central Java. It consists of estuaries and rivers including the Citanduy, Cikonde, Cibeureum, and

Ujung Alang Rivers. According to Napitupulu and Ramu (1980), Segara Anakan consists of 28% forests and plants, 15% uplands, 12% settlements and plantations, 24% farmlands, and 33% mangroves and lagoons. Segara Anakan is surrounded by 96 000 ha of wetlands and has undergone ecological change, particularly due to the increase in farming and settlement. Segara Anakan is known as a unique estuary with a rich biological diversity and provides an important habitat for local and migratory birds. The lagoon is threatened by increase sedimentation every year from escalating destructive land-based activities. In 1903, the lagoon was about 6 450 ha. It has decreased to 1 800 ha by 1992. This reduction changed the pattern of marine use as well as the social and economic activities of local fishers. The national and local governments have struggled to protect and rehabilitate Segara Anakan in order to maintain its function with respect to both ecological and economic interests by establishing a Segara Anakan Rehabilitation Mega-Project.

Natural Resources

The mangrove forests in Segara Anakan is the largest in Java. It has decreased significantly during the past few years from 15 551 ha in 1974 to 8 957 ha in 1994. About 25% or 2 457 ha of mangroves are damaged. The decrease is caused by the use of mangroves for firewood and building materials, both by local and neighboring communities. In addition, massive extension of shrimp ponds has accelerated the damage. According to Pudjorianto (1982), about 23 species from 14 families of mangroves grow in this area, dominated by *Rhizophora apiculata*, *Rhizophora mucronata*, and *Bruguiera gymnorhiza.*

In terms of fisheries, there are about 45 species of fish in the area with 17 of them migratory. The migratory species include freshwater and marine fish species entering the lagoon to feed. The presence of migratory fish in this area is due to the many small rivers and canals connecting the lagoon to the Indian Ocean. A number of fish that consume plankton and micro-carnivorous, such as *Crossorhombus azureus*, *Mugil cephalus*, and *Mugil buchanan* are found around the lagoon including some detritivorous species such as *Rataboura bicolor* and *Cynoglossus lingua*. The exploitation rate of fish is about 36%. Fishing in the Indian Ocean, particularly in Cilacap waters, is usually done in 3-100 m depths about 25 km from shore. The average stock density in these waters is 9.1 ton per km^2 within an area of approximately 12 800 km^2 . The potential stocks in this area are estimated at 52 680 tons and the potential maximum sustainable yield is 31 716 tons. According to DGoF, the production of fish and shrimp has increased by 36% from 13 765 tons in 1995 to 18 719 tons in 1996 (Table 3.3).

Social Aspects

Segara Anakan is surrounded by 14 villages. Three of these villages are located by the (marine village) lagoon: Ujung Gagak, Ujung Alang, and Panikel. These three villages are known as *Kampung Laut*. Most fishers in Segara Anakan live in *Kampung Laut*. In 1995, the population of Segara Anakan was 38 452 in an area of 265 km^2. The growth rate is relatively low (0.51%). The population of *Kampung Laut* is a small part of the population with the lowest population density (Table 3.4).

Most villagers in *Kampung Laut* work as farmers and fishers and the rest are employed in the private sector or civil service (Statistik Kabupaten Cilacap 1995).

The level of education in *Kampung Laut* is low. The highest level attained by more than 75% of population is elementary education. This serious social constraint hampers development in the area.

Table 3.3 Potential Coastal and High Seas Fisheries in Cilacap, 1996 (DGoF 1996).

Fish	Stock Density (ton/km^2)	Size of Catching Area (km^2)	Natural Potential	Potential (MSY)
Large Pelagic	0.7	12 800	9 000	5 500
Small Pelagic	2.5	5 200	13 000	7 800
Demersal Fish	4.3	5 200	22 360	13 416
Shrimp	1.6	5 200	8 320	5 000
Total	9.1	-	52 680	31 716

Table 3.4 Population and Density Rate in Kampung Laut (Statistik Kabupaten Cilacap 1995).

Village	Area (km ^{2})	Total Population	Population Density/km^2
Ujung Gagak	21.32	2 909	136
Ujung Alang	95.17	4 343	46
Panikel	29.65	9 931	122
Total	146.14	7 183	

Due to a lack of potable water, the state of health is also very low.

The economy is dominated by agriculture. Rice is the main commodity in most villages in Segara Anakan with about 5 254 ha under cultivation. Other crops include coconuts, coffee, and cloves. Small-scale cattle breeding is another activity supporting the local economy. Small-scale household industries account for about 2% of the economic activity.

Management Patterns

Resource Access

Segara Anakan is considered a unique ecosystem. It is a large lagoon surrounded by mangrove forests. In Segara Anakan, natural resource use is carried out by traditional practices using low levels of technology. The local community and other surrounding villagers use mangroves for firewood and building materials. This has caused serious degradation of mangrove forests. Findings indicate that the condition has declined to the state where only 32% is in very good condition while the rest are in various stages of degradation.

Fish and shrimp pond development has rapidly increased in the past years. Many migrants have come to look for business opportunities in the fisheries sectors. Investors have developed massive shrimp farms. These investors come to Segara Anakan and take control of ponds owned by the local community. New fishponds have been established in mangrove forest areas. As a result, there are serious damage to the environment across most of Segara Anakan. Another serious problem faced by the local community is sedimentation from three large rivers. This lagoon has progressively decreased in size from 6 450 ha in 1903, 3 270 ha in 1984, 2 700 ha in 1986, and 1 800 ha in 1992. The lagoon has decreased by at least 70%. Sedimentation has caused the emergence of new land in the lagoon. This causes an ecologically vulnerable environment and brings about cultural and economic changes. Many fishers have shifted to land-based activities, mainly agriculture. There are a number of fishers from this area fishing in the Indian Ocean.

Constraints

The exploitation of fish and other marine resources in Segara Anakan is traditionally carried out by capture and mariculture. Capture fishers usually fish in the Indian Ocean and the Segara Anakan lagoon. Mariculture fishers depend mainly on resources within the lagoon. A few fishers are equipped with small-scale motorized boats. Most do not own boats. They use small fish traps made from bamboo and homemade nets. Mariculture fishers have created their own fishponds with limited resources and technology. Small-scale fishponds owned by local fishers are located mostly in areas within mangrove forests. The legal status of the lands used for fishponds is unclear because most lands are claimed by the state and managed by sectoral agencies such as the Department of Forestry (DoF).

New land that emerges due to sedimentation is also claimed by the national government. Disagreements among national agencies, local governments and communities over these lands lead to unclear management authority. Outside investors have taken advantage of this and built massive fishponds with support from village heads (*lurah*) and government institutions at the *kecamatan* and *kabupaten* (district) levels. Thus, illegal trading of new land has created unclear property rights and complicated jurisdiction issues. This situation puts the local fishers at a disadvantage as the presence of outsiders also lead to stiff competition in the use of resources, notwith-

standing the practice of these investors to hire outsiders to work in their ponds.

Illegal exploitation of mangroves and the extension of ownership claims to new lands have occurred for years with no effective resolution. The emergence of new lands due to sedimentation is forcing local people to move from marine-based to land-based activities. This has placed fishers in a difficult situation since this kind of change also brings along a change in fishers' culture. Those who stick with their existing jobs as fishers must also struggle to compete with others who possess more advanced tools and technologies. Unfortunately, local governments and agencies are unable to resolve the problems. The conflicts of interest between government agencies and the unclear authority of local governments over the lagoon and its natural resources have worsened in past years.

Segara Anakan fishers have no traditional practices in managing fisheries and other marine resources. It seems that everyone has an equal right of access to all kinds of marine resources. One of the traditional methods used by local fishers is floating nets. Every fisher freely locates their net in the lagoon along with a personalized marker. Local people will not violate the unwritten rules concerning the property of others. They believe that marine resources belong to 'the Queen of the Indian Ocean', a traditional and powerful metaphysical figure. In order to have protection from 'the Queen', fishers carry out a ceremony on the beach whenever they plan to go fishing. However, this belief system has lapsed due to cultural change. Intensive exploitation of marine resources by outsiders has brought about tough competition that is forcing local people to ignore their traditional values.

Opportunities

Until the beginning of the 20th century, Segara Anakan was in good condition both ecologically and economically. The population was small and fully able to maintain the sustainable use of natural resources. Currently, intensive exploitation of natural resources and sedimentation is preventing local fishers from improving their livelihoods. In order to protect Segara Anakan while improving its economy, the government has established an integrated action plan. The action plan proposes to rehabilitate and maintain Segara Anakan's estuary. This plan provides a framework that promotes development predicated on community-based lagoon management. The plan addresses rehabilitation, management, and protection of the environment as well as community development. However, rapid population growth and competition between the local community and migrants are still major problems that hamper development.

Many efforts have been made to develop the local economy, but they are unable to resolve the main problems, which include sedimentation and the control of outsiders over natural resources. Human resources development and infrastructure are largely ignored and this prevents local fishers from improving their own socioeconomic conditions. The empowerment of local fishers needs to focus on developing their capacity to manage their resources wisely.

Legal and Institutional Arrangements

Legal Aspects

The Written Laws

Indonesian sovereignty over its internal waters, archipelagic waters, and territorial seas is based on UNCLOS, which was ratified by the Government of Indonesia through the establishment of Act No. 17, 1985. Under international law, Indonesia has sovereign rights to carry out exploration, exploitation and development of its EEZ. This is manifested through a number of regulations and government policies including:

- The Constitution of Indonesia, 1945;
- Guidelines of State Policy (GBHN), 1998;
- Act No. 1, 1973 on the Continental Shelf;
- Act No. 5, 1983 on Indonesia's EEZ;
- Act No. 9, 1985 on Fisheries;
- Act No. 17, 1985 on Ratification of the 1982 UNCLOS;
- Act No. 5, 1990 on Conservation of Natural Resources and Ecosystems;
- Act No. 21, 1992 on Navigation;

- Act No. 24, 1992 on Spatial Planning;
- Act No. 6, 1996 on Indonesian Waters; and
- Act No. 23, 1997 on Environmental Management.

Other related laws and regulations include:

- Act No. 5, 1960 on Basic Agrarian Law;
- Act No. 5, 1967 on Forestry;
- Act No. 11, 1967 on Mining; and
- Act No. 5, 1974 on Basic Provisions of Regional Government.

These laws and state policies provide the legal basis for coastal and marine resources management and mandate a number of government institutions to manage these resources.

Most laws and policies are concerned with economic matters. A number of laws and regulations on fisheries, forestry, mining, marine transportation, tourism, spatial planning, and environmental management include articles with provisions for coastal and marine resources and environmental protection. However, these regulations do not promote natural resources effectively or provide environmental protection.

Another major issue of coastal and marine resources management is the allocation of resources, especially related to national, regional and local interests. The 1945 Constitution of Indonesia puts land, water, and natural resources under the authority of the state to be used for the prosperity of the people. This provision is frequently used as a basic principle for policy-making, particularly with reference to natural resources management and development.

The other legal instrument used to establish government policy is the Guidelines of State Policy (GBHN: *Garis-Garis Besar Haluan Negar*a). The Guidelines are established every five years by the House of Peoples' Representatives (MPR: *Majelis Permusyawaratan Rakya*t) and emphasize natural resources management for improving the prosperity of the community. GBHN includes all strategic resources management, including fisheries and other coastal and marine resources. Environmental considerations are an integral part of the GBHN. The GBHN is usually translated into operational policies, called Five Year Development Plans (REPELITA), which provide much more detail. They are used by the government to plan and implement activities at sectoral and regional levels. Unfortunately, integration between national and regional REPELITA is difficult because they are implemented by their respective government institutions. Lack of coordination between the two levels of government has caused many projects to fail.

The management of coastal and marine resources involves regulations and sector agencies with different responsibilities and interests. Act No. 9, 1985 concerning fisheries provides a legal basis for management of fish that promotes both economic and environmental interests. According to this law, anyone have access to coastal and marine resources. In order to protect the interests of small-scale fisheries, the government tries to protect coastal areas from large-scale fishing and practices that threaten coastal ecosystems.

The Act is not a sufficient basis for overall marine and coastal management. The existing Articles cover only the harvest area, fish catching methods, and protection from pollution and damages. There is no recourse in the Act should damage occur in mangroves or coral reefs. Jurisdiction and authority of fishing resources is, in practice, under the Agriculture Department and the Forestry Department.

Another relevant regulation is Act No. 5, 1967 concerning forests. This law deals also with coastal and marine resources within protected areas, including coral reefs. This law is not applicable in most cases since the establishment of a protected area is under land-based jurisdictions. Only a small number of coastal and marine protected areas have been established and agencies responsible for managing forests have little interest in non-protected coral reefs and mangroves. Unclear jurisdiction and weak institutional capacity makes for ineffective implementation. In addition, forestry laws may not prevent damage to coastal and marine environments from sedimentation and coastal erosion caused by inappropriate practices within the forest areas. There is no single regulation or policy available to deal with these issues.

Delegation of authority from central to local governments (Articles 12 and 14) offers local government opportunities to manage and protect forests in their areas. Article 15 focuses on protecting forests from damage by economic activities or natural disasters. This Article also concerns social participation in forest protection and traditional law relating to management and ownership rights. Based on the existing Articles, this Act may be used as the basis for forestry management including mangrove area conservation, coral reefs, and other protected areas relating to tourism. Since this Act is for general forest management, its use may require additional Articles.

To identify weaknesses, it would be necessary to establish coordinated department policy for Forestry, Interior, Post, Telecommunication, Tourism, Mining, and State Ministries. Together with the Home Affairs Department, these ministries could help prepare local governments to accept the authority being delegated (to manage forestry resources) from the central government.

A regulation closely related to forestry and natural resources conservation is Act No. 5, 1990 concerning Conservation of Natural Resources and their Ecosystems. This Act deals with the conservation of biodiversity. Even though the regulation does not specifically mention coastal and marine resources, it provides a potential legal basis.

This Act does not specify any natural resources conservation policy for coral reefs, mangrove forests, protected fish or other animal species, or national marine park zoning. Nor does it regulate implementation of conservation practices as stated in Article 4. Article 16 states that management is approved by the government, but stakeholder responsibility is not clear.

Mining is an important issue related to managing coastal and marine resources, including the exploitation of minerals, oil and natural gas. Unfortunately, Act No. 11, 1967 does not include coastal and marine environmental considerations. It does include some articles that prevent coral reefs from destructive activities related to mining, but it does not provide comprehensive regulations for coral reef protection. There are several regulations related to mining, such as Act No. 1, 1973. This Act gives the government a mandate to protect the environment from destructive mining activities on the seabed. Government Decree No. 17, 1974 concerns Supervision of Exploration and Exploitation of offshore oil and gas and requires all exploration activities to protect the environment.

Act No. 23, 1997 on Environmental Management provides a legal basis for integrated management and is expected to be the umbrella for the development policies on sustainable use of natural resources. This Act deals with land-based pollution. However, the implementation is not effective and its impact is uncertain.

Article 9 (Act No. 23) provides cross-sectoral opportunities in management planning. Article 12 provides opportunities for regional governments to manage an area according to its characteristics. This Act requires environmental impact analyses for major undertakings in the region.

Another regulation affecting coastal and marine resources is Act No. 9, 1990 on tourism. The growth of marine-based tourism has been significant in the past few years and coastal communities in many locations are reaping benefits. However, there are conflicts between investors and local communities. Tourism policy is within the jurisdiction of the national government and there is little participation by provincial or district governments. The absence of such participation in developing marine-based tourism has spawned ignorance and created serious environmental consequences.

The principles of sustainable use have been incorporated into the Guidelines of State Policy (GBHN). GBHN 1998 requires the exploitation of coastal and marine resources to maintain ecological life support systems and protect marine environments from pollution and destruction through the development of effective law enforcement and control systems. It confirms that the use of natural resources, including coastal and marine resources, is for the benefit of the people. In order to achieve this policy, the government included coastal and marine issues in the Five Year Development Plan (REPELITA) for 1993-1998. In practice, the implementation of this policy has been ineffective and the overexploitation of coastal and marine resources continues.

Most regulations on coastal and marine resources management are established by the national government and implemented by national government agencies at the regional level. With the exception of small-scale fishing and mining, there are no regulations that provide a legal mandate to provincial and district governments to manage coastal and marine resources.

The absence of integrated coastal and marine resources management has caused uncertainty, including unclear responsibilities and authority among national and regional government agencies.

The Unwritten Laws

Adat law is a set of customs that regulate the rights and duties of traditional communities toward land and water resources. The rights of the community are called *hak ulayat* or traditional community rights. Traditional community rights consist of the right to explore, exploit, manage, and conserve fishing resources and their environments. This is implicitly recognized in the 1945 Constitution of Indonesia. Article 1 Paragraph 2 of the Constitution stipulates that sovereignty of the state shall be in the hands of the people and shall be exercised in full by the People's General Assembly (MPR). The MPR shall determine the general guidelines of state policy (GBHN: *Garis-Garis Besar Haluan Negara*; Article 3). The GBHN provides guidelines to the State in the formulation and implementation of policies, including Article 33, Paragraph 3 which stipulates that land, water, and resources contained therein shall be controlled by the State and shall be made for the best use of the people.

Adat law is also recognized by Act No. 5, 1960 on Basic Agrarian Law (Agrarian Act). Article 5 states explicitly that the applicable law for land, water, and air-space is *adat* law, providing the law does not conflict with national interests or disrupt the unity of the nation. Therefore, implementation of traditional community rights have to be in agreement with national interests and in accordance with the written laws and regulations (Article 2, Paragraph 4, and Article 3).

According to Soepomo 1993, various *adat* laws exist in 19 regions of Indonesia:

- Aceh;
- Tasnah Gayo-Alas, Batak, and Nias;
- Minangkabau and Mentawai;
- South Sumatra;
- Melayu (Riau);
- Bangka and Belitung;
- Kalimantan (Dayak);
- Minahasa;
- Toraja;
- South Sulawesi;
- Ternate Islands;
- Moluccas;
- Irian;
- Timor Islands;
- Bali, Lombok, and Sumbawa;
- Central Java, East Java, and Madura;
- North Sulawesi;
- Surakarta and Yogyakarta; and
- West Java.

All *adat* laws within these regions are integrated into a national concept called *Bhineka Tunggal Ika* (unity in diversity). The laws are considered national assets in the development of national unity and every law is treated equally.

Adat law in Segara Anakan is applied in Central Java, East Java, and Madura. The *Adat* law in Segara Anakan is part of *Banyamas Adat* which is influenced by the Yogyakata *adat* laws. The law recognizes that marine resources in the lagoon, the Indian Ocean, and Nusa Kambangan Island are controlled by 'the Queen of the Indian Ocean' called *Nyai Loro Kidul*. According to traditional belief, anyone seeking to exploit resources should obtain permission from the Queen. Permits will be granted to fishers and other resource users through a mediator called a *pawang*. The *pawang* functions as a regulator to ensure exploitation does not exceed the carrying capacity of the resource.

These traditional norms gradually lapsed when the Dutch introduced and applied the concept of open prisons on Nusa Kambangan Island in 1901. The development of open prisons stamped out the myth of the Queen's control over natural resources on Nusa Kambangan Island. Immigration to Segara Anakan has also changed *adat* law. Fishers no longer have to ask permission from the *pawang* when they want to catch fish, develop aquaculture, cut mangroves, or use other natural resources. Assistance from

the *pawang* is still sought when people encounter natural phenomena beyond their understanding, such as exceptionally strong winds, waves, and currents.

Adat law in Segara Anakan will disappear completely if it cannot protect traditional community rights. One cause for existing problems is sedimentation. Sedimentation occurs annually and has created new land and narrowed the lagoon. Consequently, the fishing grounds have diminished and the catch has declined. Many fishers have switched to agriculture. The new land has also created delimitation problems resulting in overlapping claims on new lands and overlapping jurisdiction among government institutions. This has led to uncontrolled use of fisheries, mangroves, land, and other resources that worsen the damage to the environment so much so *adat* law in Segara Anakan is no longer working well.

Sasi is the applicable *adat* law concerning the use of natural living resources on Nusa Laut Island and on other islands of Maluku. *Sasi* is also intended to resolve conflicts of interest and to guarantee a proportional distribution of resources among members of the community (Imami 1996). According to Kissya (1995), *sasi* applied in Haruku Island consists of *sasi laut* (marine), *sasi kali* (river), *sasi hutan* (forest), and *sasi dalam negeri* (village). On Nusa Laut Island, however, *sasi laut* is not applied since the activities of these island people are land-based. Spices such as cloves, cinnamon, and nutmeg are some of the resources available. Three years after the collapse of clove prices in 1995, the people turned their attention to the fisheries (Rahardjo et al. 1997). Since people view natural living resources differently, they apply various *sasi* to achieve a number of purposes. The various *sasi* have similarities in terms of rules, prohibitions, and sanctions. Thus, *sasi*, like the *adat* law in Segara Anakan, focuses more on resource use and exploitation than management activities.

In the Lease Islands, *sasi adat* is used to regulate land-based activity and was modified into *sasi gereja* (church) by Christian Moluccans and into *sasi lelang* (auction) by Muslim migrants from Bajo, Bugis, and Makasar. From a legal review and analysis standpoint, it appears that the Christian Moluccans transformed *sasi adat* into *sasi gereja* as Christian values are more effective than *adat* norms in providing the people with conflict resolution skills.

Sasi adat refers to a traditional *sasi* that is imposed and controlled by a *kewang*, a person or a group of individuals assigned representing traditional institution. *Sasi gereja* means church *sasi*, a system imposed and controlled by the church. In this system, the church has rights to control certain resources and, in turn, the community must share harvested resources with the church. *Sasi lelang* is a system based on "contract." This is applied only in Moslem communities. In this system, the community sells their rights to harvest resources to local traders or outsiders. The trader employs a person or a group of people as *kewang* to guard resources under his authority and impose his rules.

In order to impose the rules, *sasi* systems mandate that anyone who violates *sasi* will be fined and will be subjected to public humiliation. A punishment is usually carried out by traditional leaders or village administrators. Punishment systems vary from one community to another because these are established based on agreements among leaders, certain value systems and cultural experience.

Most *sasi* systems deal with land-based resources, while some are related to coastal resources. The latter type deals with a certain type of fish (resources) or some resources in the same area and time or in the same area at different time. The implementation of most *sasi* on coastal resources is problematic because of unclear boundaries between the coastline and the open sea, and between one village to another.

The Muslim migrants who lived for years on Nusa Laut, Haruku, and Saparua Islands have adopted the traditional values of *sasi adat* and have transformed *sasi adat* into *sasi lelang*. By so doing, they became accepted members of the local community. They in turn have introduced some of their traditional values that are more marine-based and business-oriented. Since the Muslim migrants are more interested in marine-based activities, they sell their rights over land resources through auctions. Because they want to show they comply with the local *adat* law, they submit the auction process to the *musyawarah desa* (village community forum). After the

auction, traders who purchased land will hire workers as *kewang* for a certain period as agreed.

In Kupang Bay, *adat* law on marine resources use is supported by both local people and migrants, i.e. Bajo, Bugis, Buton, Makasar, and Madura. The local people are mostly Christian Rotenese and are land-oriented, while the Muslim migrants are marine oriented. The Rotenese have little interest in the preservation of the marine environment. The Bugis, Buton, Makasar, and Madura pass through Rote Island waters on their way to Australian fishing grounds. The Bajos have agreed to certain rules being applied in their fishing grounds. These rules protect the marine environment from such activities as waste dumping and blast fishing. In 1980, the Rotenese and Bajos agreed on the use of certain types of fishing gear. The agreement, which involved four villages, was in effect for only two years. Many outsiders also engaged in fishing in the Bay and did not follow the rules.

Management activities are only implicitly regulated by *adat* law. Since *adat* law is unwritten and there is a high degree of variation among villages, it is subject to change over time. The conventions create uncertainty so that it is unlikely to be used as legal basis for business transactions between local people and outsiders. However, the integration of customs and principles into written laws would be highly valuable.

Institutional Aspects

Institutional Arrangements at the National Level

The existing laws and regulations provide government institutions with legal mandates to carry out coastal and marine resources management. A number of government institutions have been involved in managing coastal and marine resources with varying degrees of authority and levels of resources. The leading government institutions authorized to manage coastal and marine resources include (see Box 3.1):

- Department of Agriculture;
- Department of Mining and Energy;
- Department of Forestry;
- Department of Tourism, Arts, and Culture; and
- Department of Communication.

Fisheries

Fisheries management is under the jurisdiction of the Department of Agriculture with implementation through the General Directorate of Fisheries. According to the Fisheries Law, management includes policy formulation, planning, organizing, implementing, and control. The DA deals with fish, shellfish, seagrasses, and other resources related to coastal and marine-based food production. This Department is responsible for issuing licenses for any activity dealing with the exploitation of fish and other resources related to food production in internal waters, territorial waters, and the EEZ. In addition, this Department is authorized to develop fish production systems to support development. This would include resource allocation, stock assessment, exploitation, marketing, and protection of fish from improper actions. The effectiveness of the control system is not certain, even though the system is equipped with sufficient technical facilities and human resources. Management control needs improvement. Since fisheries management involves various government institutions such as the Navy and Departments of Forestry, Communication, and Mining and Energy, coordination is essential. Provincial governments are involved as they are authorized to regulate small-scale fishing and the use of vessels less than 30 GT. The provincial governments are expected to prevent improper practices that threaten the interest of small-scale fishing and local communities.

Mangroves

Mangrove management involves the Departments of Forestry, Agriculture, Tourism, and Home Affairs. Other institutions expected to make significant contributions include the State Ministry for Environment and Environmental Impact Management Agency (BAPEDAL), particularly in dealing with environmental protection issues. These institutions pay little attention to theprotection of mangroves since their focus is on land-based activities. The role of the Department of Forestry in managing mangroves is crucial since this Department is legally authorized to protect mangroves. However, the role of the Department is effective only within

Box 3.1 Major Agencies Involved in Coastal Resources Management

STATE MINISTRY FOR ENVIRONMENT

The State Ministry for Environment is responsible for the management of the living environment and prepares policies based on Act No. 23, 1997 concerning environmental management. Since this institution has no implementing agency, coordination with other institutions is necessary to ensure control over the execution of policies. This institution has jurisdiction over marine and coastal resources for their sustainability.

BAPEDAL (ENVIRONMENTAL IMPACT MANAGEMENT AGENCY)

Since this institution was established as a complement to the State Ministry for Environment, it has been responsible for the management of marine and coastal resources including environmental rehabilitation and pollution control. BAPEDAL has two deputies, one each for pollution management and environmental impact control. BAPEDAL has three regional offices: West Region in Pakanbaru, Central Region in Bali, and East Region in Ujungpandang. Each regional office monitors development of central policies, pollution conditions, and environmental impact assessments.

BAPEDAL is responsible for monitoring pollution and environmental degradation caused by land-based activities. In this case, its activities are directly related to the Spatial Planning Act No. 24 of 1992. Even though in the execution of the Act, the role of BAPEDAL has not been fully articulated, there is the potential to increase its participation in marine and coastal management.

DEPARTMENT OF FORESTRY

The Department of Forestry is responsible for general forestry management, including exploitation and conservation. Regarding marine and coastal resources, the Department is interested in conservation. The Department is the responsibility of the Directorate General Forest Control and Natural Resources Conservation. This institution has sufficient jurisdiction under the law to enforce regulations. The policies on environmental management are most effective for forest management, however, BAPEDAL has a responsibility to manage coral reefs and mangrove forests. BAPEDAL is also responsible for developing national parks and conservation areas to prevent erosion and environmental damage.

DEPARTMENT OF AGRICULTURE

The DA is directly involved in the execution of marine and coastal management but damage to fish habitats is considered beyond its jurisdiction. To prevent damage by tunnel nets, dynamite fishing and fishing using chemicals, the Department has to coordinate with the Forestry Department and State Ministry for Environment.

DEPARTMENT OF COMMUNICATION

The Department of Communication has responsibility over all forms of transportation. Act No. 21, 1992 regulates the transportation of pollutants by sea, which gives this department some responsibility for marine and coastal management. It is directly responsible for the sustainability of marine and coastal ecosystems by way of pollution prevention. It also participates in marine

and coastal environment law enforcement. These responsibilities may be performed by cooperating with institutions concerned with protection and use of marine and coastal resources.

DEPARTMENT OF MINING AND ENERGY

The Department of Mining and Energy is responsible for environmental impact assessment of mining and energy activities and the sustainable use of mining and energy resources. It is responsible for preventing environmental damage from mining activities, but has to cooperate with Forestry and Agriculture for implementation. The Department executes only large-scale environmental impact policy. Small-scale mining is still a regional government responsibility.

DEPARTMENT OF HOME AFFAIRS

The Department of Home Affairs is responsible for central and regional government environmental affairs. It is an implementing institution for environmental management policy with units in both central and regional jurisdictions. The Department is responsible for coordination between central and regional governments to avoid overlap in marine and coastal management. It is also responsible for quality of life development in local communities.

protected areas because it has no authority to deal with resources outside these areas. The interest of the Department of Forestry in mangroves is also related to the preservation of endangered species that depend on mangroves. The DA plays an important role in the management of mangroves in all coastal zones. The exploitation of mangroves or mangrove areas for fish production or mariculture is also the responsibility of the DA. The attention this Department pays to mangrove conservation is very important in order to maintain the habitats of fish and other organisms. The role of the Department of Tourism (DoT) is to regulate coastal areas (frequently within mangrove areas) for tourism and natural resources conservation to maintain and protect the quality of natural resources from destructive tourism activities. The Department of Home Affairs is indirectly responsible for protecting mangroves. The main focus of this department is to improve the quality of life in coastal communities. Any management system that involves institutions with different interests has the potential for a conflict of interest.

Coral Reefs

Coral reef protection is a priority in the years to come. The COREMAP is one of the strategic projects expected to promote integrated coral reef management. This project aims to develop a comprehensive approach to coral reef management using principles of integration (economic and ecological) for the benefit of local communities. The approach requires institutional support from government agencies, social institutions and the private sector. Coral reef management is dispersed among a number of government institutions including the Departments of Forestry, Agriculture, Mining and Energy, and Communication. These Departments deal mainly with the exploitation of resources and do not necessarily include management. The Department of Forestry is responsible for the management of protected areas and plays a role in protection, however, some coral reefs extend beyond protected areas.

The DA is mandated to protect coral reefs from destructive activities, however, eliminating destructive fishing does not necessarily lead to effective protection. The DA is unable to impose measures for protection since they have no authority to develop a strategic coral reef management systems. The Department of Mining and Energy has the same restraint. There are no regulations that give it a legal mandate to manage reefs and protect them from destructive mining practices. The Department of Tourism has a potential role in managing and maintaining the quality of coral reefs. The Depart-

ment is interested in maintaining the reefs for tourism, but they work only in tourism areas. The Department of Communication is assigned to prevent marine environments from pollution and all negative impacts of marine-based transportation, however, there is no specific mandate on coral reef management. The Environmental Impact Management Agency (BAPEDAL) and the State Ministry of Environment are also expected to take part in protecting coral reefs, but these institutions are not ready. The State Ministry of Environment is not an implementing agency while BAPEDAL is relatively new and pays little attention to coastal and marine issues.

Institutional Arrangements at the Regional Level

The implementation of policies on coastal and marine resources management is under the jurisdiction of the national government through its to various departments and institutions. Each department has established working units (*kantor wilayah* or KANWIL) at the provincial level. Each KANWIL represents its own department at the national level. They are under the coordination of provincial governors, but are not responsible to them. At the district level, each department is represented by *kantor perwakilan*. This unit works with KANWIL and is under the coordination of a *bupati*, the head of a district government.

Provincial governments have established implementing agencies called DINAS to implement provincial government policies and carry out development programs formulated by the provincial government. DINAS might work with KANWIL, but these units have no structural link. DINAS focus on the sectors designated by the national government. This means that within the same province, there are two institutions with similar responsibilities. Such complex institutional arrangements result in overlapping administrative systems that hinder policy implementation. KANWIL and *kantor perwakilan* have played a crucial role in the use of resources and management processes including planning, organizing, implementing, and control. Nonetheless, coastal and marine resources management is not effectively implemented.

Institutional Arrangements at the Village Level

Coastal and marine resources management is traditionally controlled by local communities based on customary laws. These laws exist mainly in East Indonesia (Irian Jaya, Maluku, and some regions in Nusa Tenggara Timur). Even though there are similarities in traditional values and practices, each community has its own norms and practices for managing natural resources.

The Haruku community in the Lease Islands has successfully applied *sasi* for *ikan lompa* (*Trissina baelama*) in the estuary area and extends 200 m from the shore. The *kewang* prevents any form of fishing until the fish are ready for harvest. The community harvests the fish by sweeping the river using large nets that enable anyone to catch all available fish in just a half day. This practice is ecologically questionable. The implementation of *sasi* for coastal and marine resources management tends to be ineffective because it is often unrecognized by outsiders, even those from neighboring villages. The effectiveness is further threatened by cultural changes among younger generations who have higher levels of education. Education and different cultural experiences are changing their views on traditional value systems. *Sasi* is also less effective within a community that is culturally heterogeneous, especially in villages with large numbers of recent immigrants.

Customary laws have been applied in other regions such as Nusa Tenggara Timur. A number of local communities have traditional practices called *buka* (open). Community members are only allowed to harvest natural resources (mostly fish) during a *buka* period. Even though community members believe that *buka* is useful, they are skeptical that such a tradition is still relevant. Vague boundaries and cultural change are two major problems lessening the impact of *buka* systems. Customary laws and traditional practices for dealing with coastal and marine resources management do not exist in most communities on the west coast. For example, the communities in Segara Anakan, Cilacap and Java have no tradition of managing coastal and marine resources. The integration of traditional values and practices into national or written laws could help

encourage better management systems and community empowerment.

Assessment of Marine Resources Management

Patterns

Management of fisheries includes legal, institutional, social and cultural aspects. Policy frameworks and stakeholder roles must also be taken into consideration. In this chapter, the management issues discussed in previous chapters will be considered as part of an integrated management matrix. (Figure 3.1). Management activities are defined as:

- Planning and organizing,
- Actuating, and
- Controlling.

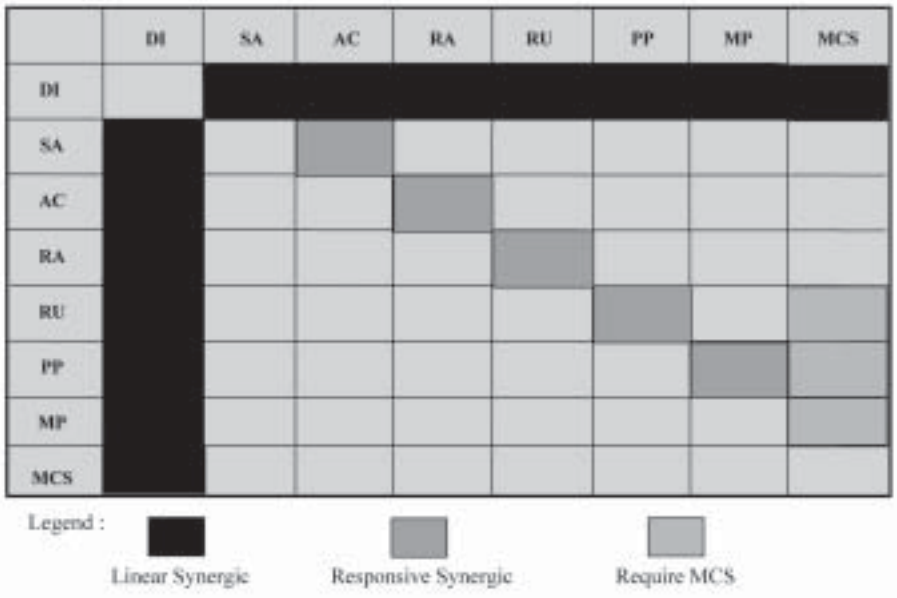
Implementing these activities is a process of interaction among legal, institutional, social, and cultural aspects of marine fisheries management. Derived from this interaction, management activities can be viewed as linear synergic interactions or responsive synergic interactions.

Each group of marine fisheries management activities can be analyzed using resource-based, community-based, and market-based approaches (Figures 3.2, 3.3 and 3.4). These approaches will identify strengths and weaknesses in marine fisheries management. Efforts to integrate *adat* law principles will be by the use of legal and institutional frameworks (Figures 3.5 and 3.6). These frameworks can be used to facilitate the development of community-based management.

The processes commonly used in fisheries management include planning, organizing, actuating and controlling activities (POAC). These activities require data and information (DI) from a fisheries database. POAC activities themselves produce inputs to the database. Interaction between DI and each activity of fisheries management creates a responsive synergic relationship (Figure 3.1).

In practice, the planning and organizing activities cover stock assessment (SA), determination of absorptive capacity of the marine environment (AC), carrying capacity of fishery resources and resources allocation (RA). The actuating activities include resources utilization (RU), process of production (PP) and marketing of fisheries products (MP). The controlling activities include monitoring, controlling and surveillance (MCS). As a sequential process, interaction among these activities creates a linear synergic relationship (Figure 3.1). In this respect, MCS plays an important role in preventing RU, PP and MP from inconsistency with AC, RA and existing laws and regulations. MCS also protects fisheries from illegal activities.

Figure 3.1 Integrated Fisheries Management Matrix (Purwaka 1997).



DI	data and information
SA	stock assessment
AC	absorptive capacity
RA	resource allocation
RU	resource use
PP	production processes
MP	marketing fisheries products
MCS	monitor, control, and surveillance

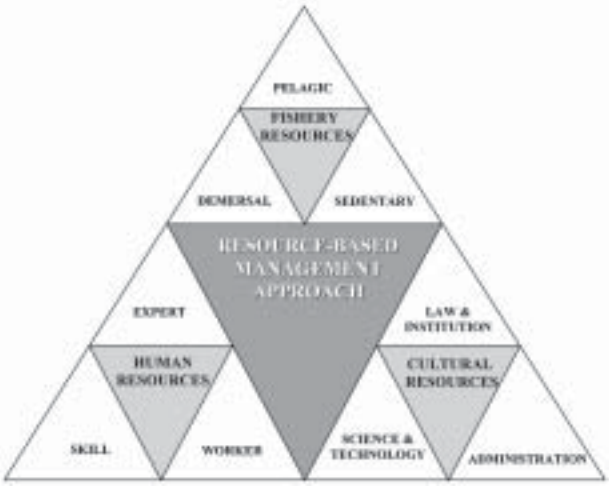


Figure 3.2 Resource-Based Management Approach (Purwaka 1997).

Figure 3.4 Market-Based Management Approach (Purwaka 1997).

Integrating fisheries management, legal, institutional, social and cultural aspects in the three study areas will be explored by the use of compatibility principles:

- Complete compatibility exists when two or more activities can be carried out at the same time and place without creating a conflict;
- Partial compatibility exists when two or more activities can be conducted at the same place, but not at the same time;
- Complete incompatibility exists when an activity cannot be executed with another activity at the same place, even at a different time.

Integrated fisheries management can be illustrated by using resource-based, community-based and market-based management approaches. This system facilitates integrated relationships among fishery resources, human resources and cultural resources (Figure 3.2).

Community-based management facilitates awareness and participation (Figure 3.3). Resource and community-based management exploit the fisheries on the basis of competition. To achieve a sustainable competitive advantage in the fisheries, resource and community-based fisheries management should be combined with market-based management. Market-based fisheries management facilitates competition by indicating how and where to compete (Figure 3.4).

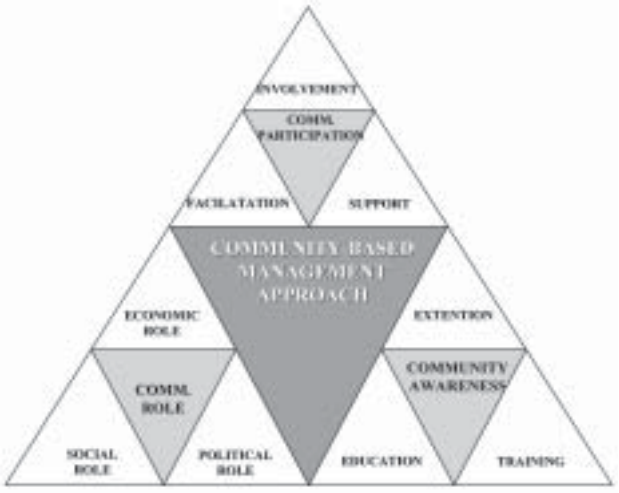


Figure 3.3 Community-Based Management Approach (Purwaka 1997 modified from Ferrer 1992).

Figure 3.5 Legal Framework (Purwaka 1997).

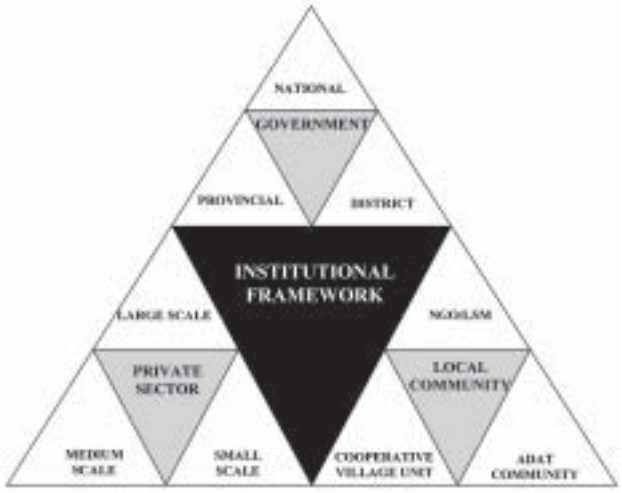


Figure 3.6 Institutional Framework (Purwaka 1997).

This management system is incorporated into the integrated management matrix (Figure 3.1). Activities within each cell of the matrix are carried out at specific times and places in accordance with the Spatial Planning Act No. 24, 1992. Interactions between activities within the matrix indicate overlapping jurisdictions and conflicts among stakeholders. Analysis of linear and responsive synergic interactions among fisheries management activities in the matrix will contribute to the development of community-based fisheries through the integration of legal (Figure 3.5) and institutional frameworks for fisheries management (Figure 3.6).

Planning and Organizing

Planning and organizing include the use of data and information for:

- Stock assessment;
- Resource allocation; and
- Determining the absorptive capacity and carrying capacity of living resources.

Data and information includes relevant facts from the integrated management matrix, the resource/community/market-based approaches, and the legal and institutional frameworks. Data and information at the national level are not complete. This has led to problems with planning as stock assessment, absorptive capacity, and resource use are likely to focus on fisheries. Human resources, community and market-based approaches are not considered in the planning and organizing process.

Local communities in the study areas have limited ability to plan as they do not have the capacity to undertake studies in stock assessment and absorptive capacity. If institutions at the national level want to incorporate the resource-based management approach, they will need to assist the local communities in working on these elements.

Actuating

Actuating is implementation of fisheries planning and consists of:

- Resource use;
- Production processes; and
- Marketing.

Planning at the national, local, and village levels stresses resource use. Community participation and institutional partnership arrangements in resource use, production, and marketing require a resource/community/market-based management approach. Interaction is required between fisheries issues and the law, institutions and society, and between fishers and other stakeholders. This is not currently taking place.

At the local and village levels, resource allocation and use is regulated by *adat* law and implemented for specific resources at a certain time and place. The *adat* law is transformed into a set of rules such as *sasi* and applied through a scheme of zones. These rules do not include regulations for production and marketing because for the most part they contain prohibitions and sanctions.

Controlling

Controlling activities are carried out through a system known as monitoring, control and surveillance (MCS):

- Monitoring focuses on changing patterns of fishing intensity so that overexploitation and resource degradation can be avoided;
- Controlling focuses on administrative relationships to distinguish between legal

and illegal fishing;
- Surveillance focuses on changes in activity, i.e., the movement of fishing vessels and pollution detection.

Since MCS is an integrated system, the three components should be carried out simultaneously.

The implementation of MCS will involve several institutions having this capability. At the national level, MCS in fisheries is still insufficient. Institutional cooperation, coordination, and integration are not yet well developed. Ameth Village of Nusa Laut Island has applied a traditional form of marine surveillance to avoid illegal activity in their territory. From the view point of an MCS program, it can be regarded as an example that could be integrated into the national system.

Integrating Efforts

Legal and institutional frameworks are capable of facilitating efforts to integrate the *adat* laws into the national legal system and to develop community-based marine fisheries management. However, these integrating efforts will take time and may be costly (Pomeroy and Williams 1994).

Conclusion

Integrated Coastal and Marine Resources Management

Responsibility for coastal and marine resources management in Indonesia is dispersed among various national government agencies. There is no single regulation that provides for a legal basis for promoting an integrated management system. Conflict between economic interests and environmental considerations has created problems in policy implementation. Each institution tends to focus on economic interests with less focus on principles of sustainable use. Even though environmental issues are considered, implementation of most policy tends to center on partial environmental protection. In order to maintain the principles of sustainable development, Indonesia needs to establish an integrated coastal and marine resources management system that promotes optimum sustainable use and environmental protection.

Establishing Integrated Policy

Indonesia needs to establish national laws integrating coastal and marine resources management. The principles of integration would confirm that coastal and marine resources be considered an integral part of the environment. Coastal and marine resources cannot be seen only from the perspective of economics. The exploitation of natural resources that focuses solely on economic interests will cause serious problems threatening sustainability. An integrated approach maintains resource availability for the benefit of the people and long-term economic development. This is crucial in light of the recent prediction that the Indonesian economy will remain dependent on natural resources for some time. The intense competition between local and international interests for natural resources will place local interests in a poor position because they lack capital, knowledge and technology. The competition between economic and environmental interests will lead to resource depletion and future generations will not have natural resources to support their livelihoods.

The principle of interdependence is based on a partnership approach. Coastal and marine resources management policy must be designed and implemented to encourage active participation of all stakeholders. This approach is extremely important in order for each stakeholder to make significant contributions in promoting sustainable development.

Decentralization

Decentralization is required to provide provincial and district governments with authority over coastal and marine resources management. Decentralization would ensure the interests of local communities are considered in the planning and implementation of policy. The management of coastal and marine resources is an integral part of regional development.

Improving Management Systems

Improved management is crucial because exploitation of coastal and marine resources has caused environmental degradation. Coastal and

marine resources are also threatened by negative impacts of land-based activities. The improvement of management systems needs to consider at least seven management issues:

- Data and information;
- Natural resources assessment;
- Natural resources allocation;
- Natural resources use and protection;
- Production process;
- Marketing; and
- Monitoring, control, and surveillance.

These issues need to be based on legal and institutional frameworks and have to include principles of integrated development.

Empowering Local Communities

Since more than 60% of the population live in coastal areas, local communities need to take an active role in protecting coastal and marine resources. Local communities have a legal right to use their resources and empowering them will ensure benefits accrue to their economy. The empowerment of local communities can be achieved by promoting community-based MCS based on traditional values.

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