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(Center for Coastal and Marine Resources Studies)

Gedung Marine Center Lt. 4, Fakultas Perikanan dan Ilmu Kelautan IPB

Kampus IPB Darmaga Bogor 16680 INDONESIA

Tel/Fax. 62-251-621086, Tel. 62-251-626380

e-mail: awan-uri@indo.net.id

Halaman muka: Pantai Sanur, Bali (foto: Bengen, D.G., 1998)

Kata Pengantar

Edisi kedua “**Jurnal Pengelolaan Sumberdaya Pesisir dan Lautan Indonesia**” kembali hadir dengan perubahan judul, yakni “**Pesisir & Lautan**”, menyusul edisi pertama yang terbit bulan Maret 1998 dengan desain yang lebih menarik.

Judul baru tersebut diharapkan akan lebih atraktif dan mudah diingat pembaca. Perubahan judul jurnal ini tidak mengubah tema dan tujuan jurnal, dimana masih membicarakan masalah-masalah yang berkaitan dengan pengelolaan sumberdaya pesisir dan lautan di Indonesia.

Penerbitan edisi kedua ini diharapkan akan lebih bermanfaat dan dapat membantu semua kalangan, terutama para pemerhati serta pihak-pihak yang peduli terhadap pelestarian serta pengelolaan sumberdaya pesisir dan lautan, sekaligus dapat berperan sebagai media informasi dalam mengulas permasalahan pengelolaan sumberdaya pesisir dan lautan.

Akhirnya saya ucapkan selamat membaca dan kontribusi serta saran-saran anda kami tunggu selalu.

Pemimpin Redak

Dr. Ir. Dietrich G. Bengen

Foreword

The second issue of “Jurnal Pengelolaan Sumberdaya Pesisir dan Lautan” was presented to you in different title: “Pesisir & Lautan” with better style, following the first issue in March 1998.

The new title was intended to make it more attractive and easily remembered by the readers. However the changing of the title doesn't effect the theme and objectives of the journal, which still within the issues related with coastal and marine resources management in Indonesia.

The second issue was aimed to make it more useful and helpful to all readers, observer and persons concerned with conservation and management of coastal and marine resources. It also doubles as information media in discussing management issue on coastal and marine resources.

Enjoy the reading of this issue and your comment, ideas and suggestions are most welcome.

Editor in Chief

Dr. Ir. Dietrich G. Bengen

IDENTIFICATION OF INDIGENOUS COASTAL FISHERIES MANAGEMENT (ICFM) SYSTEM IN SULAWESI, MALUKU AND IRIAN JAYA

VICTOR P.H. NIKIJULUW

Center for Agro Socio-Economic Research
Agency for Agricultural Research and Development, Bogor, Indonesia

ABSTRACT

This paper identifies and lists studies written on indigenous coastal fisheries management (ICFM). The objectives of this desk research were to describe the similarities and varieties of the existing ICFM and to synthesize their possible development as an alternative management system. A number of ICFM practices were found in Maluku, South and North Sulawesi, and Irian Jaya. Most of the practices are tied with customary law and organized by local communities and institutions. In a few cases, formal village government intervened to provide legal support to the systems. Factors that affect the establishment and existence of the systems were: belief and structure of society, types of rules and regulations, fishing intensity and technology, village government structure, and commodity price. Overall, the systems brought about positive impacts to their adherents. This specific resource management system is effective and efficient provided traditional rules and rights remain. The system also avoids resource utilization conflicts and provides more income to fishers. The system may serve as a basis to co-manage coastal fisheries.

Keywords: Coastal fisheries management, indigenous fisheries management, people participation.

ABSTRAK

Upaya mengidentifikasi dan mendokumentasikan sistem pengelolaan perikanan pantai yang dianut secara tradisional oleh penduduk lokal dilakukan di Maluku, Irian Jaya dan Sulawesi. Tujuannya adalah untuk mencari kesamaan dan perbedaan yang di atasnya dapat disintesakan suatu sistem pengelolaan pantai alternatif. Penelitian ini adalah kajian pustaka terhadap berbagai publikasi khususnya yang memiliki sirkulasi yang terbatas. Hasil kajian menunjukkan bahwa sistem tradisional ini dipraktekan di ketiga daerah penelitian. Peranan lembaga adat, pemimpin informal, masyarakat dan lembaga lokal sangat dominan dalam pelaksanaan aturan-aturan pengelolaan perikanan pantai. Di beberapa tempat, pemerintah ikut terlibat terutama dalam memberikan dukungan hukum bagi pelaksanaan peraturan-peraturan lokal. Faktor-faktor yang menopang dan mempengaruhi keberadaan sistem tradisional ini adalah kepercayaan dan struktur masyarakat, bentuk peraturan, intensitas dan teknologi penangkapan ikan, struktur pemerintahan desa, dan harga komoditas. Secara umum dapat dikatakan bahwa sistem tradisional ini memiliki dampak positif kepada masyarakat. Sistem tradisional ini dapat dikatakan efisien dan efektif karena sampai saat ini masih berlaku serta hampir tidak dijumpai pelanggaran. Selain itu, sistem ini dapat menghindari perselisihan dalam pemanfaatan sumberdaya serta memberikan pendapatan yang lebih baik bagi nelayan. Sistem tradisional ini dapat dijadikan dasar bagi pengembangan ko-manajemen perikanan pesisir yang melibatkan masyarakat dan pemerintah.

Keywords: Pengelolaan perikanan pantai, pengelolaan perikanan masyarakat pantai, partisipasi masyarakat.

INTRODUCTION

Indigenous management describes folk management systems based on local knowledge. The systems have existed in parts of Indonesia for centuries. Nevertheless, these important traditions have not been well documented and studied. Their documentation can be used, however, to improve the management of coastal resources.

Use of indigenous knowledge to improve coastal fisheries management is recognized in many developing countries. (Pomeroy, 1994). An approach to promote indigenous coastal fisheries management system is to integrate the system into regional or national management mechanisms. Integration may take place if the regional or national government legitimize the local traditional system. (Pomeroy and Williams, 1994) and is often referred to as cooperative management or co-management. (McGoodwin, 1992). Although Pomeroy and Williams (1994) argued that co-management is not a panacea for fisheries management, they listed its several advantages against centralized or a top-down approach.

The indigenous management approach relies on people participation. The need for participation in natural resource management is clearly stated in the Outline of the State Policy (GBHN). In the closing GBHN chapter it is mentioned that national development greatly depends on the active participation, attitude, commitment, spirit and enthusiasm of the society. Paragraph one of the Environmental Act No. 23/1997 also states that environmental management is an integrated effort that involves everyone. Paragraphs five and seven of the Act stipulate that everyone has the right to manage natural resources and the environment. The rights include decision making and the implementation of management systems. It also mentions (paragraph 10) that the government is responsible to embody, develop and promote management partnerships between government and society. Therefore, the GBHN and Environmental Act becomes solid ground for local participation in coastal resource management.

This study documents and synthesizes work undertaken on indigenous coastal fisheries management (ICFM) systems in Sulawesi, Maluku and Irian Jaya. The area has many island communities that rely on coastal fishery resources. The area has 226,000 fishing establishments, slightly more than the number of fishing companies in the rest of Indonesia. About 44 percent of Indonesian fishers live in the area. Although it has 54 percent of the Indonesian fishing fleet, the boats are smaller and less developed than boats in western Indonesia. Some 68 percent of the non-motorized boats are found in the area. Fisheries in Sulawesi, Maluku and Irian Jaya are therefore small-scale and concentrate on coastal waters.

This study documents previous ICFM studies, describes the systems and evaluates their impact on society, and synthesizes the main ideas of previous studies to form policy and recommendations.

METHODOLOGY

This desk research is based on papers on ICFM systems in Sulawesi, Maluku and Irian Jaya gathered from institutions in Jakarta, Bogor, Ujung Pandang and Ambon. This study was part of the Fisheries Co-management Project to document traditional fisheries management systems in Asia and Africa. The papers collected were summarized in English abstracts following a standardized format. The abstracts include the following information: title and author of article, source, publisher, year published, language, subject, objective, coverage, method of data collection and analysis, and summary of findings. The abstracts and collection of papers are archived with the Fisheries Co-management Project of the International Center for Living Aquatic Resource Management (ICLARM), Manila Philippines, and the North Sea Center, IFM, Hirtshals, Denmark.

Descriptive and comparative analyses were employed to discover the type, performance and impact of ICFM. Types of ICFM were grouped according to geographical area, the process of

ICFM operation, function and objective, local involvement, and commodity and method of resource exploitation. Synthesis of the articles was carried out to find conclusions and recommendations.

Forty one (41) documents were collected and analyzed. There were nine (22.0%) internal, unpublished reports, five (12.2%) government documents, four (9.8%) bachelor student theses, one (2.4%) master thesis, seven (17.1%) journal articles, three (7.3%) books, and 12 (29.9%) published reports. There were 37 (91.2%) Indonesian documents and four (9.8%) English documents.

Documents were selected through library catalogues using the following keywords: ICFM, fisheries management, traditional fisheries management, community-based fisheries management (CBFM), territorial use rights, marine (sea) tenure, and people or community participation. Priority was given to unpublished and locally published, limited-circulation documents.

RESULTS AND DISCUSSION

Types of ICFM by Area

North Sulawesi (Table 1), Irian Jaya (Table 2), and Maluku (Table 3) all had specific ICFM. The areas are either managed by village (Irian Jaya, Maluku), by clan (Irian Jaya), by tribe (Irian Jaya), by family (South Sulawesi) or by community (Maluku, North Sulawesi). Management implies that people have the right to access the area, extract benefit, protect the area and resource from other users, control future use through covenant, and transfer or convey ownership.

Regulated fishing or harvesting seasons is part of ICFM in Maluku and North Sulawesi (Nikijuluw, 1994a, 1994b, 1995a; Kissya, 1993; Wahyono et al. 1993). ICFM also regulates fishing gear, fishing method, fishing shedules, allowable catch, distribution of catch and origin of fishers. ICFM also covers rewards and sactions.

Regulated harvest seasons and times are found in Demta District, Jayapura, Irian Jaya to protect coral fish. Fish can only be caught on special occasions such as church ceremonies and cultural festivals (Imron, et al. 1993). *Tude* (*Selar umenothalmus*) fishing in Sangihe Talud, North Sulawesi is scheduled on every Monday, Wednesday and Saturday. *Tude* outside the ICFM boundary are driven into area close to the beach to mease capture (Wahyono, et al. 1994).

Government and fishers co-mamange fisheries in Ambon and Jayapura. In Latuhalat, Ambon the Ambon Mayor issued Decree No. 188.45.322/KMA on 23 April 1990 to protect village-based rules. The written rules cover fishing permits and licenses for village waters. The village waters boundaries were outlined in Village Decree No. 3/1990 (Masyuri, 1995). In Jayapura, Irian Jaya large companies must first recieve permission from community leaders before the Provincial or District Fisheries Service can issue a fishing permit (Ondoafi and Dewan Adat). If it is agreed to allow them to fish, they can then apply for a formal license from the Fisheries Service (Imron, et al 1993; Imron and Ali, 1994). Without a recommendation from the local community, Fisheries Services do not issue a fishing license although, by law, they are obliged to do so.

Organization

ICFM in Sulawesi, Maluku and Irian Jaya is vested in traditional authority, whose nature varies according to social organization. *Sasi* (customary practices that limit access to territory and/or resources) exists throughout Maluku and is organized by traditional but non-formal leaders. To place *sasi* on an area means to prohibit entry and behavior for a period of time (Lokollo, 1988).

The village head is normally the *sasi* organization leader. He is assisted by *kewang* (traditional village police) representing the village clans to implement and enforce *sasi*. The *kewang* consists of a leader and members (Nikijuluw,

1994b). Although enforcement is the responsibility of the *kewang*, villagers usually report violations.

Aside from village-managed *sasi*, the church also organizes *sasi* during certain times of the year (Lokollo, 1988). The church-managed *sasi* is led by church leaders but is not enforced by monitoring or penalties. Nevertheless, church-managed *sasi* seems to be effective, with little transgression.

ICFM in Irian Jaya and North Sulawesi is led by secular and church leaders (Table 1 and 2). The *Dewan Adat* (customary council) of clan heads, formal leaders and church leaders sets and implements ICFM rights and rules in Irian Jaya (Imron et al. 1993). In North Sulawesi, the village head, under the auspices of the village, council determines ICFM rules and rights. Implementation of these rules and rights is enforced by senior and experience fishers (Wahyono, et al. 1994).

In South Sulawesi, owners of *rumpon* (fish-aggregating device) control access to the waters around the *rumpon*. All neighboring villagers and fishers recognize this individual right (Saad, 1994) so the community becomes responsible for implementing the rights. All decision making is grounded in both written and unwritten customary law. Villagers patrol and control the ICFM areas and have the authority to drive poachers away. Conflicts between two fishers arising from resource utilization, the conflict may be solved with the help of their fellow fishers. Any unsolved cases in the field are brought to the head of ICFM organization. Although ICFM organization have veto rights, they must refer to the customary laws and often consult people to come up with fair and proper decisions. If the unsolved cases are criminal, they are brought to local police.

Rules And Rights

The words “rules” and “rights” are frequently used interchangeably in referring to utilization of fisheries resources. Basically, “rules” refer to the prescriptions that create authorization, while “rights” refer to particular actions that are authorized. “Rights” have complementary duties. Thus to possess a right implies

that someone else has a commensurate duty to observe this right (Schlager and Ostrom, 1993). In regard to fisheries resources, the most relevant operational-level property rights in utilization of coastal fisheries resources are “access” and “withdrawal” rights. They are defined as (1) “access right”, the right to enter a defined physical property; and (2) “Withdrawal right”, the right to obtain the “products” of a resource (e.g. catch fish). The collective-choice property rights include management, exclusion and alienation rights which are defined as follows: (1) “management right”, the right to regulate internal use patterns and transform the resource by making improvements; (2) “exclusion right, the right to determine who will have an access right and how that right may be transferred; and (3) alienation right, the right to sell or lease either or both “management” and “exclusion” rights.

In Teblasufa village, Jayapura, ownership of marine waters are divided into the waters belong to the village and free waters that are owned by everybody. The waters owned by the village are broken down into waters owned by a clan. There are three clans in the village, of which at the beginning Serontouw clan is the only owner of the village territorial waters. The ownership rights of this clan were once shared with the other clans due to inter-clan marriage. Hence currently each clan has its territorial waters. Ownership of each clan is further subdivided into sub-clan. Currently, there are 10 sub-clans that own village territorial waters (Imron and Ali, 1994)

People of Teblasufa have the access and withdrawal rights but they do not have collective-choice property rights. The management, exclusion and alienation rights are owned by the head of the clan (ondoafi). Ondoafi is the one who gives permission to a particular fisher if the latter is not a member of clan or sub-clan whose territorial waters are entered. The formal head of the village also has the right to provide permit for non-villagers to operate their fishing gears in the village territorial waters. However, in such circumstance, the head of the village should consult and have agreement

from three ondoafi in this village. Again, the ondoafi can veto a decision of the head of the village.

Beside issuing fishing permits, ondoafi also has the right to determine certain coral reef areas which should be closed from fishing at a particular period (Imron and Ali, 1994). This kind of ICFM is named *pele karang*, literally meaning to put a fence over a coral reef area. The objective of this ICFM is to let fish grow until they reach capturable size. The rule related to this ICFM is that villagers are prohibited to enter this area during the closed season. The time of fishing is always connected with the needs to finance a village program such as inauguration of the church, building public property, or village festival. Hence, it can be said villagers individually do not have withdrawal right in this coral reef area.

Similar to Teblasufa village, territorial waters of Endokisi Village, Jayapura, are also possessed by clans. "Demena" is the biggest clan in terms of the clan territorial waters. It is the first clan that stayed by the sea and hence relied on the sea resources for their living. The clan of Demena was recognized as the first owner of the village territorial waters. By intermarriage with other clans, however, the ownership of the village territorial waters is then shared to three other clans, namely "Mattiseray", "Nerokepoaw", and "Kereway". Therefore, the territorial waters of Endokisi village are currently owned by four clans (Imron, et al. 1993).

Each clan can catch fish in their own territorial waters. However, members of a particular clan can catch fish in other clan-owned areas provided that they use simple fishing gears such as hook line and spear. Use of more modern fishing gears for commercial purposes should be preceded by a getting permit from Dewan Adat. In practice, the council should have asked agreement first from members of the clan whose area will be entered. Therefore, it can be said that the exclusion right is entertained by members of the clan.

In implementing access and withdrawal rights, villagers of Endokisi passed rules on penalties to violators. The penalties currently applied include fine and warning. Use of poison in fishing is strictly

prohibited. Therefore, it can be said that villagers also hold management right over the resources. Therefore, of the three collective-choice property rights, only right of management which is executed by villagers. The rights of exclusion and management are owned by ondoafi and Dewan Adat.

In coastal villages in Maluku, communities claim that they have access and withdrawal rights over the waters facing their village. Villagers and their leaders together set rules and regulations. Basically, the rules and regulations have existed for decades. What is existing now are modification of the ones that were made during the pre-colonial era. For instance, the amount fines for certain violations were adjusted to present value. The rules include how, when, and where to harvest or collect the resources. In addition, there are also penalty systems for breaking the rules.

Under *sasi* system, most communities entertain both operational level property rights (rights of access and withdrawal) and collective-choice property rights (rights of management, exclusion, and alienation). The right of management is embodied in forms of common consent on the fishing time, area opened to fishing, allowed and disallowed fishing gears and equipment, and allowable catch. There are also rules on environmental protection such as banning coral head-taking. Execution of management rights is undertaken by village police named *kewang* whose members normally are representatives of each clan. *Kewang* has its own rules and organization (Lokollo, 1988). This institution may not be a part of the formal village government structure. In this case, *kewang* is under the control of and responsible to villagers and customary leaders. The village head is usually appointed or chosen from informal leaders.

The right of exclusion is entertained in forms of giving permit to non-villagers to enter village territorial waters. In some villages, non-villagers may fish in the villager territorial waters or enter the *sasi* area without having a permit if they fish for home consumption and use the same fishing gears as owned and used by villagers. If non-villagers catch fish using

commercial fishing gears, they should have a permit from the village. In the last ten years, non-villagers who have permit to enter and fish in *sasi* areas came from other provinces of Indonesia, especially from East Java and South Sulawesi (Nikijuluw, 1995a).

Rights of giving to or sharing a fishing permit with non-villagers which is owned by villagers is made through community meetings. However, it is a common now that sharing, selling or leasing of rights to enter and exploit the resources is taken over by the formal village government. The village government often passes formal village rules regarding this aspect. In other words, community consultation is left out (Nikijuluw, 1995a).

Especially in Christian villages, there is also a tendency of transferring collective-choice property rights from villagers and village government to church organizations. In this regard, the church, through the pastors, elders, and deacons is the one which stipulates the rules of harvesting or exploiting resources. In this church-organized *sasi*, there is no *kewang* patrol. Nevertheless, this *sasi* system seems to be very efficient since there are no violations. Some percentages of harvests or fish landings of villagers must be given to the church organization. Normally, the money is used for church construction and renovation (Lokollo, 1988; Nikijuluw, 1995a)

Bebalang village is located at Manganitu, Sangihe Talaud. Residents of this village have access to certain fishing grounds near their place to catch *malalugis* fish. The rule which is specified in catching *malalugis* fish is that fishers should use bamboo trap, locally named "seke". The seke is owned collectively by villagers. In 1991, there were two units of seke in Bebalang. The first seke is owned by those staying in hamlets number one and two. The other is owned by those in hamlet number three. Aside from seke, other small-scale fishing gears such as hook and line were also employed by villagers but not for catching *malalugis* fish (Adhuri, 1993; Wahyono, et al. 1991)

People of Bebalang manage waters where *malalugis* fish are found by carrying out regular

monitoring and surveillance. If they find non-villagers in this waters, they drive the outsiders away. If non-villagers are found to have caught many fish, they are detained and judged by villagers. Villagers have exclusion and alienation rights. By common consent, they specify rules that permit outsiders to fish. In order to have the rights of fishing, non villagers should pay a certain amount of fee and are obliged to use simple fishing gears.

The use of seke to catch *malalugis* fish is also found in Para Village, Sangihe Talaud. In this village, however, seke competes with small purse seines to catch the same species. In 1992, there were six units of seke and 42 small purse seines in Para village. Seke is owned communally, while the small purse seines are owned by individual fisher. Since seke and small purse seines have the same target catch, the location and time for the operation of these two fishing gears are regulated by the head of the village. Fishing grounds for each gear is set so as to be separated from each other. The schedule for fishing is rotated and arranged so that every fisher has a chance to operate his gear in different fishing grounds. It has been enacted by the head of the village that only four seke can be operated per day. Therefore, each seke can be operated four times a week or about 16 times a month. There are 18 locations of fishing grounds that are designated to be used by small purse seines. There are 18 purse seines that can be operated per day. Since Sunday is an off day, on the average, every small purse seine can be operated 10 times a month. The rules of this fishing schedule is very efficient since there is almost no trespassing. The village government enacted penalties for the violation of the rules. Each violator should pay 5-10 bags of cement which are used in building public infrastructures in the village. Based on this information, one may infer that although fishers have access and withdrawal rights, they do not have the rights of resource management (Wahyono, et al. 1993).

In Bulukumba, South Sulawesi, ICFM exists for the exploitation of fish resources in *rumpon*. Rights of fishing around waters where *rumpon* is placed is owned by the owner of *rumpon*. The area covered

by each rumpon is about 10,000 meter square. The fishing gear is small a purse-seine. Other fishers are allowed to fish in rumpon as long as they use hook and line. The right to use the waters around rumpon can be bequeathed, although the rumpon itself has been destroyed. In this case, fishers should know the location of rumpon. If other fishers want to install another rumpon or use the existing one, they should ask permit (without any payment) from the previous owner (Saad, 1994). Deployment of a new rumpon by a new owner automatically undermines the rights owned by the previous rumpon owner. Hence, deployment of rumpon creates the rights of access and withdrawal for the owner. The owner himself who has the rights of exclusion and alienation.

Factors Determining Establishment, Existence and Devolution of ICFM

The following factors are identified to affect the establishment, existence and devolution of ICFM:

(a) Belief

ICFM on malulugis fish in Bebalang village in North Sulawesi is still going on because villagers believe that the fish is the playmate of the Prince of the Sea (Prince of Adang). Hence this fish should be carefully captured so that its environment will not be destroyed. Villagers of Bebalang, therefore, use bamboo trap (seke) to catch the fish. As seke is a passive gear, the environment apparently will not be destroyed (Adhuri, 1993; Wahyono et al. 1991).

(b) Availability of rules

Availability of rules (written or unwritten) affects the existence of ICFM. Rules regarding entry of fishers do not allow outsiders to join the fishery (Nikijuluw, 1994b, 1995a; Imron, et al. 1993). Rules about fishing season and fishing area specify fishers to fish at a particular time and place (Wahyono et al. 1993, 1994, Nirahua et al. 1991). In Irian Jaya, Maluku, South and North Sulawesi, only permitted outsiders can join the fishery. In Maluku, outsiders can pay for

a fishing license or they should pay village retribution on the basis of the fish they catch (Nirahua et al 1991). A rule of allowable catch was found in Ternate, North Maluku. The amount of catch was determined before fishers go to sea. If the catch was more than that allowed, fishers were penalized for the excess catch. The penalties, however, were not specified. (Nirahua, 1991). Monitoring, controlling, and surveillance (MCS) guarantee proper implementation of the rules. Community MCS was found in Maluku, Irian Jaya, and North Sulawesi. The availability of penalty and local judicial systems on rule violation could be included as factors that affect the existence of and continuity of ICFM.

(c) Fishing Gears

Generally, villagers in Maluku still use simple fishing gear to catch fish in ICFM-managed waters. These gears can not harm resources and their environment. If non-villagers are allowed to fish, they should also use the same fishing gears as employed by villagers (Nikijuluw, 1995a, 1995b; Titahelu, 1996). The same condition also prevails in Irian Jaya. If fishers from one clan want to fish in the waters owned by other clan, they must use the same fishing gears (Imron, et al. 1993). Use of ring net or purse seine made of nylon fibers in North Sulawesi affects the implementation of ICFM in the capture of malulugis fish. The presence of ring net, which is in fact more productive and owned by individual fishers prompted traditional bamboo trap fishers to move away from fishing activity. The fish which were formerly caught by using bamboo trap is currently also exploited by ring net fishers. Fishing schedule and zonation of fishing ground were finally programmed in order to avoid possible gear use conflict (Adhuri, 1993, Wahyono et al. 1993, 1994).

(d) Industrial Fisheries and Intensive Fishing Operation

The increase of industrial fisheries considerably affected ICFM, especially sasi system in Ambon and Saparua islands. In Baturah, a village near to Ambon City, the sasi activity no longer exists.

The placement of coconut leaves as sasi sign of closed fishing season have disappeared since last decade (Lokollo, 1988). Batumerah village is now an industrial fishing base in Ambon.

Similarly, operation of joint venture fishing company using deep sea FAD in Maluku waters has affected the availability of fish in sasi-managed waters. As a result, the productivity of local fishers sharply declined and eventually fishers encroached on sasi-managed waters to collect and catch sedentary species. Another impact was that closing the season for some fish in sasi-managed waters was shortened so that villagers could have alternative income (Andamari, et al. 1991; Nikijuluw, 1994b).

In Kei Kecil, Southeast Maluku, villagers leased their sea territory to outsiders to be used for pearl culture. Antariksa (1995) reported that the costs of leasing the territory in Debut Village was Rp 10 million for 20 years. In Teblasufa, Irian Jaya, intensive gear operation obscured the boundaries of waters owned by clans and sub-clans (Imron and Ali, 1994).

(e) Change of Government Structure

ICFM existed in coastal villages in North Maluku during the era of the Ternate Kingdom. Before going out for fishing, fishers got permission from the king of Ternate. After the proclamation of independence of the Republic of Indonesia, the Ternate Kingdom no longer existed and as a result the ICFM practice vanished in some villages (Lokollo, 1988).

Sasi system in Maluku was essentially nested in a type of village governmental system. According to that system, the head of the village was not government official. He was a formal leader, but at the same time acted as a customary leader. The structure of village government was unique for each village, depending on number of clan and population. Village police or guard (kewang) was placed as one of the functional institutions in the village government system. In other words, the structure of village governmental

system granted the existence of sasi system (Lokollo, 1988). However since Law No. 5/1974 on the Local Government was passed, all villages in Indonesia, including Maluku, had a standard governmental structure. By this law, a village head could come from another place and as such he is not a customary leader. This caused sasi to disappear in some areas.

(f) Recognition and Initiative of Government

In several cases, recognition of ICFM by government allowed ICFM to survive. In Latuhalat village in Ambon, local rules of ICFM were legitimized by the Ambon Mayor Decision No. 188.45.322/KMA dated on 23 April 1980 (Masyuri, 1995). Nikijuluw (1995a) points out that each sasi regulation made by village government in Central Maluku should be legitimized and countersigned by the regent before its implementation.

(g) Trade and Price

In Bantean, North Sulawesi, ICFM on collection of milk fish fry was established because of coming of outsiders to fish in Bantean and villager's realization that collection of fry was a lucrative enterprise. When milk fish fry was low, coming of outsiders to Bantean was not of concern to villagers. However, conflicts between villagers and outsiders arose once the villagers realized that fry had a good price. Finally, outsiders were banned to enter milk fish fry collecting ground. Villagers then stipulated the rules on the use of fry-aggregating device in fry collection.

In Saparua island, ICFM on sea cucumber and trochus resources were strongly influenced by trade. Increases of sea cucumber price and availability of traders in the village, shortened the period of closed season. Traders came from as far as Java to buy sea cucumber and gave a higher price. As a consequence, resources became heavily exploited as shown by declining size of sea cucumber harvested (Nikijuluw, 1994b). High demand for sea cucumber in Java brought fishers

from East Java to seek this commodity in sasi-managed areas. In some villages, the right of exploit this commodity was leased to East Java fishers. Within a very short period, sea cucumber resources were exploited by using better equipment. Since the East Java fishers were not the resource owners, they did not concern themselves with environmental and resource sustainability (Nikijuluw, 1995a).

Social Structure ICFM is easily established and sustained in areas where villagers come from similar backgrounds. ICFM exists in many places in Maluku and Irian Jaya because the social structures of villages have similar origins, religion and economic status. Impact of ICFM almost all references in the study dealt with only descriptions of ICFM systems, leaving little information on the impact of ICFM on society. Nevertheless, some qualitative information was utilized.

In some villages in Maluku, ICFM provided opportunity for villagers to exploit fisheries resources for their domestic needs. However, in some other villages, the leasing of fishing or exploiting rights to outsiders decreased the local people chance to use the resources. The leasing fee were normally said to be used by village government for public purpose. From the individual fisher viewpoint, however, this situation brought negative impacts due to loss of income.

In the villages where rights of utilizing the resources are still owned by villagers, the implementation of ICFM results in better income. Letelay (1993) found in Babar islands of Southeast Maluku that implementation of temporary closed season could increase annual income of fishers. In Haruku village of Maluku, 92.5% of villagers admitted their satisfaction of ICFM as it increased their annual income (de Kock 1992).

Positive impact of ICFM implementation was also perceived by people in North Sulawesi. The landings of seke were distributed proportionally to all villagers. This could be done because seke is collectively owned by villagers. From a sustainability viewpoint, the

ICFM on the use of seke to catch malalugis fish did not harm the fish resource and therefore guaranteed continuity of resource utilization.

Villagers in Irian Jaya use very simple fishing gears to exploit ICFM-managed waters. The distribution impact to villagers were very clear since each clan or sub-clan has its own territorial waters. In South Sulawesi, impact of ICFM to the villagers was shown by increasing income and less pressure on the resources.

Although there are few cases of diversion of ICFM rules so that the utilization of resources biased against villagers, overall one could witness that villagers still obey the rules. In other words, this local traditional system remains important as it effectively guides villagers to use the resources. The cases of rule breaking are minimal and mostly done by outsiders or in-migrants. In the villages where ICFM implementation is a part of religious organization activities, the rules of ICFM are apparently strictly obeyed.

The existence of ICFM is local specific. At local level, however, it is successfully implemented. Hence the existence of ICFM which is organized by local traditional institution has been able to replace the tasks of national and provincial governments in the management of coastal fisheries resources. Despite it is not estimated yet, the replacement of a centrally- and officially planned management by an ICFM may lower the costs implementation such as costs of personnel and infrastructures. Combining these low administrative costs components with higher income earned by villagers, it can be concluded that the implementation of ICFM is economically efficient.

CONCLUSIONS AND IMPLICATIONS

Articles collected for this review were only confined to the provinces North and South Sulawesi, Maluku, and Irian Jaya. The area covered in each province were also limited to a few villages or localities. Except for Maluku, information of ICFM for other provinces were difficult to find. There are two possibilities why little information on ICFM is

available. The first is that the ICFM practice does not exist. The second is that although ICFM practice exists, there are no studies or efforts to document the system. Priority, therefore, should be given to conduct documentation and inventory of ICFM in the all provinces.

The studies referred to and reviewed in this report were much concerned with describing of the ICFM system. As the first step of research, the description of ICFM system in each area is indeed very important. However, since ICFM is now getting greater attention and thought as a panacea for fisheries resource management failure, the impact of ICFM should be clearly understood. Research should be directed to evaluating the impact of ICFM to stakeholders and society. It is also important to understand sustainability of the resources managed under a ICFM system.

Comparative studies of ICFM in different areas should be undertaken in order to find out contextual factors which determine each system. Based on this information, transferability of the ICFM could be established into the areas where traditionally no ICFM are found or into the areas where ICFM once existed but has vanished.

ICFM is a local management approach. It is unique in the sense that the same system may not be found in other areas. At national level, therefore, ICFM could be at odds with the national resource management policy. Hence, a nationwide study should be carried out to evaluate the appropriateness of the ICFM approach with national policy, regulation, law enforcement, and judicial system. Finally, the impact of ICFM to fisheries sector development should be also evaluated, particularly in the aspect of macroeconomics issues such as investment, trade, and employment.

ICFM could be regarded as the stepping stone for the government to increase people participation in resource management. Although people participation in development of all sectors have been enacted in GBHN, in reality people participation does not fully exist. Since development in Sulawesi, Maluku, and Irian Jaya are currently being promoted, ICFM in this part of the country may become a basis

for people participation in overall development program. In other words, from management of resources, local people could broaden their participation to cover areas of economic and community development other than fisheries and coastal zone management.

This study found that ICFM systems may survive and function better if the system could be tied with government. The intervention of formal government into ICFM could be in the form of providing legal support to ICFM. Local rules would be more respected if they are nested with formal rules and regulations. It could be also said that village-based rules need to be legitimized. If legal support can be provided by the government, the type of management regime will be co-management by which local people and government share their responsibilities and authorities.

Most enduring and successful ICFM exist in villages whose social and cultural identity is well established. When this identity becomes unclear, for instance due to in-migration, ICFM tended to gradually vanish. Based on these findings, government should be able to control resettlement programs which do not affect the identity of local people. Conversely, resettlement or regional development should enrich local identity. In a similar manner, fisheries development, through provision of credit scheme or revolving fund, should not radically change fisheries resource use pattern.

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Table 1. Selected ICFM Systems in North and South Sulawesi

Site	Management Area	Institution Responsible	Management Role of Community
Bebalang Island, Sangihe Talaud	Small Pelagic fishing ground	Local communities with support of village government	Determining bamboo trap (seke) is the only gear to catch small-pelagic fish, especially malalugis fish. Outsiders are allowed to fish if they pay fees and use simple net. Villagers regularly patrol the management area, detain and judge the poachers (Adhuri, 1993. Wahyono et, al. 1991).
Salurang Village, Sangihe Talaud.	Coastal areas up to 2 miles from the shore.	Groups of experience fishers (tonaas) and villagers	Determining schedule to catch tude fish (Selar umenophthalmus) every Monday, Wednesday and Saturday. Tonaas determine the total allowable catch and the length of fishing hours. (Wahyono et, al. 1993, 1994).
Para Village, Sangihe Talaud	Village waters destined for small pelagic fishing	Village government and local people	Determining bamboo trap (seke) and small purse seine (soma tatenda) as the allowed gears and their respective fishing grounds. Fishing operations are scheduled four times a week for every trap and 10 times a month for every seine. A penalty system is applied. Since trap is collectively owned by the households association, the catch is fairly shared among the members. Seine is owned by individual fisher. (Wahyono et al, 1993).
Bantean Village, Sangihe Talaud	Waters used for milk fish fry collection	Local community	Marine tenure system was established in 1995. As price of milk fish fry increased, many outsiders came to collect fry in the village. Competition between local fishers and outsiders lead to the banning of the outsiders. Regulation to place fry-aggregating device was established. The waters around fry-aggregating device are exclusive areas to the owner of the device (Wahyono et. Al. 1994).
Bentengge Village, Bulukumba, South Sulawesi	Waters around floating fish-aggregating device (rumpon), approximating 10,000 meter square	Local community	Determining waters around rumpon as a territorial fishing right of the rumpon owner. The right can be bequeathed although rumpon has been already destroyed. If the waters around rumpon are no longer used, other fishers who want to deploy new rumpon in the same side should get approval from the previous owner (Saad, 1994)

Table 2. Selected ICFM Practices in Irian Jaya.

Site	Management Area	Institution Responsible	Management Role of Community
Endokisi Village, Jayapura	Coastal waters areas up to the reef drop-off	Customary council (Dewan Adat) consisting of clan leaders (Ondoafi), church and formal leaders	Determining boundaries of the territorial waters for each clan, type of the allowed fishing gears, and issuing fishing permit to outsiders. Member of particular clan can fish in the areas belonged to other clans as long as simple gears such as hook-line and spear are used. Gradual sanctions (warning and fines) are applied to the violators. (Imron, et al. 1993; Adhuri, 1993).
Teblasufa Village, Jayapura	Coastal waters facing the village	Clan leaders (<i>Ondoafi</i>) and formal village leaders.	Village territorial waters is shared to three clans and further divided into 10 sub-clans. There are also opened waters accessible to all villagers. Outsiders, however, should have permit from village leaders and approval from <i>ondoafi</i> (Imron and Ali, 1994)
	Specific coral reef areas known as "pele karang" means putting fences over certain reef areas		Prohibition to fish at coral reef areas. Fishing season is opened once a year coinciding with village festivals, or inauguration of church or other important public facilities. (Imron and Ali, 1994)
Tanjung Barari Village,	Coastal waters up to the reef drop-off and mangrove forest	Villagers and Environmental Section of Village Parliament (LKMD)	Territorial use rights in fisheries are owned by villagers. Outsiders can only enter the waters if they have permit by Rp 5,000 per fishing trip. If outsiders stay in the village for one season, the payment is Rp 50,000 per month. Blast and cyanide fishing are strictly prohibited. Mangrove trees can be cut for household use only. Progressive sanction is applied, starting form warning to confiscation. (Nikijuluw, 1995b).
Amini Village, Biak	Coastal waters up to the reef drop-off.	Local community	Prohibition to use blast fishing and other destructive gears. Outsiders are not allowed to collect coral commodities (crustacean and mollusk) but permitted to catch finfish (Nikijuluw, 1995b)
Waromi Village, Biak	Coastal waters up the reef drop-off	Local community and village government	Villagers have territorial use rights in fisheries. Village leader can issue license to outside fishers. The license fee is voluntarily paid. (Nikijuluw, 1995b)

Table 3. Selected ICFM (Sasi) Practices in Maluku

Site	Management Role of Community
<p>North Maluku.</p> <p>Sample Areas: Ternate, Sidangole, Tidore, and Galela Districts.</p> <p>Referred article: Nirahua et al. (1991)</p>	<ul style="list-style-type: none"> * The perception of people in the North Maluku about sea and its resources is that the things are endowments of God. Hence they should be properly utilized. The "lalohe" ceremony is carried out to ask God for more fish if people experience a decline catch. * In most villages in Ternate, fishing permit is issued by chief of clan (fanyira). The territorial waters of each village is determined by the King of the Ternate Sultanate. The allowed fishing gear is hook-and-line. The amount catch should be determined before going out for fishing. A 10% of value of the landings should be paid as village tax to the village government. * Fuso and Siboboso Game are the terms used in Ternate and Sidangole, respectively, to denote the season where all fishing activities are stopped temporally. * Mangrove forests are protected in Tobelo and Galela districts because edible shells are found in the forests. * In Tobelo and Galela, villagers individually build bamboo rafts and bridges covered with coconut leaves which function as fish-aggregating devices (FADs). The waters around the FADs are the territorial use rights of the owners.
<p>Central Maluku</p> <p>Sample Areas: Nolloth, Haruku, Siri Sori, Paperu, Amahai</p> <p>Referred articles: Abdussomad <i>et.al.</i>(1994), Nirahua <i>et.al.</i>1991) Nikijuluw (1994a, 1994b, 1995a).</p>	<ul style="list-style-type: none"> * The rules of sasi deal with stipulation on types of allowed and disallowed fishing gears and methods, kinds of managed species, length of opened and closed seasons, and boundaries of managed areas. * Each village has its own penalty system. The penalties range from fine, gear confiscation, admission of guilt before God, public shaming, and doing social works. * Fishing rights are owned by individual and/or communities. In some villages, the rights can be transferred to individual fishers who may come from outside. * The rules and rights are written, but most unwritten. * Implementation and enforcement of sasi rules and regulations are
<p>Southeast Maluku</p> <p>Sample Areas: Kecil Kecil,, Babar islands</p> <p>Referred articles: Rahail (1993). Nirahua <i>et.al.</i>(1991). Antariksa, (1995). Letelay (1993)</p>	<ul style="list-style-type: none"> * People in Key island, perceive that sea is inundated land. Hence land and sea are not separated against each other. People establish rules on the utilization of marine living resources. The rules cover the aspects fishing ground, season, gear, and the penalty to trespassers. Resources whose harvested are regulated are shells and sedentary species such as sea cucumber. * A violation of any rules is regarded as a sin. Therefore a penalty system is imposed in a way that the relationship between God, society and violators is renewed. * Some villages rent their territory to outsiders to be used for marine culture.

Table 3. Selected ICFM (Sasi) Practices in Maluku

Site	Management Role of Community
<p>Ambon Municipality</p> <p>Sample Areas: Latuhalat</p> <p>Referred articles: Masyuri, (1995)</p>	<ul style="list-style-type: none">* Village territorial waters (petuanang laut) are opened to outside fishers who use hook and spear. Outside fishers can apply to village government for the use of other fishing gears. The application can be rejected if the target fish are limited available.* The fees of fishing permit are formally stipulated on the village decree which are countersigned by the Major.* Villagers may use all the fishing gears which are not destructive.

Table 1. Selected ICFM Systems in North and South Sulawesi

Site	Management Area	Institution Responsible	Management Role of Community
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Salurang Village, Sangihe Talaud.	Coastal areas up to 2 miles from the shore.	Groups of experience fishers (tonaas) and villagers	Determining schedule to catch tude fish (Selar umenophthalmus) every Monday, Wednesday and Saturday. Tonaas determine the total allowable catch and the length of fishing hours. (Wahyono et, al. 1993, 1994).
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Bantean Village, Sangihe Talaud	Waters used for milk fish fry collection	Local community	Marine tenure system was established in 1995. As price of milk fish fry increased, many outsiders came to collect fry in the village. Competition between local fishers and outsiders lead to the banning of the outsiders. Regulation to place fry-aggregating device was established. The waters around fry-aggregating device are exclusive areas to the owner of the device (Wahyono et. Al. 1994).
Bentengge Village, Bulukumba, South Sulawesi	Waters around floating fish-aggregating device (rumpon), approximating 10,000 meter square	Local community	Determining waters around rumpon as a territorial fishing right of the rumpon owner. The right can be bequeathed although rumpon has been already destroyed. If the waters around rumpon are no longer used, other fishers who want to deploy new rumpon in the same side should get approval from the previous owner (Saad, 1994)

Sasi Lola (Trochus niloticus)
IN THE KEI ISLANDS, MOLUCCAS:
AN ENDANGERED COASTAL RESOURCE MANAGEMENT
TRADITION

Craig C. Thorburn
Department of Geography
University of California, Los Angeles

ABSTRACT

S*asi*, the spatial and temporal closure of groves, forests, coral reefs and fishing grounds, is a traditional feature of many Moluccan societies. Despite increasing domestic and international awareness and praise of this “indigenous resource conservation technology,” the institution is in decline in many parts of the Moluccas. On many islands it is no longer practiced at all. This study examines the practice of managing topshell (*Trochus niloticus*, Indonesian: *lola*) harvests in villages on the eastern coast of Kei Besar in the District of Southeast Moluccas. Topshell is an important source of cash income for Kei villagers and, until recently, for the district government. Since 1987, topshell has been classified as a protected species in Indonesia. Numerous subsequent regulations have been issued to regulate the cultivation, harvest and transport of this and other protected species.

The author posits that erratic and uneven enforcement of the regulations, combined with collusion and self-interest on the part of various parties, threaten both the resource and the institutions that have successfully and sustainably managed them in this region. Furthermore, the protected classification precludes the establishment of sensible, mutually beneficial comanagement systems that could serve the interests and employ the inherent wisdom and capabilities of local communities, traders and government agents.

Keywords: *Trochus*, coral reef, *Sasi*

ABSTRACT

Sasi adalah suatu sistem penutupan akses (oleh siapapun juga) ke kawasan hutan, padang rumput, terumbu karang dan daerah penangkapan ikan (termasuk sungai dan muaranya) yang bersifat sementara waktu dan untuk suatu wilayah tertentu saja. *Sasi* merupakan ciri khas tradisional sebagian masyarakat di kepulauan Moluccas. Kesadaran akan keberadaan *Sasi* dan penghargaan atas manfaatnya semakin meningkat, baik dalam kancah Nasional maupun ruang-lingkup Internasional. Namun demikian, kelembagaan *Sasi* sebagai teknologi konservasi sumberdaya alam yang asli berkembang di daerah, sayang sekali semakin lama semakin menyusut di keseluruhan Propinsi Seribu Pulau ini. Bahkan di beberapa pulau, kelembagaan *Sasi* tidak lagi dipraktekkan. Penelitian ini membahas tentang penerapan *Sasi* pada pengelolaan pemanenan Lola (Topshell, *Trochus niloticus*) pada desa-desa di bagian pantai Timur Pulau Kei Besar, Kabupaten Moluccas Tenggara. Lola merupakan salah satu dari pendapatan utama bagi penduduk Kei hingga kini, dan bagi pendapatan daerah Kabupaten Moluccas Tenggara. Namun sejak tahun 1987, *T. niloticus* telah ditetapkan sebagai jenis yang dilindungi di Indonesia sehingga sejumlah besar peraturan telah dikeluarkan untuk mengatur budidaya, pemanenan, dan pengiriman satwa ini dan spesies lain yang dilindungi.

Penulis beranggapan bahwa penerapan hukum dan peraturan yang tidak konsisten serta “pilih kasih”, digabungkan dengan kolusi (persekongkolan) serta kepentingan pribadi dari berbagai kelompok yang terlibat di dalamnya, secara bersama-sama telah mengancam kelestarian baik kelembagaan *Sasi* maupun flora-fauna yang dikelola dengan berhasil

dan secara berkesinambungan di wilayah ini. Lebih lanjut, dalam klasifikasi flora dan fauna yang dilindungi tersebut, tidak tercantum hal-hal yang berkaitan dengan keberadaan dan pengembangan sistem pengelolaan bersama yang wajar, dapat dilaksanakan serta saling menguntungkan dimana sistem ini mampu memenuhi kepentingan pihak-pihak terkait dan menerapkan kebijakan yang berlaku dalam masyarakat setempat, instansi pemerintah sesuai dengan kemampuan masyarakat setempat, pedagang dan industri serta instansi pemerintah.

Keywords: *Trochus*, Terumbu karang, *Sasi*

INTRODUCTION

As the social and environmental costs of centrally-planned and managed economic and regional development models become increasingly apparent, a diverse assemblage of scholars and practitioners, including anthropologists, sociologists, economists, conservation biologists, pharmaceutical researchers, “ethnobotanists,” have noted the high coincidence of biodiversity-rich zones with traditional communities, and have embarked on the serious study of rural and indigenous peoples’ ecological knowledge and resource management systems (Dove 1986; Alcorn 1995; Brookfield and Padoch 1994; Redford and Padoch 1992; Brush and Stabinski 1996; Cadgil, Berkes, and Folke 1993; Colchester 1994; Pawluck, Sandor, and Tabor 1989). Many scholars believe that a possible means of mitigating or averting accelerating loss of biodiversity, while at the same time fostering more equitable development, lies in understanding the social and intellectual dimensions of natural resource use by native peoples. Local, indigenous or situational knowledge is gaining voice within development and conservation discourses (Peet and Watts 1996).

From Indonesia, and particularly the province of Moluccas, *Sasi* has become an internationally-celebrated indigenous people’s conservation technique (E. Salim, in Kissya 1995). *Sasi* is described by Zerner (1994:1020) as “a varied family of customary practices and laws (or rules) which establish limitation to access to individually or collectively controlled territory and/or resources. To place *Sasi* on an area means to put into effect a time-limited prohibition on entry and behavior within the area.” Notwithstanding the interest and praise of international scholars and conservationists, *Sasi* in Moluccas is generally in

decline. As long ago as the early 1960s, Cooley (1962) lamented the demise of Ambonese *adat* traditions and institutions. Recent research by ICLARM (in press) indicates that there have been two distinct periods of widespread disappearance of *Sasi* practice in Central Moluccas: during the 1970s and again in the 1990s. Conversely, a revival might be afoot, as a growing number of communities and local and regional officials show renewed interest in this venerable institution.

Sasi and other *adat* practices are still more widely employed in Southeast Moluccas than in other parts of the province. This article examines *Sasi* controls on the harvest of Topshell (*Trochus niloticus*, Indonesian: *Lola*) snails in villages in Kei Besar. *Sasi* is still practiced in most villages in that region, although the *lola* trade, and village *sasi* as well, have been complicated by a number of ministerial regulations governing the harvest, trade and transport of this and other protected species.

The article examines an historical conflict between two neighboring villages, helping to underscore the central role of this commodity in local history and politics, and then reviews recent developments affecting the harvest, trade and cultivation of the species in Kei, suggesting that current trends spell eventual disaster for the resource as well as the communities who depend on it for a significant portion of their income.

METHODOLOGY

This survey was conducted as part of the author’s Ph.D. dissertation research in the field of cultural geography between November 1997 and April 1998. Methods included collecting and analyzing relevant regulations, policy documents and research papers from Indonesian government

agencies including PHPA, LIPI, Bangda and Bappeda, followed by unstructured and semistructured interviews with villagers, village government leaders, *adat* functionaries, traders and regional government officials in the villages of Ohoirenan and Ohoiwait, and towns of Elat, Tual and Ambon. Additionally, the research included participant observation during the *lola* harvest in Ohoirenan in December 1997.

RESULTS AND DISCUSSION

The Kei Islands

The Kei Islands in Southeast Moluccas comprise three main islands - Kei Kecil, Kei Besar, and Dullah, the site of the Southeast Moluccas administrative capital, Tual. There are more than 100 small islands scattered across the shallow seas to the north and west of the three main islands. Tual is located 528 kilometers southeast of Ambon, the provincial capital, and thousands of kilometers away from Jakarta. The total population of the islands is about 106,000.

Kei's local economy is a mixture of subsistence agriculture and fishing, with copra and *lola* exports providing income. The other main sources of villagers' income are remittance from the large numbers of Kei people who migrate to other provinces, and government projects. Since the 1970s, fisheries has been the fastest growing sector of Kei's economy, however, much of this is conducted by foreign and national fleets with little participation from local fishers.

Sasi in the Kei Islands

The Kei islands share many characteristics with other parts of Moluccas, including a class system, hereditary nobility, Siwa-Lima moieties, and *sasi*. *Sasi* is spatial and temporal prohibitions on harvesting crops, cutting wood or gathering other products from the forest, *meti* (tidal zone) or *petuanan laut* (village-controlled sea), also slander, arguing, fighting, harassing or raping women, and other untoward behavior. In addition to its ritual

significance of mediating relations between human communities and spirits of ancestors, the land and seas, *sasi* serves the very practical functions of making sure no one takes what does not belong to them, that fruits ripen before picking, that *lola* or other marine species are allowed to reproduce and grow, that migratory or spawning fish are allowed to accumulate, and that sufficient food or funds are gathered for communal events or activities.

Anthropologists and legal historians speculate that Moluccan *sasi* began as a personal practice, as individual villagers placed *matakau* (totems imbued with magical powers) to warn people away from sago groves or particular forest trees they wished to control (von Benda-Beckmann, von Benda-Beckmann, and Brouwer 1995; Antariksa 1995). Thereafter, the procedure was adapted to mark boundaries of village-controlled territory to warn away enemies. Rituals, beliefs and sanctions developed over time, and *sasi* eventually became the most conspicuous and widespread means of regulating access to and harvest of communally and clan-controlled crops, fields, forests and marine territories.

Larwul Ngabal

One type of *sasi*, called *hawear*, or *hawear balwirin* in the Kei language, is the most conspicuous manifestation of customary Kei law known as Larwul Ngabal. According to local legend, this law was proclaimed in two separate episodes, each involving newly-arrived emissaries from Bali. The proclamation of law ended a long, dark period of Kei's history, referred to as "*Dolo Soin Ternat Wahan*" (the age when Kei was on the periphery of the Jailolo and Ternate kingdoms far to the north). This period is described as a time of lawlessness, murder, pillage and intrigue (Rahail 1993). The arrival of Larwul Ngabal law marks the beginning of Kei civilization, when people were able to form villages and live in relative peace. Some people in Kei claim to know that Larwul Ngabal was promulgated in the year 1503. Most

people, however, say only that it arrived before people knew about dates and calendars.

Larwul Ngabal is perhaps the most formal *adat* law found in Moluccas. It consists of seven maxims, each further elaborated by numerous specific prohibitions and sanctions. Kei people take this law very seriously, believing the alternative is a return to mayhem. Most adults can quote the seven provisos, along with a litany of clauses and stipulations. The wording, to outsiders, is vague and mysterious:

1. *Uud entauk na atvunad* (Our head sits on the nape of our neck).
2. *Lelad ain fo mahiling* (Our neck is respected, esteemed).
3. *Uil nit enwil rumud* (Skin of earth covers our bodies).
4. *Lar nakmot na rumud* (Blood is encased within our bodies).
5. *Rek fo kilmutun* (Marriage relations should occur in a pure, hallowed place).
6. *Morjain fo mahiling* (A woman's place is respected, esteemed).
7. *Hira I ni fo I ni, it did fo it did* (A person's possessions are his own, ours belong to us).

As obscure as they may seem, these seven edicts form the basis of social relations in the Kei islands. The first four combine criminal law (i.e.: "Thou shalt not kill") with an elucidation of the "proper order of things," while numbers five and six stress the sanctity of marriage and the respect accorded women. Number seven forms the basis for Kei property law. Sanctions for those who violate these laws are generally severe, ranging from public humiliation or payment of gongs, brass cannons or gold taels to exile, death by drowning or live burial (The latter two have not been practiced for several decades). Monetary fines have become the most common sanction.

When the Dutch arrived, a few villages had already embraced Islam, but most people in Kei still practiced their animist faith. The Dutch sent missionaries, first Catholic then Protestant, to convert the population. The Kei population is now nearly

evenly divided between the three religions, with Catholicism predominating, followed by Protestantism. A small number still adhere to the traditional religion, now officially classified as Hindu.

In keeping with the syncretism common to many Indonesian cultures, Larwul Ngabal soon melded with Church law. Closing of *sasi*, for instance, is now always announced at the beginning of the Sunday services in the villages and traditional ceremonies and oaths to place the *sasi* totems are followed by prayer and offerings at the church. Kei people claim that this reinforces *sasi*, saying that now in addition to tradition, *Sasi* has the blessing and strength of the Christian God. Announcements in church, usually made by the secretary of the congregation at the beginning of the service, are replete with admonitions emphasizing what a serious matter it is.

Individuals can also ask the church to sanction a *sasi* on their own crops. *Sasi gereja* (Church *sasi*) protects people's crops and fields during those periods between the annual communal *sasi umum* or *negeri* (local and regional traditions). This performs the dual function of guarding crops and paying tithes. When the person who has requested *sasi gereja* asks that the *sasi* be opened and harvests the crops, he or she makes a contribution to the church. *Sasi umum* is signaled by placing a totem made from plaited fronds of young coconut - sometimes decorated with strips of cloth - at special sites designated by the ancestors as *tanah sakti* (hallowed ground), and sometimes at the edges of the area being placed under *sasi*. Individuals who have requested *sasi gereja* hang a coconut in a black plastic bag from a pole at the edge of their field. The black plastic bag has replaced black cloth as a symbol of death and mourning. This is not a threat, rather a sign that this *sasi* is placed in respect of "God - the dead".

Many villages also practice unsanctioned forms of individual or clan *sasi*. This is generally discouraged by both village and religious leaders because they conjure dark forces and are redolent

of the lawless, pre-Larwul Ngabal days. A common form is *sasi babi* (pig *sasi*), signified by a pig's jaw hung from a crossbar between two poles. This carries a clear threat: those who violate *sasi babi* will see their own fields ravaged by wild pigs. Moslem villagers sometimes signal individual *sasi* by erecting a small thatch roof with a bottle of coconut oil hanging from the crossbeam. In some villages, this is condoned by the mosque in the manner of *sasi gereja*, in others it is frowned upon, a vestige from the days "before religion".

Sasi Lola

Trochus niloticus inhabit a well-defined area of coral reefs: the windward edge in shallow water generally no deeper than five to eight meters (Nash, 1988). The narrow fringing reefs on the eastern coast of Kei Besar provide an ideal habitat for the snail. Topshell occurs in other parts of the islands, but not in the concentrations found on the east coast. The shells are used to manufacture mother-of-pearl buttons, the leftovers are ground up and added to automobile paints to provide luster. An Asian market for trochus shells began to emerge in the 1870s, when the Japanese started to adopt western-style clothing fastened with buttons instead of their traditional kimono (ibid.). Japanese buyers began visiting the Kei islands in the 1930s in search of the valuable shell. Before long, topshell rivaled copra as the major income source in many villages. Village leaders began to apply *sasi* to topshell fisheries and elaborate ceremonies and rules evolved.

T. niloticus grow to marketable size (6cm. diameter) in about two years. They continue to grow throughout their lifespan, however mortality increases significantly after four to five years. Trochus larger than about 9cm in diameter are not good for button manufacture because the walls are too thick and many shells are damaged by boring organisms (Amos 1997). In a simple management regime, taking the easily-harvested adult topshell from a reef at two or three-year

intervals results in continued good harvests. More frequent harvests result in declining returns for effort.

Kei islanders have been harvesting topshell for sale for six decades. Before that the snails were eaten and the shells thrown away. Nearly every village on the eastern coast of Kei Besar applies *sasi* to control the harvest of this important commodity. Each village has its own *petuanan laut*. The term *petuanan* means territory under one's control and can be applied to terrestrial or marine (*laut*) properties. *Petuanan laut* boundaries are straight lines running perpendicular to the villages' land boundaries, as far as the blue sea just beyond the reef slope. These boundaries have names replete with legend and meaning, and there usually is some conspicuous feature like a promontory, stream or rock. There are slightly different rules in each village for *sasi petuanan laut*.

Some villages also have *sasi meti*, that alternately closes portions of the intertidal zone so that plants and other organism can regenerate. The rationale for this is clearly grounded in an innate understanding of natural regeneration and carrying capacity. It is intended to always provide some area where women and children can glean small fish, shellfish and other reef products for their household needs. Alternately, some villages declare a *sasi meti* for a few weeks before *Meti Kei*, the annual neap tide occurring in September and October. This serves to enrich the harvest during the festive season when entire villages converge on the exposed tidal flats - stretching for more than a kilometer in some areas - to collect shellfish, fish, seaweed, sea cucumber, and anything else they can find.

But the most important commodity is topshell. *Sasi lola* is opened for a very brief period - usually only two or three days - every two or three years. The decision to open *sasi* is made by community elders, and is based more on need than on ecological considerations such as carrying capacity or maximum sustainable yield. To open *sasi* two years in a row would be unseemingly greedy. Taking *lola* when *sasi* is closed is a very serious

crime, punishable by payment of one bronze cannon to the village plus an additional monetary fine for the *Tuan Sasi* (*sasi* master) and often a reward for the person reporting the theft.

Some villages ban the use of goggles in their *petuanan laut* except during the brief period when *sasi* is open. Others allow them so villagers can spear octopus, lobster and fish, but with a strict admonition to leave topshell alone. Many also ban fishing with nets inside the line that demarcates the beginning of blue water. More recently, many villages have also banned catching fish using the poisonous root *akar tuba* (*Derris heterophylla*) because of the damage it inflicts on topshell, coral and other reef organisms.

Ohoirenan

The village of Ohoirenan is located on the southeast coast of Kei Besar, about 18 km from Elat, the port and seat of the subdistrict government. It is a large village by Kei standards, with a population approaching 1,000 people. Founded in 1815, Ohoirenan appears prosperous. It has a fine white church and “pastori,” and many houses are constructed of masonry and have asbestos roofs. It sits perched in a small bowl facing the sea, with steep mountains rising on the other three sides. Houses cling to the hillsides, supported by lovely stonework terraces. During the eastern monsoon (May through September) Ohoirenan, like all villages on the island’s eastern coast, is pounded by high waves. Sea transportation and fishing cease. Villagers have to climb a steep stairway and path leading to the top of the ridge separating Ohoirenan from neighboring Nerong where they can fish, *memeti* (glean), or catch boats to Elat or Tual. During the past decade, the Indonesian government has completed an all-weather road connecting Elat with villages in the southern part of the island, but villagers in Ohoirenan still must climb the hill to wait for infrequent minibuses or trucks. Recently, the villagers of Ohoirenan completed construction of a road connecting their village to the main artery, which curves down the northern precipice

at a hair-raising angle. They have also installed a four kilometer pipeline bringing in water from a stream in Weduar, the neighboring village to the south. Ohoirenan has only one very small spring, located near the top of the ridge.

Ohoirenan’s prosperity is due to topshell. Ohoirenan has the longest coastline (six kilometers) of any topshell-producing village in Kei. Harvests average between seven and 10 tons each time they open *sasi*, the highest in memory was 16 tons in 1986. That harvest coincided with the best price ever paid for topshell in Kei: Rp. 16,000 per kilogram. The total came out to just over Rp. 250 million, or about Rp. 285,000 (US\$ 140, 1986) for every person in the village. For comparison purposes, the District of Southeast Moluccas (265,000 people) collected less than Rp 1 billion that year from local taxes, retribution and government enterprises.

Ohoirenan divides its *petuanan laut* into five equal-size zones. One of these, located just south of the village itself, is called the *kongsi*. All topshell harvested from here are used to finance village or church projects. The others are controlled by each of the four major ruling clans in Ohoirenan: Ubro, Ubra, Rahakbau and Rahallus. The *kongsi* is harvested more frequently than the others because there is some project that requires money nearly every year. As a result the yields are only about 20 percent of the other sections. The entire *petuanan*, including the *kongsi*, is harvested at two or three-year intervals, usually in December. Beginning in the north, the elder of the clan responsible for that portion of the *petuanan* opens *sasi* with a brief ceremony thanking God and the ancestors, pleading for continued good harvests, and reviewing *sasi* rules. Following this, he dives, retrieves one *lola* shell, and with three cries of “*Hura!*” opens the *sasi*. All village men and male youths - not just those from the particular clan responsible for that section of the *petuanan* - then rush into the water to search for topshell. They wear homemade goggles fashioned from bamboo and pieces of glass, fastened with a

strip of rubber inner tube. A few years ago, the rules were changed allowing women and children to paddle canoes for the men to deposit topshell and catch their breath, but only men and teenage boys dive. A skilled diver can retrieve 20 or 30 kilograms of shells on a good day. After two days, the next section of the *petuanan* is opened with a similar ceremony, and the process is repeated from north to south, then again for a second round of sweeping up. In the evenings, villagers feast on chewy, delicious topshell meat. Each household collects its own shells for weighing later. *Sasi* is then closed for two or three years.

Traders come to bargain for the topshell. Villages used to hold a silent auction, with the entire catch going to the highest bidder. Buyers are local merchants, usually Chinese Indonesians with shops in Elat or Tual. In Ohoirenan, the catch is divided as follows:

1. *Ulu hasil*: each diver's first *lola* from each day is donated to the village or church.
2. *Lolal kongsi*: all shells collected from the *kongsi* also belong to the village and church.
3. *Lola umum*: shells collected from the other four sections of the *petuanan* are apportioned as follow:
 - * 60 percent of the total is pooled for redistribution to all households;
 - * 40 percent is allocated for the individual who collected the shells.

The 60 percent of the *lola umum* are pooled, and the proceeds are divided evenly between villagers. Two shares go to each married couple, a single share to unmarried adults, widows and widowers, and a half share to each youth old enough to participate in village *gotong-royong* (self-help) projects. Younger children receive no share. Ohoirenan villagers who live abroad are entitled to a share if they are present when the proceeds are divided. Since *sasi* is opened during December, many villagers who work in nearby Irian Jaya are home for the holidays. A few families from neighboring Nerong and Weduar, who are responsible to manage

boundary lands or whose ancestors assisted Ohoirenan in long-ago wars, also receive shares.

The Ohoirenan-Ohoiwait Conflict

Ohoirenan's northern neighbor is the village of Ohoiwait. Ohoirenan and Ohoiwait are both part of the *Ratschaap* (kingdom) of Lo-Ohoitel. The Raja of Lo-Ohoitel lives in the village of Nerong. Larat, further south on the west coast, is the other constituent village making up this unit. The name Lo-Ohoitel means "three villages". Ohoiwait, which means "new village", is the fourth. Ohoiwait was established during the 19th century when migrants from northern Kei Besar joined with local clans to form a new settlement. Ohoiwait controls a large territory, stretching clear across the narrow waist of the island. Ohoiwait has four villages: Kampung Atas and Kampung Bawah are located on top of and immediately below a steep bluff on the eastern shore just north of Ohoirenan, while Matahollat and Wetuar are on the west coast. The island is triangular, leaving a small stretch of coast on the eastern shore. Ohoiwait's western coastline is much longer, but the shallow, sandy-bottom seas yield very few topshell. As well, a stream runs through Kampung Bawah, suppressing coral growth and diminishing topshell yields. When Ohoiwait opens *sasi*, they get only 400 to 700 kilograms of topshell, compared to Ohoirenan's seven to 16 tons.

Over the years, people from Ohoiwait and Ohoirenan have intermarried. Bridegrooms' families pay a bride price of cannons, gongs and gold, in return they are usually granted *hak makan* (eating rights) to plots from the bride family's land. The hills between Ohoirenan and Ohoiwait are more easily accessible from the latter village and many Ohoiwait families have opened fields there. This is common in Kei and not problematic. The old boundary is acknowledged by both parties and families in Ohoiwait are allowed plots of land in Ohoirenan as long as proper procedures are followed.

Ohoiwait villagers also began using the *meti* that fronts the area of land they now cultivate. They gleaned for fish and shellfish, and installed *bubu batu* (tidal fishtraps made of stone). During the calm months of November through January, these are often supplemented with *sero daun kelapa* (coconut frond stakes to guide fish into the *bubu*). As far as topshell was concerned, however, the area was still firmly controlled by Ohoirenan.

Villagers in Ohoirenan point out several old coconut trees planted by the Ibra clan just a few meters behind the church in Ohoiwait showing where the true boundary lies. Both parties also acknowledge a stone named “Haorbob” that demarcates the line between the two villages. *Bob* means vagina in the Kei language, the implication being that if you transgress this boundary you peer at your mother’s vagina.

So long as no one from Ohoiwait tried to take any topshell this situation presented no problems. The trouble began during the Japanese occupation between 1942 and 1945. World War II was a time of great privation in the Kei islands. Many villagers stopped farming and fled their villages for interior forests. Japanese troops commanded villagers to collect topshell in Ohoirenan and elsewhere on the east coast, which they stored in a warehouse on their base in Ohoiwait’s Kampung Bawah. These shells had still not been shipped to Japan when the war ended. A delegation from Ohoirenan came to Ohoiwait to request that their topshell be returned, but Ohoiwait refused, and sold the shells themselves.

Relations soured somewhat between the two villages, and Ohoirenan began accusing Ohoiwait villagers of stealing topshell from their *petuanan*. In 1957, men from Ohoirenan demolished Ohoiwait people’s *bubu batu* and *sero daun kelapa* in the *petuanan*, and captured several men who had been fishing there. Ohoirenan’s *Kepala Desa* (Village Head), who was a young boy at the time, remembers these hostages being jostled by crowds and poked with spears and *parang* (machettes) until they were “bathed in blood.”

That incident passed, but relations did not improve. The years of 1964 and 1965 were years of great political tumult in Indonesia, compounded in Kei by a series of long dry seasons. Ohoiwait came under attack from two sides. Ohoiel, Ohoiwait’s northern neighbor and part of the rival Ratschaap of Mau Umfit, claimed that their ancestors had planted coconuts in land now controlled by Ohoiwait, and began ransacking fields. Ohoiwait, maintaining that their ancestors had long ago paid compensation for the trees, went to war against its northern neighbor. Three villagers were killed, two from Ohoiel and one from Ohoiwait. Ohoiwait prevailed in the fighting, and again when the police arrived and sided with Ohoiwait. Soon after, Ohoirenan tried to permanently push Ohoiwait out of its *petuanan*. A brief fight ensued but both sides retreated when both War Captains received minor injuries.

Ohoiwait’s elders decided to sue. They demanded that the two villages’ respective rights and responsibilities be resolved by a higher authority. Southeast Moluccas had no provincial court at the time, so the *Camat* (Subdistrict Head) convened an *adat* court of several respected Raja and *Orang Kaya* (Hereditary Village Heads). The council decided that Ohoirenan controlled the land, but that families from both sides were entitled to use it, based on the well-established tradition of *hak makan*. That had never been the problem. They decided the best solution to *petuanan laut* was *hak makan bersama* (shared eating rights), with the two villages taking turns managing the *sasi* and harvesting the topshell. Ohoirenan rejected this solution and swore to appeal the decision. They never have and the *petuanan* section has been disputed ever since.

Neither side has harvested topshell from the 1.2 kilometer stretch of *petuanan sengketa* for over three decades. According to villagers in Ohoirenan, this is some of the richest, most productive reef they own, potentially yielding as much as three or four tons of topshell each time they open *sasi*. Paradoxically, biologists from the Indonesian Institute for Science (LIPI) speculate

that this unintentional breeding reserve may help account for Ohoirenan's continued good topshell harvest year after year (Dwiono 1998). Overall, topshell yields have declined in Kei, as they have in many other parts of the Indo-Pacific. As recently as the 1970s, traders purchased as much as 100 to 110 tons of topshell each year from Kei Besar, today the figure is 60 to 70 tons (Liemen 1998).

Trochus Niloticus: An "Endangered Invertebrate"

In 1984 IUCN added *T. niloticus* to its list of "commercially endangered invertebrates" and recommended that steps be taken by South Pacific and Indian Ocean countries to conserve remaining populations (Groombridge 1993). Indonesia responded in 1987 by granting protected status to *T. niloticus*, along with 17 other marine species including black coral, giant clams, triton, robber crabs, chambered nautilus. As a protected species, topshell could no longer be legally harvested or traded.

The trade continued in the Moluccas and other parts of the archipelago, although occasional seizures, harassment and increasing unofficial levies rendered it less profitable and more risky each year. In 1989 the *Bupati* (District Head) of Southeast Moluccas sent a letter to the Provincial Bureau of Natural Resource Conservation (BKSDA, a branch of the Forestry Department) urging the region be granted special status to trade the important component of the local economy. He reasoned that local *sasi* traditions effectively conserved the resource and that the Southeast Moluccas communities should not be punished for other regions' carelessness in managing their stocks. LIPI biologists soon designated Southeast Moluccas as having high potential for topshell cultivation but stopped short of official approval for local *sasi*. The Moluccas Provincial Government sent a similar letter to the Minister of Forestry in 1994 or 1995 but did not receive a reply. Records of this latter transaction have been lost.

Between 1989 and 1996, the Minister of Forestry and Director General of Forest Protection and Resource Preservation (PHPA) issued guidelines for the legal capture, cultivation and transport of protected species (See Appendix I). Permits can now be acquired by accredited businesses to harvest and trade topshell and other species that are products of cultivation. For topshell, this involves fencing off a section of reef and stocking it with 100,000 juvenile snails. The fence slowly disintegrates and the topshell fan out across the surrounding reef area. The shells can be harvested within three years. The local Conservation Agency (KSDA, a branch of the Provincial-level BKSDA) will issue a permit for the transport and export of topshell procured in this manner.

LIPI has expended considerable effort and resources developing techniques to breed *T. niloticus* for cultivation and restocking. This is a sound investment for replenishing stocks in reefs that still provide a good habitat but where local populations have been decimated by over-harvesting. In Kei, it is patently unnecessary. Local topshell populations can be sufficiently sustained through natural regeneration provided *sasi* is maintained and habitat is preserved.

T. niloticus harvests in Kei have declined during the 1980s and 1990s. There are several reasons that help explain this decline. One major cause has been the abandonment of the *sero daun kelapa* mentioned above. As the coconut leaves decompose, they disburse nutrients to the surrounding waters and reef, encouraging algae and plankton growth. *T. niloticus* graze on filamentous algae and tend to congregate around *sero daun kelapa* as they begin to decay. Decomposing *sero* also provide an ideal habitat for larval and juvenile snails. Villagers in Kei are aware of this connection, but relatively inexpensive nylon fishing nets provide a far more efficient means of catching fish. Building a *sero* is an arduous task and several people stand to benefit from an individual's efforts. With nets, a fisherman catches more and retains the entire payoff

from his own labor. *Sero daun kelapa* are hardly seen in Kei anymore.

Another important factor is the declining condition of coral reefs in the area, caused by blast fishing, potassium cyanide and *akar tuba* use and house construction. Live coral cover has been reduced by 20 to 40 percent in some villages on Kei's eastern coast (Thorburn 1998). Blast fishing is less pervasive along the eastern coast than in other parts of the Kei islands nearer to local markets but is still a factor. Cyanide use for the hugely profitable live grouper trade has caused far more damage in this area. Fortunately, most of the large companies engaged in this practice have recently left the Kei Islands and the local entrepreneurs who have taken over the trade concentrate their efforts in the more easily accessible coasts of Kei Kecil and western Kei Besar. Use of potassium cyanide, while still a problem, seems to be declining in Kei (Thorburn 1998).

A third factor is theft. Fishermen from other parts of the archipelago who are granted permission to harvest sea cucumber often take topshell as well. Local villagers, too, are not above nabbing a topshell or two if the opportunity presents itself, despite the serious consequences. This is why Ohoirenan and some other villages ban the use of goggles altogether in their *petuanan*.

These problems are not addressed by the ban on harvest and trade of *T. Niloticus*. Conversely, the ban probably contributed to topshell's rapid extinction around many islands in central Moluccas. The trade was driven underground leaving government agents without data or management inputs. The cost and risk of trading topshell went up, driving prices down for shells purchased from villagers. People had to harvest more, including undersized individuals, to attain the same income. Given the uncertainty, many villagers and buyers felt the wisest strategy was to "grab everything they can while they still can," which led to gross overharvesting. It seems the ban had precisely the opposite effect than intended.

To address this situation, Forestry officials in Ambon and Tual encouraged several local traders

to apply for cultivation permits. In Kei, only one trader responded. A company named "CV MM" was granted the first permit in 1995. The operation, located in the village of Ler-Ohoilim, on the west coast of Kei Besar, is a known sham. Ler-Ohoilim's shallow, protected, sandy-bottom seas do not provide a good habitat for topshell. Once during the 1980s villagers attempted to implement *sasi*. After closing their *meti* for two years, they harvested a mere half ton of shells from the six kilometers of sea fronting the village. They agreed it was not worth the effort and have not tried since.

CV MM installed a fenced pen in a small cove in Ler-Ohoilim, and tossed in about 1,000 juvenile *T. niloticus* purchased from another village. BKSDA officials from Ambon came, took pictures and issued a recommendation that CV MM be granted a *T. niloticus* cultivation permit. CV MM has not been back to Ler-Ohoilim since.

Armed with this impressive document signed by the Minister of Forestry, the owner of CV MM managed to convince most villagers and traders in Kei that he possessed the sole legal right to buy and ship topshell, allowing him to set prices. The local Forestry/KSDA office has ever issued a topshell shipping permit to CV MM. All topshell are smuggled out of Kei.

CV MM gradually acquired a monopoly without the permit. Its owner enjoys close relations with many officials in Tual and Ambon, and the company possesses a fleet of boats that greatly facilitate loading and unloading. Many other traders abandoned the topshell business after the 1897 ban. "RL," previously the largest buyer in Kei Besar with annual purchases of 60 to 70 tons, stopped trading topshell in 1993, preferring to concentrate on safer ventures.

BKSDA officials in Ambon are aware of the situation, but claim their intention is to provide at least a semi-legal window for the trade to continue. The permit was arranged in Ambon, bypassing the Tual KSDA office. This breach of procedure fostered some ill-will between local KSDA officials and their superiors in Ambon, and toward CV MM.

BKSDA officials in Ambon claim that they had no intention of creating a monopoly and that they have encouraged other local entrepreneurs to apply for permits. By the end of 1997, they still had not received any applications.

In December 1997, Ohoirenan opened *sasi* and harvested 7,343.5 kilograms of topshell shells. They were the first village in Kei to open *sasi* in the 1997/1998 season. CV MM offered to purchase the harvest for Rp 11,500 per kilogram, the same price as the previous year. The value of the Rupiah, however, plummeted 70 percent against major currencies during the intervening year and inflation was already seriously affecting local purchasing power. Village leaders in Ohoirenan refused the offer.

A store owner in Elat named "EH" purchases all copra from Ohoirenan and supplies basic goods and construction materials - often on credit - to villagers. This sort of *Bapak Angkat* (Adopted Father or, more aptly, Godfather) relationship between individual traders and certain villages is common in Kei and elsewhere. EH offered to purchase Ohoirenan's topshell for Rp 14,000 per kilogram. The difference between the two offers came to nearly 18.4 million rupiah. Ohoirenan accepted.

An integrated team of officials from BKSDA Ambon and Tual police and army officers soon arrived in Elat to provide "guidance". CV MM paid local transport and accommodation expenses for the Ambon officials. They did not visit Ohoirenan. The Village Head there had warned: "If those people come to my village, they will not go home until this matter is resolved to our satisfaction."

Ohoirenan sent a delegation to meet with members of the district People's Representative Council (DPRD Tk. II) in Tual. They were encouraged to take their petition directly to the *Bupati*. The *Bupati* agreed to provide a Letter of Recommendation that EH be allowed to purchase and ship the shells. He had his staff draft the letter and he signed it on 26 January 1998. EH weighed and paid for the topshell and sold them to a buyer from Surabaya for Rp

17,000, making a gross profit of Rp 22 million. Getting them to Surabaya became the buyer's problem. EH was required to make donations to Ohoirenan's church, village leadership council and several local officials and politicians in Elat and Tual. His net profit was therefore closer to Rp 10 or 15 million.

The *Bupati's* letter was a serious breach of procedure and generated a storm of controversy among local forestry, security and elected officials. Trade in protected species is clearly Forestry's concern. The letter did stipulate that EH must "fulfill, obey and adhere to all obligations according to regulations in effect," and "coordinate with the relevant agencies regarding the development and continuation of this endeavor." The *Bupati's* recommendation expired in three months but it was unquestionably the District Government's approval for an activity that is not only illegal but also none of its business.

Following this incident, two local entities, EH and a Village Cooperative (KUD) located in Dullah in Kei Kecil, initiated application procedures to acquire *T. niloticus* cultivation permits. Both have letters granting permission to install nurseries from the Kepala Desa of bona fide topshell-producing villages: EH from Ohoirenan, and the KUD from Haar, and both are following procedures set down in the Minister's and Director General's guidelines. A local KSDA official, still miffed at having been excluded from CV MM's licensing procedure two years before, is shepherding these applications through the Forestry bureaucracy. Once they have been forwarded to BKSDA Ambon, a team will come to inspect the locations. Villagers will be required to construct nursery pens and fill them with thousands of juvenile topshell from the surrounding reefs in order to pass inspection. Only after this step can the applications be forwarded to the Minister of Forestry. This entire exercise is unnecessary from a biological standpoint, but under present circumstances represents the only existing legal solution to the problem.

Between December 1997 and March 1998, another six villages in Kei Besar - Weduar, Keluair, Wako, Haar, Ngefuit and Ohoiel - opened *sasi* and harvested topshell. CV MM bought it all at prices ranging between Rp 14,000 and 17,500 per kilogram. This was shipped from Tual without encountering any problems. Meanwhile a local KSDA official is considering attempting to enforce existing regulations as pertain to CV MM's topshell operations. He is somewhat hesitant because if the law is rigorously applied topshell cannot be legally shipped from Kei for three years, and then only from villages participating in cultivation schemes. Enforcing the law will virtually abolish the trade, something no one in Kei wants to see happen.

EH is hesitating as well. He has chosen to see what happens with the CV MM case before proceeding with his cultivation permit application. EH reasons that the application process is going to cost him upwards of Rp 10 million, and worries that, "Even if I get the permit, it does not guarantee that I will be able to buy and ship topshell from the villages, which is the whole purpose, after all."

CONCLUSION

The fate of topshell and *sasi lola* in the Kei islands is seriously threatened by the situation. Several factors combine to foul the topshell trade in Kei:

- * the District Government is unhappy with the Ministry of Forestry for promulgating regulations that deny local villagers, and local government, an important source of income;

- * the local Forestry Service is upset with the District Government for intruding into its affairs;

- * buyers are distressed at mounting informal levies, and are concerned that stricter enforcement of the law will lower profits or render the business unfeasible;

- * local officials are increasingly divided between supporters of CV MM and those who would like to see other traders take part in the business.

The combination of inappropriate government regulation, cronyism, collusion and corruption and increasingly antagonistic relations between all concerned parties ensure the eventual extinction of topshell in local waters and the abandonment of a traditional management regime that has worked well for over six decades. Villagers in Kei and elsewhere simply want to be able to continue to sell their topshell at a fair price.

The obvious solution to this conundrum is for the Indonesian government to recognize *sasi* topshell as a legitimate, legal resource management system. Once that step is taken, the Forestry Service, working together with local traders, could introduce modifications to local *sasi* practice - such as more rigid minimum and maximum size standards, breeding reserve set-asides, scheduling changes, reseedling of depleted reefs, and the reintroduction of *sero daun kelapa* - to secure the continued health of local topshell populations. This could also provide a platform for organizing and supporting other community-based coral reef conservation measures.

Asked whether such a scenario was likely, the local KSDA officer at the center of this unfolding drama replied: "Not a chance. *Sasi* is based on tradition and on nature. Whereas cultivation is based on science."

Appendix No. 1

2. Keputusan Menteri Kehutanan Nomor 556/Kpts-II/1989 tentang Pemberian Izin Menangkap/Mengambil, Memiliki, Memelihara dan Mengangkut Baik di Dalam Negeri Maupun ke Luar Negeri Satwa Liar dan Tumbuhan Alam, dan atau Bagaimana-Bagaimana (Decision of the Minister of Forestry No. 556/Kpts-II/1989 on Granting of Permission to Trap/Take, Own, Raise and Transport Domestically or Internationally Wild Animals or Plants, etc.).
3. Keputusan Direktur Jenderal Perlindungan Hutan dan Pelestarian Alam Nomor 25/KPTS/DJ-VI/1989 tentang Persyaratan dan Tatacara untuk Mendapatkan Izin Menangkap/Mengambil, Memiliki, Memelihara dan Mengangkut Baik di Dalam Negeri Maupun ke Luar Negeri Satwa Liar dan Tumbuhan Alam, dan atau Bagaimana-Bagaimana yang Dilindungi dan Tidak Dilindungi Undang-undang (Decision of the Director General of Forest Protection and Resource Preservation No. 25/KPTS/DJ-VI/1989 on Regulations to Acquire Permits to Trap/Take, Own, Raise and Transport Domestically or Internationally Wild Animals or Plants, etc. that are Protected and Not Protected by Law).
4. Keputusan Menteri Kehutanan Nomor 771/Kpts-II/1996 tentang Pemanfaatan Jenis Tumbuhan dan Satwa Liar dari Alam Maupun dari Pengangkaran (Decision of the Minister of Forestry No. 771/Kpts-II/1996 on Utilization of Species of Plants and Wild Animals from Nature and Raised in Captivity/Cultivated).

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Figure 1. Map Showing the Kei Island, Province of Moluccas

**KONFLIK PENGELOLAAN SUMBER DAYA
KELAUTAN DI SULAWESI UTARA
DAPAT MENGANCAM KELESTARIAN PEMANFAATANNYA**

**SAPTA PUTRA GINTING
Seksi Proteksi Bina Pengelolaan Sumberdaya Kelautan,
Direktorat Jenderal Pembangunan Daerah, Departemen Dalam Negeri**

ABSTRACT

Coastal resources management often exhibit conflicts, especially where coastal areas are highly developed. Coastal areas, where terrestrial resources meet marine waters, are rich, many stakeholder have interest to use those resources. Each stakeholder has objectives and plans to exploit resources. Conflicting objectives, plans and jurisdictions in the same coastal area trigger conflicts.

Preliminary documentary and social data collection show that the conflict exists in the Manado Bay and other parts of North Sulawesi, User conflict arises between artisanal fishers and pearl farms, between tourism, fishery and protected area and among developers. The jurisdictional conflict arises between central and local governments on the management of Bunaken National Park areas. Stakeholders work within poorly defined property regimes and do not recognize traditional marine tenure system. The local community perceived that the land and nearshore sea belong to them as a commons, but the central government claims that the coastal resource belongs to the central government. Coastal resource is neither common nor public property. This poorly defined property regimes leads to conflict of coastal management.

Keywords: coastal resources management, property regimes, common property.

ABSTRAK

Dalam pengelolaan sumberdaya pesisir sering muncul konflik antara berbagai pihak yang berkepentingan, khususnya di wilayah pesisir yang pembangunannya pesat. Wilayah pesisir memiliki sumberdaya yang sangat kaya, sehingga banyak pihak yang mempunyai kepentingan untuk memanfaatkannya. Setiap pihak yang berkepentingan mempunyai tujuan dan rencana yang dapat mendorong terjadinya konflik pengelolaan.

Berdasarkan hasil studi, konflik pengelolaan muncul di Teluk Manado dan daerah pesisir lainnya di Sulawesi Utara. Konflik pemanfaatan muncul antara nelayan tradisional dengan pengusaha budidaya mutiara di Talise, antara pengelola pariwisata, perikanan dan kawasan konservasi serta pengembang di Teluk Manado. Konflik kewenangan muncul antara Pemerintah Pusat dan Daerah di Taman Nasional Bunaken. Pihak yang berkepentingan kurang jelas dalam menjabarkan konsep pemilikan dan perusahaan sumberdaya pesisir, dan sering mengabaikan sistem pengelolaan yang bersifat tradisional. Sementara penduduk pesisir setempat merasa bahwa lahan dan sumberdaya laut disekitarnya adalah milik mereka, tetapi secara hukum sumberdaya pesisir dianggap milik penduduk dan juga milik pemerintah. Kerancuan pemilikan dan penguasaan sumberdaya pesisir ini mendorong timbulnya konflik.

Kata-kata kunci: pengelolaan sumberdaya pesisir, batas-batas kepemilikan, kepemilikan umum.

PENDAHULUAN

Sumber daya kelautan, merupakan salah satu asset pembangunan Indonesia yang penting, karena kontribusi produk domestik bruto pemanfaatan sumber daya kelautan tersebut telah mencapai 22% pada tahun 1990 (Dahuri *et al.*, 1996). Sementara sumber daya darat seperti hutan dan lahan semakin terbatas akibat alih fungsi, eksploitasi yang berlebihan, dan kebakaran hutan. Disamping itu, pertambahan populasi penduduk yang hidup di kawasan pesisir meningkat pesat mendorong tekanan terhadap sumber daya kelautan semakin besar. Diperkirakan 60% dari populasi Indonesia bermukim di pesisir, dan 80% dari pembangunan Industri mengambil tempat di pesisir (Hinrichson 1997). Banyak pembangunan sektoral, regional, swasta dan masyarakat mengambil tempat di kawasan pesisir, seperti budi daya perikanan, resort wisata, industri, pertambangan lepas pantai, pelabuhan laut, dan reklamasi pantai untuk perluasan kota. Sehingga salah satu pilihan, untuk pembangunan jangka panjang adalah memanfaatkan potensi sumber daya kelautan, yang terdapat di wilayah pesisir daerah.

Dalam pengelolaan sumber daya kelautan (SDK), sering muncul konflik antara berbagai pihak yang berkepentingan, khususnya di wilayah pesisir yang pembangunannya pesat. Wilayah pesisir, dimana sumber daya darat dan laut bertemu, memiliki sumber daya yang sangat kaya, sehingga banyak pihak yang mempunyai kepentingan untuk memanfaatkannya. Secara umum pihak yang berkepentingan ini dapat dikategorikan dalam sektor perikanan, pariwisata, pertambangan lepas pantai, perhubungan laut, industri maritim, konservasi dan pertahanan/keamanan¹. Selain itu sektor pekerjaan umum dan energi juga mempunyai kepentingan yang relatif besar, terutama dalam perlindungan pantai dari abrasi, dan lokasi pembangkit listrik tenaga uap.

Setiap pihak yang berkepentingan mempunyai maksud, tujuan, target dan rencana untuk mengeksploitasi sumber daya tersebut. Perbedaan maksud, tujuan, sasaran dan rencana tersebut mendorong terjadinya konflik pemanfaatan sumber daya kelautan. Sektor perikanan mempunyai tujuan untuk meningkatkan produksi ikan tangkap. Sektor pariwisata bertujuan untuk meningkatkan jumlah wisatawan yang melakukan *snorkelling* dan *scuba diving*. Pengembang kawasan reklamasi bertujuan membangun kota pantai yang bisa langsung melihat ke pulau, sunset dan pantai berpasir, sementara, Balai Konservasi Sumber Daya Alam ingin mengkonservasi keanekaragaman hayati lautnya. Untuk mencapai maksud, tujuan dan sasaran tersebut, masing-masing pihak menyusun perencanaan sendiri-sendiri, dengan tugas pokok dan fungsinya yang berbeda-beda. Perencanaan dari masing-masing sektor sering tumpang tindih dan berkompetisi pada ruang laut yang sama. *Tumpang tindih perencanaan dan kompetisi pemanfaatan sumber daya ini memicu munculnya konflik pemanfaatan di wilayah pesisir.*

Konflik dapat juga muncul karena adanya kesenjangan antara tujuan, sasaran, perencanaan, dan fungsi antara berbagai pihak terkait. Banyak pihak yang mengambil keputusan menyadari bahwa telah terjadi penangkapan ikan secara illegal, berkembangnya perusakan ekosistem mangrove, terumbu karang dan padang lamun, namun tidak ada atau tidak banyak kegiatan pembangunan yang mengatasi persoalan tersebut.

Akar permasalahan konflik ini sering berasosiasi dengan faktor sosial-ekonomi-budaya dan bio-fisik yang mempengaruhi kondisi lingkungan pesisir. Konflik tersebut, baik langsung maupun tidak langsung dapat menyebabkan pihak-pihak yang bertikai, terutama mengurangi minat penduduk dan Pemerintah Daerah setempat untuk melestarikannya, dan membiarkan kerusakan sumber daya kelautan berlangsung hingga mencapai tingkat yang mengkhawatirkan,

¹ Pengertian sektor merupakan lingkungan satu kelompok kegiatan sesuai dengan Sorensen 1996.

karena tidak ada insentif bagi mereka untuk melestarikannya.

Fenomena konflik tersebut sebenarnya sudah lama ada, tetapi makin lama makin banyak jumlahnya dan makin besar skala konfliknya. Konflik pemanfaatan SDK dan jasa lingkungan muncul di Teluk Jakarta, di Banyuwangi dan di Kepulauan Natuna. Konflik antara pengelola pariwisata dan pengelola kawasan konservasi laut. Konflik antara nelayan tradisional dengan nelayan komersial, sehingga terjadi pembakaran kapal nelayan di Sumatera Utara.

Untuk melihat fenomena konflik menjadi kenyataan, dilakukan studi di Sulawesi Utara. Studi tersebut dibagi dua bagian, pertama *documentary study* untuk melihat apakah dari dokumen kebijakan dan perencanaan masing-masing instansi, menunjukkan adanya tumpang tindih atau kesenjangan antara maksud, tujuan, sasaran dan rencana masing-masing instansi, swasta dan masyarakat. Kedua, *in-depth interview* terhadap *key respondents*, dilanjutkan dengan *field observation* di lokasi yang diperkirakan konflik terjadi dan korelasinya dengan kondisi dan kelestarian SDK disekitarnya.

Berdasarkan hasil sementara studi tersebut dapat ditemukan bahwa konflik pemanfaatan SDK dan jasa lingkungan (*marine resources and environmental amenities*) muncul di Teluk Manado dan daerah pesisir lainnya di Sulawesi Utara. Konflik antara nelayan tradisional dengan pengusaha budidaya mutiara di perairan Talise. Konflik antara pengelola pariwisata, pengelola TNL Bunaken, nelayan serta pengembang reklamasi pantai di Teluk Manado.

Salah satu masalah mendasar ialah pihak yang berkepentingan sering kurang jelas dan kurang transparan dalam menjabarkan konsep pemilikan dan penguasaan sumber daya kelautan dan kurang memperhatikan sistem pengelolaan yang bersifat tradisional di daerah. Secara *de facto*, penduduk pesisir setempat merasa bahwa lahan dan sumber daya kelautan di sekitar adalah milik mereka, yang dikelola

secara tradisional turun temurun. Tetapi secara *de jure*, pasal 4, UURI No. 6 Tahun 1996 tentang Perairan Indonesia, menyatakan seluruh sumber kekayaan alam yang terdapat dalam perairan Indonesia adalah milik Pemerintah Pusat. Dalam skala tertentu pemerintah membiarkan kelompok masyarakat pesisir untuk mengelolanya, tetapi bila ada investor, hak pengelolaannya diberikan kepada investor. Ironisnya, penduduk lokal sering tersingkir oleh situasi seperti ini. Sehingga timbul kerancuan bahwa di satu sisi SDK dianggap milik penduduk, tetapi di sisi lain dianggap milik pemerintah. Kerancuan pemilikan dan penguasaan SDK ini mendorong timbulnya konflik kewenangan dan konflik pemanfaatan.

Konflik kewenangan muncul di Teluk Manado Sulawesi Utara, terutama sejak ditetapkannya perairan pulau-pulau Bunaken menjadi Taman Nasional Laut (TNL) tahun 1991. Konflik kewenangan muncul antara pemerintah Pusat c.q. Ditjen PHPA dengan Pemerintah Daerah c.q. Dinas Pariwisata di TNL Bunaken. Dalam kasus ini Pemerintah Daerah merasa bahwa daratan pulau-pulau di perairan Bunaken serta masyarakatnya berada di bawah kewenangan Pemerintah Daerah Sulawesi Utara, sesuai dengan UURI No. 5 Tahun 1974 tentang Pokok-pokok Pemerintahan di Daerah. Namun di pihak lain, setelah pulau-pulau Bunaken ditetapkan sebagai Taman Nasional, maka kewenangan pengelolaan sumber daya hayati lautnya berada di bawah Departemen Kehutanan. Beberapa konflik yang sedang berkembang di Sulawesi Utara dapat diuraikan dalam Tabel 1. di bawah ini.

Untuk menyamakan persepsi, maka dalam paper ini, batasan wilayah pesisir merupakan satu kawasan tempat ber-interaksinya ekosistem darat dan laut, dimana batas kearah darat dapat dianggap DAS hulu yang dipengaruhi ekosistem laut dan kearah laut sejauh 12 mil dari garis pangkal (base line) atau dikenal sebagai laut territorial, dimana tumpang tindih pengelolaan sering terjadi. Sumber daya kelautan meliputi sumberdaya perikanan, ekosistem terumbu karang, mangrove,

padang lamun, pantai berpasir, bahan galian tambang lepas pantai serta flora dan fauna laut lainnya (Dahuri *et al.* 1996).

Untuk memperjelas bentuk-bentuk konflik tersebut, maka dianggap penting

untuk memahami tipe-tipe pemilihan dan penguasaan SDK yang terdapat di Indonesia. Masalah pemilikan dan penguasaan (*property regimes*) sumber daya akan dibahas secara terinci dibawah ini.

Tabel. 1. Daftar Konflik Pemanfaatan dan Konflik Kewenangan di Sulawesi Utara

Tipe konflik	Pihak Pertama	Pihak Kedua	Lokasi
Pemanfaatan	Nelayan tradisional	Nelayan komersial	Sulawesi Utara
Pemanfaatan	Nelayan setempat	Nelayan luar	Sulawesi Utara
Pemanfaatan	Nelayan tradisional	Pengusaha mutiara	Pulau Talise
Pemanfaatan	Nelayan tradisional	Pengembang reklamasi pantai	Malalayang TM
Pemanfaatan	Pemilik tanah	Pengembang reklamasi pantai	Malalayang TM
Pemanfaatan	Diving and snorkeling	Jet skiing, glass bottom boats	TNL Bunaken
Kewenangan	Dinas Pariwisata dan Dinas Perikanan	Kehutanan	TNL Bunaken
Kewenangan	Pelabuhan perikanan	Pengembangan pariwisata	Bitung
Kewenangan	Hak ulayat	Milik pemerintah	TM & Sulut

Sumber: pengamatan lapang, wawancara, harian Suara Pembaruan, Kompas, Manado Post
 Catatan: TM=Teluk Manado; Sulut=Perairan Sulawesi Utara; TNL=Taman Nasional Laut

Konsep Pemilikan dan Penguasaan Sumber Daya Alam

Bromley dan Cernea (1989, p.5) menyatakan bahwa pemilikan dan penguasaan sumber daya alam merupakan suatu hak, kewenangan dan tanggung jawab pribadi pemilik dalam hubungannya dengan pribadi pihak lain terhadap pemanfaatan suatu sumber daya alam. Pemilikan sumber daya alam adalah hak untuk mendapatkan manfaat dari sumber daya dan jasa lingkungannya yang dijamin oleh Pemerintah, dan di hargai oleh orang lain yang mempunyai kepentingan yang sama, sesuai dengan kondisi dan karakteristik sumber dayanya.

Hak dan akses untuk memanfaatkan sumber daya, diatur oleh kaidah-kaidah pengelolaan dan pemilik dapat mempertahankan sumber daya alam tersebut dari orang lain. Hak akses terhadap pemanfaatan sumberdaya alam tersebut yang menentukan apakah suatu sumber daya alam tersebut milik pemerintah, masyarakat tertentu, swasta atau milik siapa saja.

Menurut Bromley dan Cernea (1989, p.11), tipe pemilikan dan penguasaan

sumberdaya alam dapat dibagi menjadi 4 bagian :(i) tanpa pemilik (*open access*); (ii) milik masyarakat tertentu (*commons*); (iii) milik pemerintah (*state property*); dan (iv) milik swasta/pribadi.

McKean (1992, p.251-252) mengelompokkan pemilikan sumber daya alam tersebut dalam 6 (enam) bagian: (i) tanpa pemilik (*unknown property*); (ii) milik masyarakat tertentu (*commons*); (iii) milik pemerintah yang tidak boleh dimasuki orang secara sembarangan, seperti pangkalan angkatan laut (*state property*); (iv) milik pemerintah yang bisa dimasuki khalayak umum (*public proverty*); (v) milik swasta/perusahaan yang lebih satu orang; dan (vi) milik pribadi (*private property*).

Kedua klasifikasi tersebut diatas mempunyai persamaan dan perbedaan. Perbedaan yang khas, McKean membagi milik pemerintah menjadi dua bagian, dan memisahkan milik pribadi dengan swasta yang lebih dari satu orang. Namun dari perbedaan tersebut, kedua tipe milik pemerintah masih dapat dikelompokkan sebagai milik pemerintah, dan kedua tipe milik swasta masih dapat dikelompokkan sebagai milik pribadi/swasta. Akses terhadap

pemanfaatan SDK milik pemerintah dapat kembali dari khusus ke umum atau sebaliknya, tergantung dari kepentingan pemerintah, seperti pada Table 2. Otoritas pemilik sumber daya adalah pemerintah. Demikian juga untuk pemilikan swasta dan pribadi, keduanya mempunyai kesamaan, dimana hanya para pemilik yang boleh menikmati manfaat SDK. Penduduk yang tidak punya sertifikat pemilikan sumber daya tersebut tidak berhak menikmatinya.

Berdasarkan pertimbangan-pertimbangan tersebut, maka pola pemilikan dan penguasaan SDK tersebut dapat dikelompokkan menjadi 4 kelompok, yaitu:

- i. tanpa pemilik (*open access property*);
- ii. milik masyarakat tertentu (*common property*);
- iii. milik pemerintah (*public property*);
- dan (vi) milik pribadi (*private property*), dengan penjabaran sebagai berikut:

- i. Tanpa Pemilik (*open access property*) adalah milik semua orang dan tanpa pemilik atau tidak jelas status pemilikannya (Bromley dan Cernea 1989). Tidak ada seorangpun yang berhak untuk memanfaatkan sumber daya tersebut demi kepentingan pribadi atau kelompoknya dan mempertahankannya agar tidak digunakan orang lain. Tidak ada peraturan yang meregulasi pemanfaatannya dan melarang orang lain untuk mengeksploitasi SDK tersebut. Sumber daya kelautan ini biasanya terdapat di perairan laut lepas (*high seas*), atau di luar laut teritorial (12 mil dari garis pangkal).

- ii. Milik Masyarakat atau Komunal (*common property*) merupakan milik sekelompok masyarakat yang telah melembaga, dengan ikatan norma-norma atau hukum adat yang mengatur pemanfaatan SDK tersebut dan dapat melarang pihak lain untuk mengeksploitasinya. Kelompok masyarakat tersebut bervariasi dari segi bentuk, jumlah anggota dan ukuran, anggotanya memiliki identitas yang khas, dan memiliki ikatan dan rasa persatuan terhadap kelompoknya (*esprit de corps*). Individu anggota kelompok ini tidak dapat menjual atau mengalihkan haknya kepada

orang lain, tetapi bisa diwariskan kepada keturunannya (McKean 1992). Biasanya konsep pemilikan dan penguasaan SDK tersebut merupakan satu kesatuan yang tidak terpisahkan di darat dan laut (*inseparable right for both terrestrial and marine resources*). Pemegang hak biasanya mempunyai hak ulayat atas tanah pertanian di pesisir dan hak akses untuk memanfaatkan SDK di pesisir (Ruddle, Hviding and Johannes *et al.* 1992).

- iii. Milik Pemerintah (*public/state property*) merupakan pemilikan SDK yang berada dibawah kewenangan pemerintah sesuai dengan peraturan yang berlaku. Pasal 4 UURI No. 4/1996 tentang Perairan Indonesia, menyatakan bahwa seluruh sumber kekayaan alam di perairan Indonesia dibawah kedaulatan Negara Republik Indonesia. UURI No. 4/1996 ini mendeklarasikan bahwa Pemerintah memiliki hak, dan bertanggung jawab mengontrol pemanfaatan SDK tersebut. Individu ataupun kelompok masyarakat dapat saja memanfaatkan SDK tersebut atas izin, persetujuan, lisensi, atau hak pengelolaan yang diberikan oleh Pemerintah (McKean 1992). Pemerintah membuat peraturan yang bervariasi untuk pemanfaatan sumber daya kelautan, mulai dari peraturan yang ketat sampai yang belum diatur dengan baik. Pemanfaatan pangkalan Angkatan Laut, serta ladang pertambangan minyak lepas pantai relatif ketat sehingga hanya orang-orang tertentu saja yang boleh masuk ke lokasi sumber daya tersebut. Pemanfaatan taman nasional atau kawasan konservasi laut relatif sedang, tergantung efektivitas *law enforcement*-nya. Pemanfaatan sumber daya perikanan di laut lepas relatif belum banyak diatur. Sering terjadi sumber daya milik pemerintah dibiarkan di kelola masyarakat karena belum bernilai ekonomis. Namun sejalan dengan perkembangan ekonomi, sosial dan budaya, sumber daya yang dimanfaatkan masyarakat tersebut diambil oleh pemerintah lalu izin untuk memanfaatkannya di berikan kepada

swasta atau investor seperti di perairan Pulau Talise dan pantai Malalayang Manado.

iv. Milik Pribadi/Swasta (*private/quasi private property*) adalah sumber daya yang dimiliki oleh perorangan atau sekelompok orang secara syah yang ditunjukkan oleh bukti-bukti kepemilikan, seperti sertifikat hak milik tanah. Pemilik SDK tersebut dijamin secara hukum dan sosial untuk menguasai dan memanfaatkannya bagi kepentingan pemilikinya dan dapat melarang pihak lain untuk memanfaatkan sumber daya tersebut (Bromley dan Cernea 1989). Pemilik dapat menjual, membagi, mentransfer, dan mewariskan ke keturunannya, atau menyewakannya ke pihak lain. Pada umumnya hak milik tersebut di lahan pesisir, sekaligus mempunyai hak dan akses untuk

memanfaatkan sumber daya kelautan disekitarnya. Dalam hal sumber daya milik pemerintah tetapi investor diberi hak dan kewenangan untuk mengeksploitasinya selama kurun waktu tertentu, maka pemegang hak dapat dianggap quasi swasta. Karena kriteria pemilikan dan penguasaannya hampir sama dengan milik pribadi/swasta, mereka bisa menjualnya ke pihak lain. Berdasarkan UURI No. 5/1960, tentang Pokok-Pokok Agraria, menyatakan bahwa ada beberapa tipe pemilikan dan penguasaan lahan: hak milik; hak guna usaha; dan hak guna bangunan. Hak tersebut dibuktikan oleh adanya sertifikat hak milik, HGU dan HGB. Namun banyak penduduk di wilayah pesisir yang belum punya sertifikat, karena diwariskan atau menggarap tanah pemerintah, dan status kepemilikannya tidak jelas.

Tabel 2. Pemilikan Penguasaan Sumber Daya Kelautan dan Karakteristiknya

Tipe	Open Acces	Milik Kelompok	Milik Pemerintah	Milik Pribadi
Kriteria	-tanpa pemilik -tidak ada aturan -tidak ada pelarangan	-hak pokmas, desa atau adat -ada aturan, norma sosial, hukum adat dan sanksi -pokmas dapat melarang pihak lain mengeksploitasi SDK	-hak pemanfaatan SDK diatur pemerintah -ada peraturan pemanfaatan atau manajemen plan -dapat melarang pihak lain -hak pengelolaan dapat disewakan	-hak pemanfaatan hanya utk pemilik -perencanaan tersendiri -dapat melarang pihak lain -hak dapat dibagi diwariskan, ditransfer, dijual
Lokasi	Laut lepas, ZEE	Perairan tangkap tradisional	Pangkalan ALRI, taman nasional	Resort swasta, tanah milik

SEJARAH PEMILIKAN DAN PENGUASAAN SUMBERDAYA DI INDONESIA

Pada jaman penjajahan Belanda, sebahagian besar sumber daya alam adalah milik penjajah. Penjajah hanya mengakui hak milik atau hak warisan bagi masyarakat yang patuh pada penjajah atau tokoh-tokoh serta kaum bangsawan yang berkolaborasi dengan penjajah Belanda. Secara khusus

Belanda tidak banyak mengurus pemilikan dan penguasaan SDK, karena pada masa penjajahan baik sumber daya ikan, ekosistem mangrove dan terumbu karang maupun minyak di lepas pantai masih dipandang kurang ekonomis dan kontribusinya relatif rendah dibandingkan hasil tanaman industri dan rempah-rempah. Banyak penduduk desa pesisir yang nelayan merangkap petani, relatif bebas memanfaatkan SDK tersebut. Pada masa penjajahan sebagian masyarakat

masih beranggapan bahwa jika seseorang memiliki lahan di pesisir maka ia juga mempunyai hak akses memanfaatkan SDK-nya. Jadi pada masa penjajah: *hak milik pribadi; milik kelompok tertentu; milik pemerintah; dan tanpa milik (open access)* sudah ada.

Setelah Indonesia merdeka 17 Agustus 1945, sampai tahun 1960, maka sumber daya lahan dan kelautan secara otomatis menjadi milik Pemerintah Indonesia. Beberapa tipe pemilikan dan penguasaan milik kelompok masyarakat tertentu ataupun milik pribadi ada juga yang dialihkan menjadi milik pemerintah Indonesia, terutama milik kelompok atau orang yang berkolaborasi dengan Belanda. Pemerintah memiliki hampir semua sumber daya, seperti hutan, lahan dan ekosistem pesisir. Namun banyak perkebunan kelapa di pesisir Sulawesi Utara yang dikembangkan pada zaman Belanda, sampai pada saat ini masih dimiliki secara pribadi oleh orang Minahasa, yang mendapat warisan dari pengusaha perkebunan kelapa tersebut.

Pada masa ini, pemerintah mengeluarkan ordonansi *Stb 1939. No. 442* tentang Laut Teritorial Dan Lingkungan Maritim, yang menyatakan bahwa perairan Indonesia adalah 3 mil dari titik pasang terendah dari setiap pulau. Tiga mil ini adalah laut teritorial yang dipandang sebagai bagian dari wilayah pesisir. Dengan demikian pemerintah daerah mempunyai kewenangan untuk menata dan mengelola SDK di perairan teritorial tersebut termasuk mengelola kegiatan perikanan, pelabuhan dan pertambangan. Berdasarkan ordonansi tersebut, nelayan tradisional dijamin secara bebas untuk menangkap ikan di perairan teritorial. Ordonansi ini tidak mengakui secara resmi konsep milik kelompok tertentu (*common property*) namun penduduk lokal memegang teguh dan melaksanakan hak-hak ulayat, norma sosial dan hukum adat mereka dalam mengelola SDK, seperti Sasi di Maluku, atau Ondoapi di Irian Jaya.

Setelah tahun 1960 sampai sekarang pemerintah Indonesia mengeluarkan beberapa undang-undang yang mengatur tentang pemanfaatan sumber daya alam dan

pola pemilikan dan penguasaannya. Pertama PERPU No. 4/1960 tentang Perairan Indonesia, pasal 1 ayat 3 menyatakan bahwa perairan Indonesia adalah 12 mil dari garis pangkal (*base line*). Seluruh sumber daya alam mulai dari titik pasang surut terendah dari setiap pulau sampai 12 mil laut dari garis pangkal adalah milik Pemerintah Pusat. Undang-undang ini mengambil alih kewenangan pemerintah daerah yang dahulu dapat mengelola SDK selebar 3 mil laut (BPHN 1995, p.32). Kedua, UURI No. 5/1960 tentang Pokok-Pokok Agraria, mengatur pemilikan dan penguasaan lahan dalam beberapa tipe seperti : i. hak milik, ii. hak guna usaha, iii. hak guna bangunan, iv. hak pakai, dan v. hak sewa. Dalam pengaturan hak tersebut, tidak ada keterkaitannya dengan hak akses pemanfaatan SDK disekitar lahannya

Setelah masa orde baru, Pemerintah Indonesia mendeklarasikan doktrin Wawasan Nusantara tahun 1973. Doktrin Wawasan Nusantara ini dimaksudkan untuk mencapai tujuan pembangunan nasional. Doktrin wawasan nusantara menyatakan seluruh kepulauan Indonesia merupakan satu kesatuan politik, kesatuan sosial dan budaya, kesatuan ekonomi, dan kesatuan pertahanan/keamanan (Djalal 1996).

UURI No. 5/1974 tentang Pokok-pokok Pemerintahan di daerah, secara implisit mengurangi kewenangan Pemerintah Daerah hanya pada wilayah darat saja. Sehingga banyak Pemerintah Daerah kurang menaruh perhatian terhadap pembangunan kelautan. Pada tahun 1992, pemerintah mengeluarkan UURI No. 24/1992, tentang Tata Ruang, yang memberikan kesempatan secara implisit kepada pemerintah daerah untuk menata ruang lautnya. Akan tetapi undang-undang tata ruang laut sampai saat ini belum diterbitkan, sehingga belum ada dasar hukum bagi pemerintah daerah untuk mengatur pengelolaan SDK.

Djalal (1996) menyatakan, bahwa pada masa orde lama pemerintah tertarik dalam menata perairan Indonesia dalam rangka memperluas hak dan kewenangan untuk mengontrol perairan, mengatur kegiatan di perairan tersebut, dan untuk menciptakan identitas

politik secara nasional. Dari segi ekonomi, SDK belum dianggap strategis untuk memberikan kontribusi bagi pembangunan nasional. Selain itu 'perairan dalam' diantara pulau-pulau di Indonesia sering dilalui kapal asing sehingga memudahkan infiltrasi pihak asing dan dapat menyebabkan disintegrasi. Untuk itu di keluarkan deklarasi Djuanda 1959, yang menyatakan bahwa laut perairan dalam adalah bagian dari kedaulatan negara Republik Indonesia.

Sebagai satu kesatuan ekonomi, kekayaan sumber daya yang ada di Perairan Indonesia adalah milik pemerintah, dan sumber daya tersebut digunakan untuk memenuhi kebutuhan masyarakat seluruh Indonesia. Kegiatan ekonomi yang memanfaatkan sumber daya mineral muncul dengan berkembangnya eksplorasi minyak lepas pantai. Terutama setelah harga minyak meningkat dan memberikan kontribusi yang sangat besar bagi pembangunan Indonesia setelah tahun 1973. Sehingga kepentingan politik pemerintah Orde Baru mendeklarasikan bahwa seluruh sumber daya, baik yang ada di darat maupun di laut adalah milik Pemerintah Pusat, dan tidak mendesentralisasikan urusan pengelolaan SDK ke daerah.

Ditilik dari pemilikan dan penguasaan sumber daya, maka secara de jure SDK yang berada di perairan Indonesia sampai batas 200 mil dari garis pangkal adalah milik Pemerintah. Pemerintah menjamin kebebasan nelayan tradisional untuk menangkap ikan di perairan tersebut sesuai dengan peraturan perundang-undangan yang berlaku.

Berdasarkan tipe pemilikan dan penguasaan seperti yang disebutkan diatas maka setelah Indonesia merdeka sampai saat ini tipe pemilikan mengalami perubahan. Tipe open access semakin berkurang, hanya ada di laut lepas. Tipe milik kelompok (*commons*) juga semakin berkurang karena kewenangannya tidak diakui secara hukum. Tipe milik pemerintah semakin di regulasi, sehingga wilayah pesisir yang tadinya belum diregulasi dan dikelola secara bertahap di serahkan ke investor. Tipe pemilikan pribadi/swasta semakin berkembang.

Untuk melihat lebih jauh konsekwensi kerancuan tipe pemilikan dan kewenangan, maka akan dikaji secara mendalam tipe pemilikan milik kelompok dibawah ini.

TIPE PEMILIKAN KELOMPOK

Beberapa pengambil keputusan dan pelaku kebijakan menyatakan bahwa SDK merupakan *open access property* dan *common property*. Sehingga sering terjadi konflik kepentingan antara berbagai pihak, dan masing-masing berupaya mengeksploitasi SDK tersebut. Kedua tipe pemilikan ini dianggap sama, sehingga perlu diklarifikasikan.

Hardin (1968) dalam "*the tragedy of the commons*" menyatakan bahwa *commons* merupakan *open access property*, sehingga pihak-pihak yang berkepentingan diasumsikan sebagai pelaku yang bebas memanfaatkan sumber daya tersebut. Dia mengasumsikan bahwa pihak yang berkepentingan cenderung untuk memaksimalkan keuntungan dan menyaingi pihak lain untuk memanfaatkan sumber daya tersebut, sehingga sumber dayanya cepat terdegradasi. Oleh sebab itu, Hardin menyarankan agar sumber daya tersebut dikelola swasta atau dikontrol pemerintah. Karena bila dikelola swasta atau pemerintah, maka pengelolaannya lebih baik dan lebih memperhatikan kaidah-kaidah konservasi. Ostrom (1992) mengkritik pemikiran Hardin ini dan menyatakan bahwa *commons* berbeda dengan *open access*. *Commons* adalah milik kelompok masyarakat tertentu yang diikat oleh norma atau hukum adat untuk melegitimasi anggotanya memiliki akses untuk pemanfaatan sumber daya, sedang di *open access* tidak ada pengaturan kepemilikan dan setiap orang bebas memanfaatkannya. Ostrom (1990) menggunakan terminologi "*common pool resources*" (CPR) untuk menyatakan milik komunal. Ostrom menyatakan ada dua kriteria yang memberikan batasan mengenai *commons*: a. adanya biaya (*social costs*) yang digunakan untuk melindungi dan melarang pihak lain untuk mengeksploitasi

sumber daya tersebut; dan b. sumber daya tersebut terbatas sehingga bila dimanfaatkan terus dapat habis.

Bromley dan Cernea (1989) menyatakan bahwa *commons* adalah milik komunal atau sekelompok masyarakat, dan kelompok tersebut dapat melarang pihak lain untuk memanfaatkannya. Clark (1996) mendefinisikan *commons* sebagai sumber daya milik masyarakat atau pemerintah yang dikelola pemerintah untuk kepentingan masyarakat. Berkes (1994) mendefinisikan *commons* sebagai pemilikan sumber daya oleh sekelompok orang yang sukar untuk di pilah-pilah secara individu. Sharp (1998, p.53) menyatakan bahwa *commons* merupakan pemilikan sumber daya oleh sekelompok orang yang telah melembaga dan mempunyai ikatan sosial yang relatif erat, dengan kriteria pemanfaatan yang disepakati dan ditaati serta aturan-aturan mengenai boleh atau tidak sumber daya tersebut dimanfaatkan.

Berdasarkan pemikiran tersebut, definisi milik kelompok masyarakat atau milik komunal (*commons*) bervariasi namun dapat diambil kesamaannya seperti yang diuraikan dalam Tabel 2, bahwa hak pemanfaatan sumber daya dimiliki kelompok masyarakat atau anggota; terdapat norma sosial, hukum adat dan sanksi yang mengatur pemanfaatannya, dan pokmas dapat melarang pihak lain mengeksploitasi sumber daya tersebut.

Oleh sebab itu pemanfaatan SDK yang dianggap *commons* tidak selalu menyebabkan eksploitasi besar-besaran sehingga terjadi "*the tragedy of the commons*", melainkan terdapat bukti-bukti yang cukup banyak, terutama di negara-negara Asia-Pasific, bahwa pengelolaan berbasis masyarakat untuk *commons* lebih baik dari pengelolaan SDK milik pemerintah atau pribadi/swasta (White *et al.* 1994). Beberapa pengelolaan berbasis masyarakat telah berhasil mengelola sumber daya secara lestari (Ruddle, Hviding and Johannes 1992). Meskipun sebagian dari pengelolaan sumber daya komunal ini gagal melestarikannya (Berkes 1994).

Ruddle, Hviding and Johannes (1992) menyatakan bahwa pemanfaatan SDK secara komunal (*commons*) belum terbukti dengan jelas menyebabkan degradasi sumber daya. Oknum-oknum yang memanfaatkan sumber daya komunal tidak selalu memaksimalkan keuntungan dan hanya mementingkan diri sendiri, tetapi ada sanksi sosial yang dihadapi anggotanya bila terjadi penyimpangan dalam mengeksploitasi sumber daya komunal tersebut. Sanksi sosial dan pola pemanfaatan yang berbasis masyarakat ini yang membuat penegakan hukum (*law enforcement*) bisa dilaksanakan secara efektif.

Menurut Ruddle, Hviding and Johannes (1992) Indonesia memiliki model pengelolaan berbasis masyarakat yang sangat kaya untuk pemanfaatan sumber daya kelautan yang bersifat komunal dengan penerapan hak-hak ulayat dan sanksi dari masyarakat. Pengelolaan berbasis masyarakat (PBM) ini telah lebih dari seratus tahun diterapkan di Indonesia Bagian Timur, seperti sasi di Maluku dan Ondoafi di Irian Jaya. Kelompok pemilikinya bervariasi mulai dari desa, marga, klan sampai suku adat (Ruddle, Hviding and Johannes 1992). Hak dan akses untuk memanfaatkan sumber daya tersebut bervariasi tergantung status sosial seseorang di masyarakat dan posisinya dalam menentukan dan mengarahkan kegiatan eksploitasi sumber daya tersebut (Adhuri 1998).

Sasi dan PBM lainnya adalah bagian integral dari adat satu suku tertentu. Hukum adat tersebut digunakan untuk mengatur kehidupan bermasyarakat dan sekaligus pemanfaatan sumber daya disekitarnya (Adhuri 1998). Biasanya sasi, ondoafi dan sejenisnya berada dalam satu pulau kecil, atau desa atau dusun² (White *et al.* 1994). Sasi di Kabupaten Maluku Tengah, diterapkan di desa-desa pulau-pulau Lease seperti desa Noloth, Ameth dan sebagainya. Masing-masing sasi ini berbeda-beda, tergantung karakteristik klan, atau suku yang mendominasi desa tersebut. Ada sasi adat,

² Pengertian desa dan dusun diatur dalam UU no. 5/1979, tentang Pemerintahan Desa

ada sasi dari gereja bagi penduduk yang umumnya beragama Kristen, dan ada sasi di masyarakat yang umumnya beragama Islam.

Salah satu sasi yang diterapkan di Maluku Tengah beberapa waktu yang lalu, telah menunjukkan keberhasilan dalam melestarikan tanaman kelapa, ikan jenis tertentu, lola (*trochus niloticus*) dan teripang sampai tahun 1974 (White *et al.* 1994). Kesuksesan pengelolaan ini karena masyarakat pesisir tersebut memiliki hak untuk mengelola sumber daya darat dan laut secara tidak terpisahkan. Pemimpin masyarakat desa ini menetapkan batas tersebut sampai sejauh mata memandang atau batas tubir laut. Batas ini biasanya ditandai batas-batas yang kelihatan secara fisik, pertemuan antara laut dalam dengan laut dangkal yang ditandai dengan riak-riak ombak, atau antara terumbu tepi dengan drop-off. Wilayah pengelolaan ini disebut sebagai petuanan laut yang lebarnya bisa sampai beberapa mil dari titik pasang surut terendah. Wilayah petuanan ini dimonitor oleh kawang (kepala adat, asistennya dan penduduk desa) jadi konsep pemilikan komunal (*commons*) yang diterapkan melalui sasi dapat diarahkan untuk mengoptimalkan sumber daya darat dan kelautan melalui koordinasi secara kolektif di muara sungai ataupun teluk untuk melestarikan ikan tertentu, lola, ataupun teripang. Pelaksanaan ini bisa sukses karena norma-norma sosial dan hukum adat secara konsisten diterapkan sehingga penegakan hukumnya dapat dilaksanakan secara efektif. Eksploitasi berlebihan dari sumber daya yang di 'sasi' akan mendapat sanksi yang tegas dari adat seperti denda atau diusir dari desa.

Akan tetapi meningkatnya permintaan pasar makanan laut (*sea food*) dan kebutuhan akan lola dan teripang yang berbarengan dengan munculnya keinginan masyarakat desa untuk meningkatkan taraf hidupnya serta membeli barang-barang keperluan rumah tangga mendorong kelompok masyarakat tersebut untuk meningkatkan laju eksploitasinya (Zerner, 1994). Interval waktu pemberlakuan sasi yang satu dengan yang lain semakin pendek, sehingga mengurangi kesempatan ikan, lola,

dan teripang berkembang biak dengan baik, dan lama kelamaan populasinya mengalami penurunan.

Laju kerusakan sumber daya kelautan ini semakin meningkat setelah pihak adat menyewakan (*leasing*) wilayah penangkapan ikan-ikan karang dan laut dangkal kepada nelayan-nelayan komersial dari negara-negara tertentu seperti Taiwan. Kewang menyewakan wilayah tangkapan ikan mereka untuk mendapatkan dana membangun tempat ibadah, prasarana desa dan kebutuhan kelompok lainnya. Sementara nelayan komersial menggunakan teknologi yang lebih canggih untuk mengeksploitasi ikan-ikan yang ada di wilayah tersebut, sehingga laju pemanfaatannya semakin intensif.

Pengalaman pengelolaan berbasis masyarakat tersebut di atas memberikan gambaran bahwa sumber daya yang bersifat komunal (*commons*) dapat dikelola secara lestari. Namun tekanan ekonomi, adanya permainan uang dan kolusi, serta masalah-masalah supra struktural sering melemahkan kinerja pengelolaan tersebut dan penegakan hukum tidak lagi dapat dilaksanakan secara efektif (Zerner 1994, Supit 1994). Oakerson (1992) menyatakan bahwa salah satu kunci dari pelestarian milik komunal ini adalah penetapan laju pemanfaatan setiap individu untuk memanen atau memanfaatkan SDK pada batas-batas yang lestari. Tetapi bila faktor-faktor eksternal mempengaruhi tingkat laju pemanfaatan yang disepakati ini diabaikan, maka sumber dayanya akan mengalami degradasi. Kepala adat tidak lagi mempunyai otoritas yang kuat mengontrol pemanfaatan SDK, karena penyewa mengeksploitasi SDK sesuai dengan kepentingannya. Teknologi yang digunakan turut mempercepat laju pemanfaatan SDK itu, sehingga tidak tersedia waktu untuk melakukan regenerasi kembali.

Di Sulawesi Utara penduduk asli setempat beranggapan bahwa mereka mempunyai hak atas sumber daya darat dan laut di desa mereka (Mantjoro 1997). Ekosistem mangrove, terumbu karang, padang lamun yang terdapat di sekitar desa mereka dianggap milik masyarakat dan mereka menjaganya dari upaya pihak lain

menebang mangrove, membom ekosistem terumbu karang, serta menggunakan perairan untuk budidaya rumput laut seperti yang terdapat di desa Bentenan dan Tumbak. Secara defacto masyarakat desa menganggap SDK di sekitar desa mereka adalah milik komunal sehingga mereka terpanggil untuk melestarikan sumber dayanya.

PEMILIKAN SUMBERDAYA DAN KONFLIK DI SULAWESI UTARA

Pemilikan dan penguasaan sumber daya di Sulawesi Utara menunjukkan bahwa tipe pemilikan sumber daya pada umumnya adalah tipe milik pemerintah, milik komunal, milik quasi-pribadi. Perbedaan persepsi dari tipe pemilikan dan penguasaan sumber daya tersebut memberikan kontribusi terhadap kerancuan pemilikan dan kewenangan, dan dapat menimbulkan konflik. Konflik dapat muncul dari beberapa sebab, namun faktor yang cukup dominan adalah kerancuan tipe pemilikan sumber daya dan kerancuan kewenangan. Artinya kerancuan pemilikan menyebabkan tidak jelasnya siapa yang berhak untuk memanfaatkan satu sumber daya dan berakibat timbulnya pertikaian antara pihak-pihak yang berbeda persepsi di dalam menetapkan siapa yang berhak memiliki SDK. Oleh sebab itu tipe dan konsep pemilikan yang berasosiasi dengan pemilikan SDK dapat memberikan suatu rangka kerja yang berguna untuk menganalisis kewenangan yang rancu dan konflik yang berkembang dalam pengelolaan SDK.

Ada dua tipe konflik, yaitu: konflik pemanfaatan dan konflik kewenangan (Crawford pers. comm. 1998). Konflik pemanfaatan timbul karena beberapa pengguna sumber daya berkompetisi untuk menggunakan sumber daya yang sama dalam ruang laut yang sama, dan menerapkan kegiatan-kegiatan yang memanfaatkan sumber daya tersebut yang tidak sesuai satu dengan yang lain (Dahuri *et al.* 1996). Sebagai contoh, di Taman Nasional Bunaken konflik pemanfaatan muncul antara turis dan nelayan melawan para pencinta lingkungan;

dan antara pengguna jet ski atau perahu catamaran, melawan orang-orang yang melakukan snorkeling atau scuba diving (Dutton pers. comm.1998). Konflik pemanfaatan berkembang didaerah reklamasi desa Malalayang - Manado antara nelayan tradisional dan pengembang; dan antara pengembang dan pemilik tanah yang menghadap ke laut (Manado Post, 20.09.1997). Para nelayan tepi yang tidak punya keterampilan lain kehilangan tempat untuk menangkap ikan, karena tempatnya telah direklamasi dan ikan-ikan pelagis tepi ini menjauh dari dinding bangunan reklamasi (Alfred pers. comm. 1998). Sekarang para nelayan tepi harus mencari ikan lebih jauh dari desanya, sehingga membutuhkan mesin perahu yang lebih baik. Para nelayan yang menggunakan perahu katengteng merasa susah untuk menemukan tempat penambatan perahunya, karena pantainya sudah di beton (Katril pers. comm. 1998).

Di Talise, pengusaha budidaya mutiara mengembangkan usahanya secara ekstensif di wilayah penangkapan ikan tradisional, dan memaksa para nelayan tradisional keluar dari perairan tersebut. Jika mereka masuk ke perairan dekat budidaya mutiara sering konflik atau dipukul penjaga areal budidaya (Malik pers. comm. 1998). Para nelayan Talise harus berlayar jauh, sehingga tenaga mereka terkuras banyak dan waktu mereka habis di perjalanan. Untuk mengkompensasi kehilangan waktu dan tenaga tersebut, maka mereka menggunakan bom atau racun sianida agar hasilnya bisa banyak dalam waktu relatif singkat (Malik pers. comm. 1998). Akibat konflik tersebut, para nelayan membiarkan ekosistem mangrove disekitar desa ditebangi penduduk atau pengelola budidaya mutiara, karena mereka sudah kehilangan rasa memiliki dan tidak ada insentif bagi nelayan Talise untuk melestarikan ekosistem mangrove.

Kompetisi diantara developer yang bersaing mendapatkan izin, mempengaruhi nelayan yang merasa dirugikan dan pemuda putus sekolah untuk berdemonstrasi ke DPRD atau Pemda Kodya Manado meminta agar pembangunan reklamasi distop (Suara Pembaruan 10.11.97). Selain itu, beberapa

pemilik tanah yang menghadap ke laut langsung mengajukan keberatan terhadap reklamasi tersebut. Sebagai pemilik tanah pesisir, mereka merasa memiliki hak untuk menikmati jasa lingkungan laut dan keindahannya dan akses langsung ke perairan. Mereka berpersepsi bahwa keindahan laut dan sumber daya perairannya adalah milik komunal. Tetapi setelah investor lain mendapat izin untuk mereklamasinya dan membangun hotel, maka pemilik tanah tersebut merasa kehilangan sebagian haknya, terlebih bila hotel yang dibangun menghalangi pandangan mereka ke arah laut langsung (Lalamentik pers. comm. 1998)

Di selat Lembeh, nelayan Taiwan yang bekerjasama dengan yayasan tertentu, menyewa perairan tempat penangkapan ikan nelayan tradisional, dan memasang jala net raksasa berukuran 300 x 500 m di mulut Selat Lembe (Suara Pembaruan 29.05.97). Menurut Rossiter (1997) antara tanggal 27 Maret 1996 sampai 12 Februari 1997, perusahaan penangkapann ikan Taiwan diperkirakan menangkap 1.429 ikan pari besar, 18 hiu whale, 312 hiu lain, 4 ikan paus minke, 577 paus pilot, 326 lumba-lumba, 789 marlin, 84 penyu, dan 9 dugong. Mereka mengambil ikan-ikan yang terperangkap ke dalam net dan membantai ikan dan binatang laut yang langka seperti tersebut diatas (Matindas pers. comm. 1998). Akibatnya nelayan tradisional sekitar Selat Lembe, dan nelayan komersial dari Sulawesi Utara, menangkap ikan dengan jumlah yang terus menerus menurun. Nelayan lokal baik tradisional maupun komersial tidak mampu bersaing dengan nelayan asing berteknologi tinggi dan berkolusi dengan kelompok penguasa tertentu (Dako pers. comm. 1998). Konflik semakin mencuat setelah adanya tekanan internasional dari Cetacean Society Internasional, kemudian Menteri Negara Lingkungan Hidup dengan beberapa orang yang menaruh perhatian terhadap kelestarian Selat Lembe, menyetop penangkapan dengan perangkap net raksasa tersebut dan mengajukan perusahaan tersebut ke pengadilan (Matindas pers. comm. 1998).

Dari kejadian tersebut, terdapat kerancuan pemilikan dan hak pemanfaatan, serta kerancuan kewenangan. Secara defacto, para nelayan dan masyarakat di sekitar Selat Lembe merasa memiliki dan berhak memanfaatkan sumber daya perikanan tersebut secara turun temurun, masyarakat Cetacean Internasional merasa binatang laut langka perlu dilindungi, tetapi pemerintah melalui Ditjen Perikanan merasa sebagai pemilik sumber daya ikannya dan berhak memberikan izin kepada pihak investor untuk mengeksploitasi ikannya. Kewenangan ini menjadi rancu setelah pihak penguasa dan pengusaha berkolusi, sehingga instansi yang berwenang tidak dapat mengontrol izin yang dikeluarkan (Matindas pers. comm. 1998).

KESIMPULAN

Konflik kewenangan berkembang karena adanya kerancuan pemilikan dan hak penguasaan SDK, serta kerancuan kewenangan diantara beberapa instansi yang mempunyai hak mengeluarkan izin. Sampai saat ini penetapan pemilikan dan penguasaan SDK belum ditata dengan baik, apakah milik masyarakat (*commons*), tanpa pemilik (*open access*), milik pemerintah atau quasi-swasta. Kerancuan dalam pemilikan ini berimplikasi siapa yang berwenang mengelolanya dan memberi izin pembangunannya. Sering pemilikan dan hak pemanfaatan ini dikaitkan dengan pemilikan lahan pesisir. Masyarakat di pesisir mempunyai persepsi yang berbeda dengan pemerintah, pemilik lahan menganggap mereka yang berhak memanfaatkan SDK didepan lahan mereka. Selama pemanfaatan tersebut tidak menimbulkan nilai ekonomi yang relatif besar, instansi yang berwenang kurang tertarik mencampuri urusan absah tidaknya pemilikan tersebut. Tetapi bila nilai ekonomi pemanfaatan SDK relatif besar, maka berbagai pihak mengklaim bahwa mereka yang berhak menatanya. Ironisnya, bila sumber daya tersebut mengalami degradasi, banyak masyarakat dan pemerintah daerah yang dituding sebagai pihak-pihak yang bertanggung jawab. Dari kasus-kasus konflik

diatas, belum ada instansi yang berwenang secara resmi menyatakan bertanggung jawab dan ikut menyelesaikan konfliknya.

Hak dan kewenangan diantara instansi pemerintah dalam mengelola SDK ditingkat pusat masih tumpang tindih, sebaliknya hak dan kewenangan pemerintah daerah belum jelas (Dahuri *et al.* 1996). Banyak kegiatan pembangunan di wilayah pesisir yang membutuhkan izin berbelit-belit. Izin prinsip pembangunan reklamasi pantai dikeluarkan Walikota, Amdal pembangunannya harus disetujui BAPEDAL Pusat. Di dalam kawasan reklamasi tersebut terdapat pembangunan yang membutuhkan lisensi atau izin dari instansi pusat, seperti pembangunan dermaga atau jetty, hotel berbintang dan pembangunan lainnya. Sehingga investor menghabiskan waktu yang relatif lama untuk memproses izin pembangunan di wilayah pesisir. Untuk memotong jalur birokrasi tersebut, maka timbullah praktek kolusi dan biaya sosial yang besar yang mengundang berbagai pihak merasa perlu mendapatkannya. Praktek kolusi dan ketidak transparanan proses izin melemahkan penegakan hukum, sehingga aturan-aturan pengelolaan yang telah ditetapkan tidak dilaksanakan secara benar.

Kewenangan sering diinterpretasikan secara berbeda-beda tergantung kemampuan pihak yang berkepentingan menjustificasinya (Dutton pers. comm. 1998). Justifikasi tersebut didasarkan dari berbagai peraturan perundang-undangan yang mendukung tugas pokok dan fungsi instansinya. Ironisnya undang-undang dan peraturan pendukungnya sering tumpang tindih, atau mempunyai celah-celah yang bisa diinterpretasikan secara berbeda-beda. Penerapan interpretasi ini, tanpa ada koordinasi, transparansi dan sosialisasi terhadap berbagai pihak terkait akan menimbulkan konflik kewenangan, seperti yang terjadi di TNL Bunaken.

Kerancuan dalam penetapan pemilikan dan penguasaan sumber daya akan mendorong timbulnya konflik pemanfaatan dan konflik kewenangan. Kedua konflik ini akan mengurangi rasa memiliki (*stewardship*) pihak-pihak yang bertikai dan

mereka akan mengabaikan kelestarian SDK yang dimanfaatkan. Pihak lain akan mengeksploitasi SDK sesukanya, tidak ada lagi insentif bagi mereka untuk melestarikannya. Implikasinya, SDK seperti mangrove, terumbu karang dan ikan, akan mengalami degradasi sampai pada tingkat yang mengkhawatirkan.

Oleh sebab itu dalam pengelolaan SDK di wilayah pesisir, pihak yang terkait dan pemerintah daerah dan pusat perlu memetakan siapa yang berhak memiliki dan memanfaatkan sumber daya kelautannya serta sejauhmana hak pengelolaan tersebut dapat dilimpahkan ke pihak swasta yang akan mengelolanya. Pemetaan dan penetapan pemilikan dan penguasaan SDK merupakan salah satu kunci dalam pengelolaan wilayah pesisir.

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CONDITION OF CORAL REEF RESOURCES IN INDONESIA

SUHARSONO

Pusat Penelitian dan Pengembangan Oseanologi LIPI,
Jakarta, Indonesia

ABSTRACT

The Indonesian archipelago is one of the global centers of species diversity of hard corals and many groups of reef associated flora and fauna. Assessment of the present status of coral reef in Indonesia using life form method and based on the percentage of living coral cover showed that out of 421 stations located in 43 different areas, 6.41 % of the reef areas were in excellent condition, 24.23 % in good condition, 29.22 % in fair condition and 40.14% in poor condition. . Within Sulawesi, Maluku and Nusatenggara Island are the most extensive reef development as well as highest coral species diversity which occur in a vast and geologically diverse area. Generally coral reefs in Indonesia are dominated by *Acropora* spp., *Montipora* spp., and *Porites* spp., at shallow water whereas in the greater depth coral growths are dominated by *Echinophora* spp., *Mycedium* spp., *Oxyopora* spp. and *Turbinaria* spp.. The major causes of coral reef degradation in Indonesia are bleaching events and human activity. The human activities take the form of over exploitation, physical damage and death due to marine pollution. Destructive fishing techniques are often practised including blasting and use of poisonous chemicals such as cyanide. Coral reef ecosystems adjacent to rapidly growing cities such as Jakarta, Ujung Pandang, Ambon and Manado have collapsed or deteriorated drastically due to pollutants.

Key word : Coral reefs distribution, status, degradation.

ABSTRAK

Kepulauan Indonesia merupakan salah satu pusat keanekaragaman jenis karang dan beberapa jenis biota lain yang berasosiasi dengan terumbu karang. Di sekitar Sulawesi, Maluku dan Nusatenggara karang tumbuh dan berkembang sangat baik dan mencapai keanekaragaman yang tertinggi. Secara umum karang di daerah dangkal didominasi oleh *Acropora* spp., *Mantipora* spp., dan *Porites* spp., sedangkan di daerah yang lebih dalam didominasi oleh *Echinophora* spp., *Mycedium* spp., *Oxyopora* spp., dan *Turbinaria* spp.. Penyebab kerusakan karang yang utama di Indonesia adalah bleaching dan aktivitas manusia. Kegiatan manusia yang dapat menyebabkan kerusakan karang adalah tangkap lebih, pencemaran. Kerusakan akibat penggunaan bom dan cyanida yang sampai saat ini masih tetap berlangsung. Sedangkan terumbu karang yang berada dekat dengan kota besar seperti Jakarta, Ujung Pandang, Ambon dan Manado telah rusak berat akibat menurunnya kualitas perairan.

Keyword: Distribusi terumbu karang, status, degradasi

INTRODUCTION

Indonesia is the world's largest archipelago, comprising of more than 17,000 individual islands with 80,791 km of coastlines. Approximately two

thirds of the Indonesian coastline are protected by coral reefs and all reef types are present in Indonesia. Fringing reefs are the commonest throughout Indonesian seas. These reefs support high degree of marine biodiversity such as fish,

crustaceans, echinoderms, algae and sponges (UNEP/IUCN 1988).

Indonesia is considered one of the center of coral reef distribution in the Indo-Pacific and enjoys the highest coral species richness in the world (Veron, 1995). Coral reefs are sources of food product and nonfood items. Non food items include building materials, raw materials for industry, pharmaceutical products or bioactive substances. Being the most diverse ecosystem with a variety of colours and shapes, coral reefs provide a rare beauty, unmatched for recreational, educational and research purposes. Several million villagers in coastal areas depend upon coral reef fish for their livelihood as well as for their main source of animal protein. Recently coral reefs have become subject to commercial exploitation via tourism.

Over the past 10-15 years progressive degradation of the reefs in several areas has been recognized. Many of the reefs have less living coral cover and smaller fish than they did before as a result of combined human and natural factors (Tomascik et al. 1993). Natural disturbances, such as the bleaching event in 1983 caused mass mortality of coral species (Brown and Suharsono 1990). In that year devastating bleaching associated with higher than normal temperature occurred throughout the islands of Lombok, Bali, Karimun Jawa, and Kepulauan Seribu, and Sunda Strait, causing large scale mortality of coral reefs.

Several reefs are under intensive indirect use through a wide range of human activities. It has been pointed out that a decrease of about 40-70 % of world reefs may occur in the next 10-40 years (Wilkinson, 1992). This report aims to describe the condition of Indonesia's coral reefs and to identify the major human activities that may affect coral reefs. The last section addresses actions that have been taken by the government to protect coral reefs.

METHODS

This studieson which this report is based several means of data collection including field observation, personal interviews and document analysis. The line transect method was used to assess the condition of coral reefs in 43 different areas throughout Indonesian waters (Figure 1). A measuring tape was placed across the reef and any coral colony underlying the line transect was recorded and the projected length of living coral and other organism on the tape was measured to the nearest centimeter. Two depth ranges were sampled; the upper reef slope (3 m depth) and middle reef slope (10 m depth). At each depth a set of 3 replicates 50 m long positioned parallel to the shoreline were surveyed. Assessment was done through SCUBA diving, and the data were recorded on waterproof data sheets. Sessile benthos underlying the line transect were classified into 27 categories at the level of lifeform (DeVantier 1986, English et al. 1994). The field data were entered into a dBase program for storage, checking and analysis.

Several interviews were conducted with fishermen who are familiar with particular coral reef uses (e.g. bomb and cyanide fishing). These interview assessed their impressions of reef condition, how these conditions have changed over time and the major impacts on reefs. Documents analyzed included government and non-governments organization reports, especially about reef resource use patterns and reef management.

RESULTS AND DISCUSSION

Wetern Indonesia Reefs

The coastal environment of West Sumatera consists of a chain of islands and shallow water reef, separated from the mainland of Sumatera by deep water. It extends from Simuelue Island in the north to the Enggano Islands in the south east. The eastern side of those islands are, in some places, covered by mangrove. Some coral species such as *Porites* spp. and *Goniastrea* can often be

found adjacent to Rhizophora roots. Further seaward more corals appear and among the most abundant are massive Porites which can form microatolls. They are mostly dominated by coral boulder of Porites and big column of Goniastrea. The reef flats are very wide and they slope gently down to 5-10 m depth. The soft bottom substrate coral communities are dominated by various species of Acropora, Seriatopora sp. and Pocillopora. From the depth of 5-10 m a steep reef slope goes down to more than 100 m depth. Coral reef communities are dominated by Acropora spp. and Montipora spp.

There are two chains of small islands running parallel to the east coast of Sumatera at a distance of about 10 and 30 km respectively. The inshore chain is situated on the continental shelf with depth around 50-80 m while the outer chain is in 200 m isobath right on the continental slope. The reef flats are relatively narrow and gently sloping down to 10 m depth. On the western side of the island spurs and groves are well developed. The eastern side of these islands are relatively protected from strong wave actions. On the western side, the coral communities are dominated by Acropora formosa group and Montipora while in the eastern side they are dominated by massive corals such as Porites spp., and Diploastrea. A steep reef slope is found in the 10-40 m depth with octocoral and gorgonian being the most common, some reaching as large as 3 m. The coral reefs communities are subject to heavy sedimentation from rivers in Sumatera. Some 49 genera were found from this study area whose condition ranges from good to poor.

Reefs are poorly developed on the northern part of the east coast of Sumatera but are widespread around the offshore island to the south of Riau Kepulauan as far as the islands of Bangka and Belitung. Mangroves are well developed on the inshore and offshore islands due to many large rivers which flow into the sea bringing high sediment and decreasing the salinity. The reef flats in the offshore island are relatively narrow, terminating at their seaward edge in shallow reef slopes down to approximately 5-7 m. Coral reef communities are well

developed at the upper reef slope down to 7 meter depth. Coral growths are dominated by branching coral Acropora, Echinopora and massive coral such as Favites and Favia in which the larger size is up to 1-2 m.

The fringing reefs along the south coasts of Java develop only in certain areas such as Panaitan Island, Pangandaran, Pangumbahan, and Parangtritis. The most extensive reef developments on East Java occur along the coast of Grajagan, Watu Ulo to Blambangan Peninsula. Coral reefs in this area are subject to high-energy waves and are dominated by digitate Acropora such as Acropora degitifera and Acropora humilis. The north coast of Java by contrast is lacking of fringing reef except in Banten Bay and Jepara Bay. Millions of tons of sediments are deposited along the north coast of Java every year. Coral reefs are developed well on the offshore islands in the Java Sea such as the islands of Karimunjawa, Bawean, Kangean and Kepulauan Seribu. Coral reef structures on the offshore islands north of Java are patch reefs or fringing reefs which slope down gradually to the depth of 15-20 m. The reef flat of the subtidal patch reefs are dominated by branching corals in the windward side while in the leeward sides Porites nigrescens is the commonest species. The reef slope has mainly encrusting and foliaceous corals such as *Mycedium*, *Echinophylia*, *Oxypora* and *Pachyseris*. A total of 56 genera containing 193 species have been recorded in the Kepulauan Seribu (Moll and Suharsono 1986).

No study has been carried out around west and southern Kalimantan so far. In these areas mangroves are well developed. Many large rivers flow into the sea. Almost all of the east coasts of Kalimantan are covered by pristine mangrove swamps, followed by seagrass beds and then fringing reefs. Fringing reef are well developed along offshore islands at a distance of about 20-40 km from the mainland. Porites spp. and large foliaceous species Montipora spp. and Turbinaria spp.

are the most dominant scleractinian corals in these areas.

Nusatenggara is situated on the border of Indian Ocean and Banda Sea. It consists of several thousand of islands, stretching east to west, with coastlines dominated by rugged, rocky shores sloping relatively steeply into the sea. Reef flats are mostly narrow, with the slope varying from gently to steep down to 30-50 m. The southern coasts are exposed to oceanic swell throughout the year and the corals here are dominated by encrusting or low branching species such as *Seriatopora* sp., *Stylopora* sp. and *Acropora humilis*. In some places there are relatively sheltered bays with mangrove. There are several places with very strong tidal currents, flowing through the straits. Coral development is greatest in the west and north coast of the islands. Reef formations in Nusatenggara reach approximately 30 m depth and coral species are very diverse reaching their maximum richness. The underwater topography of Nusatenggara is very rugged and known as refuge areas for coral species (Best et al., 1989). A total of 225 coral species belonging to 61 genera were recorded. Coral species are mostly dominated by branching *Acropora* spp., *Seriatopora* sp.. In sheltered areas large stand of *Echinopora* spp. and *Montipora* spp. are found.

Oceanic reefs such as Takabonerate, Lucipara Islands and Tukang Besi Island are found in the Banda Sea. These rise from great depths and are remote from major influences of continental processes such as land runoff, siltation, turbidity etc. Lucipara Island has the widest reef flat and the greatest reef development. The reef contains a variety of habitats related to different degrees of exposure to prevailing winds, waves and currents. The sheltered areas or lagoon are dominated by *Anacropora* sp., *Acropora* spp., and *Galaxea fascicularis*. In the more exposed areas the dominant species are *Favia speciosa*, *Montipora verrucosa*, and *Platygyra daedalea*. A total of 198 coral species belonging to 68 genera were recorded in Takabonerate (Best et al. 1989).

The seas surrounding Sulawesi Island are the main reef areas in Indonesia and well known as the global center of coral species diversity. The coastline of Sulawesi is bordered by an almost continuous fringing reefs. The deep seas surrounding Sulawesi generally remain extremely clear and favour reef development. Coral communities are typically diverse and mixed. Four major reef types can be found in Sulawesi waters: barrier reefs, fringing reefs, patch reefs and atolls. Takabonerate is the largest atoll in Indonesia and the third largest in the world.

3. Eastern Indonesia Reefs

Maluku has numerous large and small volcanic islands. Generally these islands are situated within zones of high tectonic activity and earthquakes. Maluku is surrounded by deep seas and is located between Sunda shelf in the west and Sahul shelf in the east. Several volcanic islands with fringing reefs are found in Banda and Halmahera. The coastlines are usually rugged with narrow and steep beaches. Reef flats are narrow and gently sloping down seaward to about 2-5 meter depth, followed by a drop down at an angle of 80-90° to a depth greater than 100 m or sometimes down to where the ocean floor can not be seen. The shallow subtidal reef flats are dominated by acroporoid assemblages or *Millepora*, while vertical walls are densely covered by massive and encrusting corals, soft corals and gorgonians.

The southern coast of Irian Jaya is continuously covered by mangrove. These rivers cause high sedimentation and salinity fluctuations. Reefs here are poorly developed. Irian Jaya coral reefs are most developed in Teluk Cendrawasih, Padaido Island, Auri Island, Mapia Island and Raja Ampat Island. Many reefs in Irian Jaya have not been surveyed but are thought to be in good to excellent conditions. Coral reefs in Teluk Cendrawasih are still in good condition and have achieved their highest development and diversity here. Generally offshore islands have narrow fringing reefs with steep reef slope down to great depths (200 m).

There are four major types of island and reef system in Indonesia: 1) fringing reefs, 2) barrier reefs, 3) atoll and 4) patch reefs. Each reef has many derivatives. Indonesia has at least 76 barrier reefs, 55 atolls, 40 patch reefs, and total reefs area is estimated at more than 85.707 km² (Tomascik et al. 1997). Coral cover and generic richness have been measured and counted at several locations throughout Indonesia (Table 1). We use live coral cover as an indicator for coral reef health. Although some people question the assertion that high coral cover (more than 50%) is an indication of a healthy coral reef and low coral cover (less than 50%) being an indication of unhealthy reefs, one thing is surely clear, coral growth depends upon where the reef is located. Coral cover can definitely be used as an indicator for the coral reefs adjacent to human settlement. In remote areas lower coral cover is not necessarily indicative of unhealthy reefs. For example, most areas that are exposed to strong and small wave action like those in the south of Java and Nusatenggara Islands, and some areas which have windward facing reef margins, such as ridges spur and groove, show reduced coral cover and high coralline algae cover or soft coral cover. In western Indonesia, coral reefs are subject to greater anthropogenic impact compared with those in the central and eastern Indonesia. For example 70% of coral reefs in the Kepulauan Seribu near Jakarta, are in poor condition (Table 1). 1) In this case percent age of coral cover can be used as indicator of reef health. A total of 421 stations from 43 different locations of reefs throughout Indonesia have been surveyed. The results showed that 40% of the reefs were in poor condition while 7% are in excellent condition. The clear water of the central and eastern part of Indonesian seas permits corals to develop to a depth of more than 30 m. In the western Indonesia, in contrast, coral growth is limited to an average depth of no more than 20 m. Shallow water coral reefs in Indonesia are dominated by *Acropora* spp., *Montipora* spp. and *Porites* spp.. In greater depth coral growth is dominated by

Echinopora sp., *Mycodium* sp., *Oxypora* sp. and *Turbinaria* sp. This difference in coral domination can be related to the degree of exposure to water movement. Certain species function as indicators for either sheltered or more exposed biotopes. For example *Porites* sp. survives better in sheltered and turbid water and becomes the dominant genera of a less diverse community. Alternatively *Acropora* sp. and *Montipora* sp. flourish in habitats more exposed to water movement and clear water.

The Indonesian archipelago is the center of the greatest diversity in term of *Acropora* species, with 78 species recorded so far. This is much higher than the 60 species recorded from the Great Barrier Reef (Wallace, 1997). In total approximately 364 species of Scleractinian coral belonging to 76 genera have been recorded from various localities of the Indonesian waters. The high diversity of coral fauna of Indonesia is enhanced by a high level of endemism.

The Major Natural and Anthropogenic Disturbances to coral in Indonesia

Bleaching is a major natural disturbance affecting coral reefs in some areas of Indonesia. In 1983 bleaching events were recorded in Karimunjawa Islands, Seribu Islands and Sunda Strait. Coral mortality reached 80-90%, extending from the reef flat down to a depth of 15 m. Oceanographic data collected during the bleaching event indicated that sea surface temperature reached 2-3°C above normal during March - June 1983 (Brown and Suharsono, 1990). That coral bleaching event and subsequent mass mortality of Scleractinian and other zooxanthellae reef organisms has been linked to synergistic effect of increased temperature, unusually cloud free and calm weather during that time.

Human impacts, direct and indirect, have been recognized as a higher threat than natural disturbances. Many stresses on coral reefs from human activity have been well documented such as dredging, siltation, organic pollution, oil pollution, sewage, blast fishing, fish poisoning, anchor damage,

construction of infrastructure on reefs and marine tourism (Gomez et al. 1994; Jameson et al. 1995; Hawkin and Roberts 1993; Wilkinson and Ridzwan 1994). The major causes of coral reef degradation in Indonesia are blast fishing, sewage, industrial pollution and cyanide fishing. The majority of the Indonesian population are concentrated along the coast. Rapid economic developments in particular those closer to major population centers resulted in large amounts of sewage and industrial pollution which have caused the decline of many reef areas especially the reef in front of the growing cities such as Jakarta, Ambon and Ujung Pandang. Umbgrove (1929) noted that the reef in Nyamuk Besar (Jakarta Bay) was characterized by a prominent *Montipora ramosa* and *M. foliosa* facies today none of those remains. Recent studies show that living coral cover in Jakarta Bay and Ambon Bay ranged from 2.5 - 24.01 % respectively.

Muroami fishing and blast fishing are considered major factor contributing to physical damage to the reefs. These fishing techniques cause corals break and damage the bottom habitat. There are at least two types of fishermen using blast fishing: (1) small scale fishermen using self constructed bombs made from fertilizer in order to catch fishing by blowing up small reef areas at shallow water near by their house; (2) medium scale to large scale bomber using big bombs and detonators. They fish in remote areas (about 7-10 day trips), destroying vast areas of reef, from reef slope to about 20 m depth. They also use tire compressors to supply air to divers who collect the fish.

The demand for reef dwelling grouper and humpehead wrase has risen dramatically over the past few years and Indonesia is now the largest single industry to supply living reef fish into Asian market. It is estimated that more than 50 % of the total wild caught living reef fish are currently supplied to Hong Kong and Singapore (Johannes and Riepen, 1995). Cyanide is a broad spectrum poison causing damage to the liver, instentine and reproductive organ of the fish and causing extensive damage to corals. Blast fishing and cyanide fishing

have caused irreversible damage to many Indonesian reefs. These destructive fishing techniques continue to be practised throughout Indonesian water (Figure 2).

Management

Currently there is no policy coordinating mechanism that is specifically concerned with Indonesia's marine resources. Coordination of decision making process is required at various levels, covering broad strategic policy planning, and detaile local management planning. Each sectoral agency (ministry) is typically responsible for the formulation of its own policy and subject to having the necessary legal basis, may issue its own implementation regulations. To some degree, policy formulation is a consensus forming exercise but the full implications of the actions of one ministry upon all other users are not always apparent.

There are no special management measures protecting and conserving the Indonesian coral reefs. Management methods are included in the general marine and coastal resources management and conservation program which consist of coastal resources planning, fishery and environmental regulation and development of marine parks and reserves. Coastal zone planning and implementation, including coral reef managemnet, involves a number of agencies at three government levels. This underscores the complexity of coastal zone management in Indonesia. It is challenging to set aside coastal zone planning in areas where there are competing development objectives sponsored by different agencies.

The strategies of the Indonesian government in marine conservation is to achieve sustainable utilization of Indonesian marine resources and to protect critical habitats for the sustainability of commercially valuable species and for survival of the vulnerable endemics marine species. There are 4 types of protected area in Indonesia: 1. Strict Marine Nature Reserve (7 locations), 2. Marine Wildlife Reserves (7 locations), 3. Marine National Park (7 locations) and 4. Marine Recreational Park (13 locations), covering a area of 461.9 million ha.

Although 34 Marine Conservation areas have been established throughout Indonesia, it should be noted that to date many of these conservation areas occur only on paper since there has been no commitment to staffing and operational funding so far.

CONCLUSION

Indonesia's coral reefs are of considerable global significance. The majority (70%) of these reefs are in fair to poor condition only; less than 7 % are in excellent condition. They are under increasing direct and indirect use pressure and are being constantly degraded by inappropriate and often unsustainable use. A comprehensive and multisectoral approach for their management is needed.

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Figure 1. Map of Indonesian Archipelago Showing The Location of Study Sites

TABEL I
STATUS OF INDONESIAN CORAL REEFS

No.	Location	No. of Station	Excellent	Good	Fair	Poor	No. Genera	Note
WESTERN INDONESIA								
1.	Sunda Strait	16	0	1	6	9	50	- Industrial areas, major shipping route, blast fishing, cyanide
2.	Belitung Islands	7	0	2	3	2	55	- Under develop areas
3.	Seribu Islands	40	0	4	8	28	63	- Industrial and domestic pollution, intensive tourism, oil refinery
4.	Natuna Islands	11	2	5	3	1	51	- Developing oil industry
5.	Nusakambangan Islands	3	0	0	1	2	30	- Oil refinery, domestic pollution
6.	Bali Island	14	0	0	2	12	50	- Intensive tourism
7.	Kangean Islands	9	0	6	3	0	40	- Developing oil industry, blast fishing, cyanide
8.	Bakauheni	8	0	3	4	1	50	- Harbour, shipping route
9.	Jejara	5	0	0	1	4	36	- Fish pond areas
10.	Siberut Islands	13	0	0	1	12	42	- Under develop, blast fishing, explosion of <i>Acanthaster planci</i>
11.	Merak Islands	5	0	0	1	4	40	- Harbour, industrial and domestic pollution
12.	Madura Island	5	1	3	1	0	40	- Developing area, blast fishing, cyanide
13.	Bangka Island	2	0	2	0	0	35	- Under develop
14.	Baluran, Pasir Putih (East Java)	9	1	2	4	2	37	- Tourism
15.	Weh, Sabang	6	0	1	3	2	48	- Tourism, developing area
16.	Nias, Sibolga	8	0	1	4	3	42	- Under develop, blast fishing, cyanide
17.	Riau	7	3	3	1	0	48	- Developing areas, blast fishing, cyanide
18.	Enggano	5	0	0	0	5	38	- Under develop
19.	Karimun Jawa	5	0	1	4	0	58	- Under develop, tourism, blast fishing, cyanide
Total		178	7	34	50	87	853	
Percent Cover			3.93 %	19.10 %	28.09 %	48.88 %		
CENTRAL INDONESIA								
20.	Lombok Islands	24	2	4	4	14	65	- Intensive tourism, blast fishing
21.	Sumbawa Islands	3	0	3	0	0	50	- Developing area, blast fishing
22.	Komodo Islands	6	2	2	1	1	68	- Conservation area, tourism
23.	Rinca Islands	14	3	5	2	4	54	- Conservation area
24.	Selayar Islands	5	0	2	3	0	61	- Developing area, blast fishing, cyanide
25.	Takabonerate Islands	24	0	1	6	17	65	- National park, blast fishing, cyanide
26.	Tukang Besi Islands	10	0	0	4	6	43	- Under developing, conservation area, cyanide
27.	Banggai Islands	17	1	8	6	2	62	- Under develop, blast fishing, cyanide
28.	Kumeke Islands	9	1	2	2	4	40	- Under develop
29.	Dulupi Islands (Gorontalo)	4	0	0	3	1	39	- Developing area
30.	Derawan Islands	8	0	1	6	1	64	- Under develop, blast fishing
31.	Wetar Islands	8	0	1	5	2	35	- Gold mining
32.	Togian Islands	5	0	3	2	0	65	- Under develop, tourism
33.	Kapoposang Islands	4	1	0	3	0	68	- Developing areas, tourism
Total		141	10	32	47	52	799	
Percent Cover			7.09 %	22.70 %	33.33 %	36.88 %		
EASTERN INDONESIA								
34.	Tobelo Islands	14	0	4	2	8	61	- Under develop
35.	Morotai Islands	14	0	0	1	13	50	- Developing areas, blast fishing, cyanide
36.	Ambon Bay	10	1	5	2	2	58	- Domestic pollution, harbour
37.	West Seram	4	0	3	1	0	60	- Conservation area, blast fishing
38.	Banda Islands	7	1	5	1	0	47	- Conservation area, blast fishing, cyanide
39.	Kei Islands	17	2	3	7	5	42	- Developing area, blast fishing
40.	Padaido Islands	14	0	5	7	2	50	- Under develop, blast fishing, cyanide
41.	Lucipara Islands	8	5	3	0	0	63	- Remote area
42.	Cendrawasih Bay	12	1	7	4	0	60	- Conservation area, blast fishing, cyanide
43.	Biak	2	0	1	1	0	48	- Developing area, blast fishing, cyanide
Total		102	10	36	26	30	539	
Percent Cover			9.80 %	35.29 %	25.49 %	29.42 %		
TOTAL CONDITION								
Total		421	27	102	123	169	2,171	
Percent Cover			6.41 %	24.23 %	29.22 %	40.41 %		

Excellent : Living coral cover 76 - 100 %

Fair : Living coral cover 26 - 50 %

Good : Living coral cover 51 - 75 %

Poor : Living coral cover 0 - 25 %

KEBUTUHAN RISET UNTUK MENDUKUNG IMPLEMENTASI PENGELOLAAN SUMBERDAYA PESISIR DAN LAUTAN SECARA TERPADU

ROKHMIN DAHURI

Pusat Kajian Sumberdaya Pesisir dan Lautan (PKSPL)

Institut Pertanian Bogor

ABSTRACT

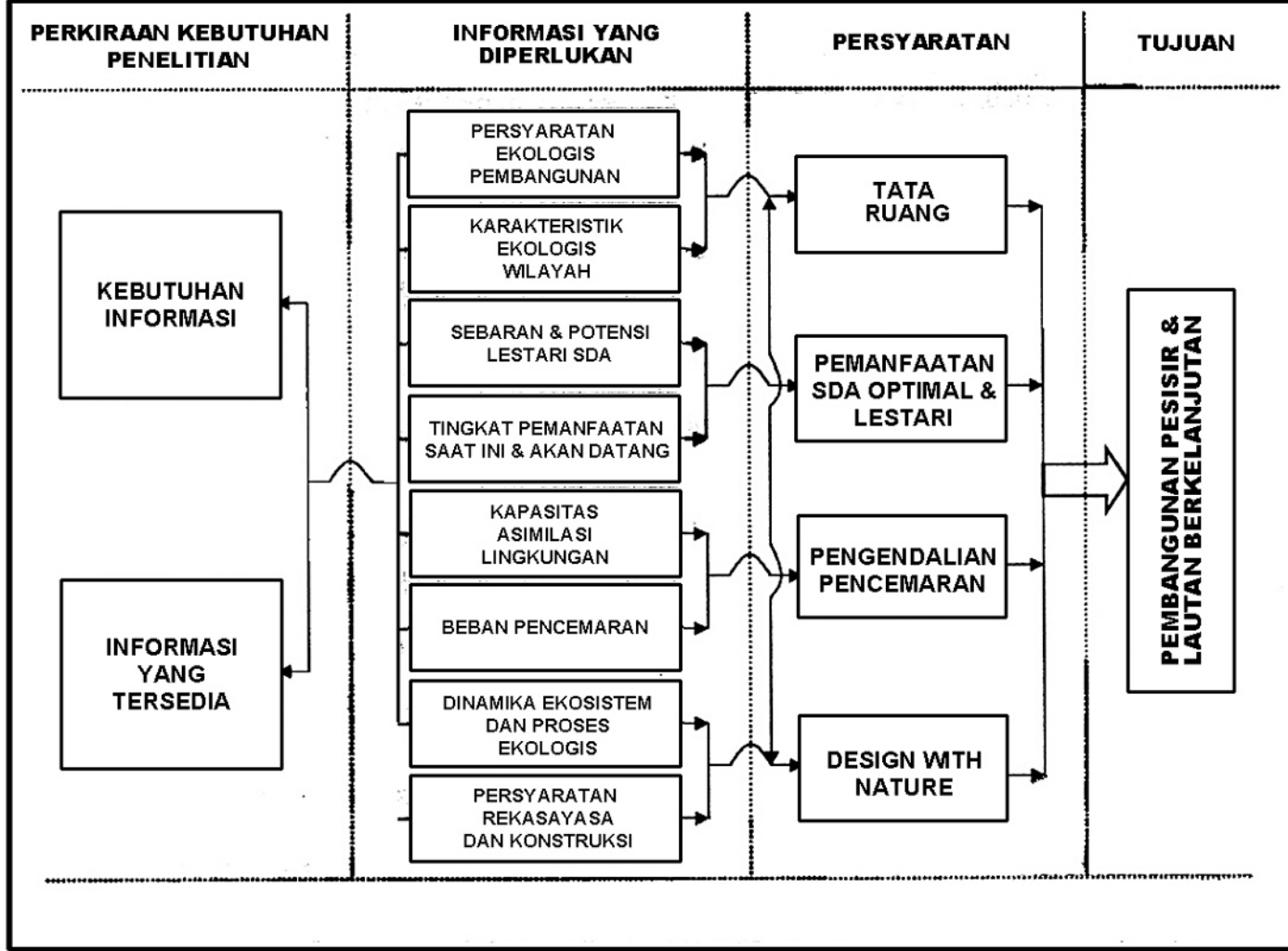
Coastal zones are the most densely populated regions in the world and also areas where various development activities take place. The concentration of human beings and various activities in this area is mostly due to three strong economic rationales, i.e., coastal zone is the most productive area on earth, coastal zone provides accessibility for various activities, and coastal zone is attractive for recreation and tourism. Unfortunately, those rationalities make the area prone to degradation and unsustainable use/development patterns. In Indonesia such damage is mostly due to the development that is oriented more to economic growth without sufficient attentions to coastal ecosystem characteristics, function, and dynamics, whereas in marine and coastal zones including all the resources in them is hoped to be the basic pillar for the national development in the 21st century.

Because of that, basic improvements in coastal resources plans and management are imperative. The development paradigm which is oriented only to economic growth need to be replaced with sustainable development. The approach and practice of coastal zone development management which is implemented sectorally and separately to date can be improved through an integrated management approach. This paper discusses then need for a research agenda to support integrated marine and coastal zone management

Key words: marine and coastal zones, marine and coastal resources, sustainable development, research agenda.

ABSTRAK

Wilayah pesisir merupakan kawasan yang paling padat dihuni oleh manusia serta tempat berlangsung berbagai macam kegiatan pembangunan. Konsentrasi kehidupan manusia dan berbagai kegiatan pembangunan di wilayah tersebut disebabkan oleh tiga alasan ekonomi yang kuat, yaitu bahwa wilayah pesisir merupakan kawasan yang paling produktif di bumi, wilayah pesisir menyediakan kemudahan bagi berbagai kegiatan, dan wilayah pesisir memiliki pesona yang menarik bagi obyek pariwisata. Hal-hal tersebut menyebabkan kawasan pesisir di dunia termasuk Indonesia mengalami tekanan ekologis yang parah dan kompleks sehingga menjadi rusak. Di Indonesia kerusakan wilayah ini terutama disebabkan oleh pola pembangunan yang terlalu berorientasi pada pertumbuhan ekonomi, tanpa ada perhatian yang memadai terhadap karakteristik, fungsi, dan dinamika ekosistem. Padahal wilayah pesisir dan lautan beserta segenap sumberdaya alam dan jasa-jasa lingkungan yang terkandung di dalamnya diharapkan akan menjadi tumpuan pembangunan nasional pada abad ke-21.



Gambar 3. Kerangka Pendekatan Sistem untuk Menentukan Kebutuhan Penelitian dalam Mendukung Implementasi Pengelolaan Sumberdaya Pesisir dan Lautan secara Terpadu

Oleh karena itu diperlukan perbaikan yang mendasar di dalam perencanaan dan pengelolaan pembangunan sumberdaya alam pesisir. Pola pembangunan yang hanya berorientasi pada pertumbuhan ekonomi perlu diganti dengan pembangunan berkelanjutan. Pendekatan dan praktek pengelolaan pembangunan wilayah pesisir yang selama ini dilaksanakan secara sektoral dan terpilah-pilah, perlu diperbaiki melalui pendekatan pengelolaan secara terpadu. Tulisan ini membahas tentang perlu adanya agenda penelitian untuk mendukung pengelolaan wilayah pesisir dan lautan secara terpadu.

Kata-kata kunci: wilayah pesisir dan lautan, sumberdaya pesisir dan lautan, pembangunan berkelanjutan, agenda penelitian.

PENDAHULUAN

Wilayah pesisir, daerah peralihan antara ekosistem darat dan lautan, merupakan kawasan di permukaan bumi yang paling padat dihuni oleh umat manusia serta tempat berlangsungnya berbagai macam kegiatan pembangunan. Sekitar 60% dari total penduduk dunia bermukim di daerah sekitar 60 km dari garis pantai. Dua per tiga dari kota-kota dunia dengan penduduk lebih dari 2,5 juta jiwa juga terdapat di wilayah pesisir (UNESCO, 1993). Bahkan di Australia, yang daratan pesisir (*coastal land*) nya hanya meliputi 17% dari luas total benua ini, sekitar 86% penduduknya bertempat tinggal di wilayah pesisir (Southern Cross University, 1997). Keadaan serupa juga terjadi di Indonesia, di mana hampir sebagian besar kota-kota besar (seperti Medan, Jakarta, Semarang, Surabaya, dan Ujung Pandang) serta lebih dari 60% jumlah penduduknya terdapat di wilayah pesisir.

Konsentrasi kehidupan umat manusia dan berbagai kegiatan pembangunan di wilayah pesisir bukanlah suatu kebetulan, melainkan disebabkan oleh tiga alasan ekonomis (*economic rationality*) yang kuat. *Pertama*, wilayah pesisir merupakan salah satu kawasan yang secara

biologis paling produktif di planet bumi ini. Berbagai ekosistem dengan produktivitas hayati tertinggi, seperti hutan mangrove, padang lamun, terumbu karang, dan estuaria, berada di wilayah pesisir. Lebih dari 90% total produksi perikanan dunia (sekitar 82 juta ton), baik melalui kegiatan penangkapan maupun budidaya, berasal dari wilayah pesisir (FAO, 1992). *Kedua*, wilayah pesisir menyediakan berbagai kemudahan (*accessibilities*) yang paling praktis dan relatif lebih murah bagi kegiatan industri, pemukiman, dan kegiatan pembangunan lainnya, dari pada yang dapat disediakan oleh daerah lahan atas (*up-land areas*). Kemudahan tersebut berupa media transportasi, tempat pembuangan limbah, bahan baku air pendingin (*cooling water*) dari air laut untuk berbagai jenis pabrik dan pembangkit tenaga listrik, dan bahan baku industri lainnya. *Ketiga*, wilayah pesisir pada umumnya memiliki panorama keindahan yang dapat dijadikan objek rekreasi dan pariwisata yang sangat menarik dan menguntungkan (*lucrative*), seperti pasir putih atau pasir bersih untuk berjemur; perairan pesisir untuk renang, selancar, dan berperahu; dan terumbu karang serta keindahan bawah laut lainnya untuk pariwisata selam dan *snorkling*.

Sementara itu, banyak kawasan-kawasan pesisir di dunia termasuk

Indonesia telah mengalami tekanan ekologis yang semakin parah dan kompleks, baik berupa pencemaran, over-eksploitasi sumberdaya alam dan pengikisan keanekaragaman hayati, degradasi fisik habitat pesisir, maupun konflik penggunaan ruang dan sumberdaya. Bahkan, di beberapa daerah pesisir tingkat kerusakan ekologis tersebut telah mencapai atau melampaui daya dukung lingkungan dan kapasitas keberlanjutan (*sustainable capacity*) dari ekosistem wilayah pesisir untuk menopang kegiatan pembangunan dan kehidupan manusia di masa-masa mendatang. Hal ini terutama disebabkan oleh paradigma dan pola pembangunan yang selama ini terlampaui berorientasi pada pertumbuhan ekonomi, tanpa adanya perhatian yang memadai terhadap karakteristik, fungsi, dan dinamika ekosistem wilayah pesisir yang menyusun daya dukung dan kapasitas ekosistem ini bagi kelangsungan pembangunan.

Padahal seiring dengan pertambahan jumlah penduduk Indonesia, yang diperkirakan akan mencapai 276 juta jiwa pada tahun 2010, dan kenyataan bahwa sumberdaya di daratan (lahan atas) semakin menipis, maka wilayah pesisir dan lautan beserta segenap sumberdaya alam dan jasa-jasa lingkungan (*environmental services*) yang terkandung di dalamnya diharapkan akan menjadi tumpuan pembangunan nasional pada abad-21.

Oleh karena itu, jika bangsa Indonesia hendak memanfaatkan dan mendayagunakan sumberdaya wilayah pesisir bagi sebesar-besar kemakmuran

rakyat dan kemajuan bangsa secara berkesinambungan, maka diperlukan perbaikan mendasar di dalam perencanaan dan pengelolaan pembangunan sumberdaya wilayah pesisir. Paradigma pembangunan yang hanya berorientasi pada pertumbuhan ekonomi perlu diganti dengan pembangunan berkelanjutan (*sustainable development*) yang sudah menjadi kesepakatan hampir seluruh bangsa-bangsa di dunia sejak KTT Bumi di Rio de Janeiro 1992. Pendekatan dan praktek pengelolaan pembangunan wilayah pesisir yang selama ini secara dominan dilaksanakan secara sektoral dan terpilah-pilah, perlu diperbaiki melalui pendekatan pengelolaan secara terpadu.

Untuk dapat menerapkan prinsip-prinsip pembangunan berkelanjutan dan pendekatan pengelolaan secara terpadu di dalam pemanfaatan sumberdaya wilayah pesisir diperlukan informasi yang akurat dan memadai, baik dari sisi permintaan (*demand side*) terhadap sumberdaya alam dan jasa-jasa lingkungan wilayah pesisir maupun dari sisi kemampuan menyediakan (*supply side*) ekosistem wilayah pesisir di dalam memenuhi permintaan termaksud. Sistem informasi semacam ini sangat bergantung pada kegiatan penelitian (pengumpulan data dan informasi) secara terencana dan sistematis sesuai kebutuhan pengelolaan.

BATASAN DAN KARAKTERISTIK WILAYAH PESISIR DAN LAUTAN

Untuk dapat mengelola pembangunan sumberdaya wilayah pesisir dan lautan secara berkelanjutan (*on a*

sustainable basis), perlu pemahaman dan penguasaan yang mendalam tentang batasan dan karakteristik utama kedua wilayah tersebut.

Pengertian Wilayah Pesisir dan Lautan Sebagai Satuan Pengelolaan

Dalam pengelolaan sumberdaya alam, seperti wilayah pesisir dan lautan, langkah pertama yang harus dikerjakan oleh para perencana dan pengambil keputusan adalah menentukan batas-batas (*boundaries*) dari wilayah yang akan dikelolanya sebagai suatu satuan pengelolaan (*management unit*). Dengan mengetahui batas-batas dari suatu wilayah pesisir dan lautan sebagai satuan pengelolaan, maka komponen-komponen beserta segenap interaksi fungsional (seperti aliran bahan dan energi) antar komponen tersebut di dalam satuan (sistem) wilayah pengelolaan dan interaksi antar satuan wilayah pengelolaan dengan satuan wilayah pengelolaan lainnya dapat diketahui dengan baik. Pengetahuan tentang komponen dan interaksi fungsional secara internal dan eksternal inilah yang menjadi dasar bagi perencanaan dan pengelolaan pembangunan sumberdaya wilayah pesisir dan lautan secara berkelanjutan.

Sayangnya, karena sifat wilayah pesisir yang sangat dinamis dan bervariasi dari satu lokasi ke lokasi lainnya (*site-specific*), maka tidak mungkin membuat satu definisi (batasan) operasional tentang wilayah pesisir yang berlaku untuk semua kawasan pesisir. Jika ditinjau dari garis pantai (*coastline*), suatu wilayah pesisir memiliki dua macam batas yaitu: batas

yang sejajar garis pantai (*longshore*) dan batas yang tegak lurus terhadap garis pantai (*cross-shore*). Bagi keperluan pengelolaan, penetapan batas-batas wilayah pesisir yang sejajar garis pantai relatif mudah, misalnya batas wilayah pesisir antara Sungai Brantas dan Sungai Bengawan Solo, atau batas wilayah pesisir Kabupaten Kupang adalah antara Tanjung Nasikonis dan Pulau Sabu, dan batas wilayah pesisir DKI Jakarta adalah antara Sungai Dadap di sebelah barat dan Tanjung Karawang di sebelah timur.

Akan tetapi, penetapan batas-batas suatu wilayah pesisir yang tegak lurus terhadap garis pantai, sejauh ini belum ada kesepakatan. Dengan perkataan lain, batas wilayah pesisir berbeda dari satu negara ke negara yang lain. Hal ini dapat dimengerti, karena setiap negara memiliki karakteristik lingkungan, sumberdaya, sistem sosial, dan tujuan pengelolaan tersendiri.

Namun demikian, terdapat kesepakatan umum di dunia bahwa wilayah pesisir adalah suatu wilayah peralihan antara ekosistem daratan dan lautan, yang saling berinteraksi dan membentuk suatu kondisi lingkungan (ekologis) yang unik (Dahuri et al., 1996; Brown, 1997).

Sementara itu, menurut berbagai pustaka utama tentang pengelolaan wilayah pesisir, seperti Gartside (1988), Sorensen and Mc.Creary (1990), Pernetta and Elder (1993), Chua (1993), Clark (1996), Dahuri et al (1996), dan Brown (1997), bahwa penentuan batas-batas wilayah pesisir di dunia pada umumnya berdasarkan pada tiga kriteria berikut:

- (1) Garis linier secara arbiter tegak lurus terhadap garis pantai (*coastline* atau *shoreline*). Republik Rakyat Cina, misalnya, mendefinisikan wilayah pesisirnya sebagai suatu wilayah peralihan antara ekosistem darat dan lautan, ke arah darat mencakup lahan darat sejauh 15 km dari garis pantai, dan ke arah laut meliputi perairan laut sejauh 15 km dari garis pantai (Zhijie and Cote, 1990).
- (2) Batas-batas administrasi dan hukum. Negara bagian Washington, Amerika Serikat; Australia Selatan; dan Queensland, misalnya, batas ke arah laut dari wilayah pesisirnya adalah sejauh 3 mil laut dari garis dasar (*coastal baseline*) (Sorensen and Mc.Creary, 1990).
- (3) Karakteristik dan dinamika ekologis (biofisik), yakni atas dasar sebaran spasial dari karakteristik alamiah (*natural features*) atau kesatuan proses-proses ekologis (seperti aliran air sungai, migrasi biota, dan pasang surut). Contoh batas satuan pengelolaan wilayah pesisir menurut kriteria ketiga ini adalah: batasan menurut Daerah Aliran Sungai (*catchment area* atau *watershed*).

Dari kepentingan (perspektif) konservasi (pembangunan berkelanjutan) sumberdaya wilayah pesisir, batasan wilayah pesisir atas dasar kriteria ekologis lebih tepat dan benar. Hanya dengan batasan ekologislah, segenap proses-proses lingkungan (*environmental processes*) yang berlangsung di dalam wilayah pesisir atau

dari luar yang mempengaruhinya dapat diperhitungkan. Dan, proses-proses lingkungan inilah yang menentukan kualitas serta keberlanjutan ekosistem pesisir. Akan tetapi, kelemahannya adalah bahwa batasan menurut kriteria ekologis tidak dapat diberlakukan secara umum untuk semua jenis wilayah pesisir (*site specific*). Sehingga, kebanyakan para perencana dan pengelola wilayah pesisir di dunia cenderung memilih batasan wilayah pesisir menurut kriteria garis lurus secara arbiter dan administratif.

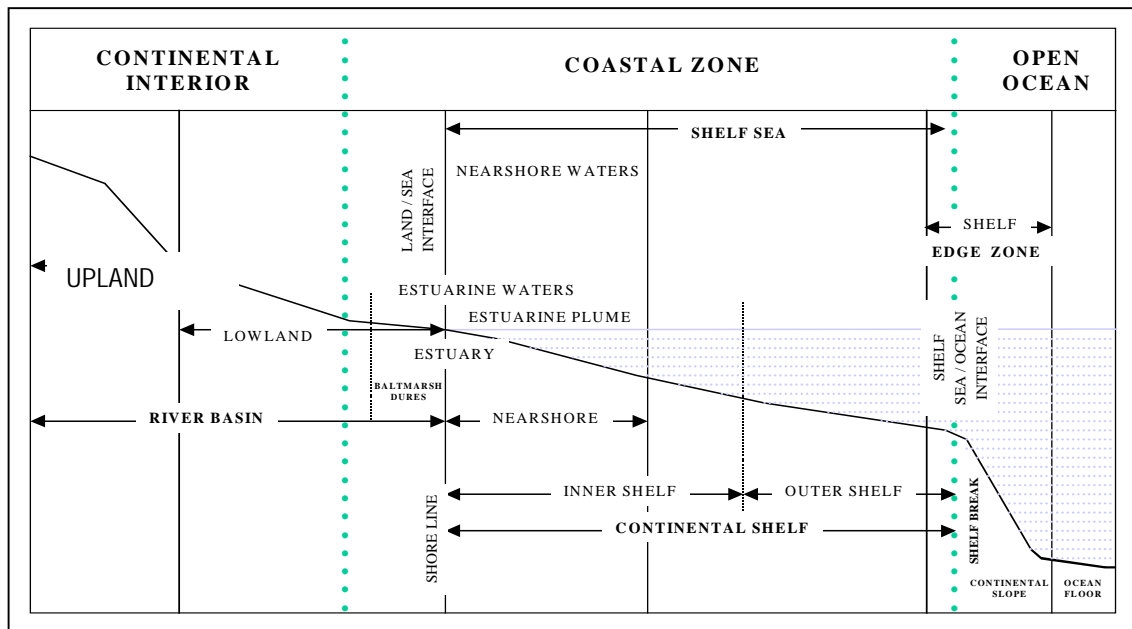
Oleh karena itu, untuk kepentingan pengelolaan dengan tujuan pembangunan sumberdaya wilayah pesisir secara berkelanjutan, sebaiknya tidak menetapkan batas-batas wilayah pesisir secara kaku. Akan lebih bermakna, jika penetapan batas-batas wilayah pesisir adalah atas dasar tujuan pengelolaan itu sendiri. Misalnya, batasan wilayah pesisir untuk tujuan pengelolaan bahaya banjir akan berbeda dengan batasan untuk tujuan pengelolaan pengendalian pencemaran, penambangan terumbu karang, pemanfaatan sumberdaya ikan secara lestari, dan sebagainya. Akan lebih baik lagi, jika batas ke arah darat dari suatu wilayah pesisir dapat ditetapkan sebanyak dua macam, yaitu batas untuk wilayah perencanaan (*planning zone*) dan batas untuk wilayah pengaturan (*regulation zone*) atau pengelolaan keseharian (*day-to-day management*). Wilayah perencanaan sebaiknya meliputi seluruh daerah daratan (hulu) apabila terdapat kegiatan manusia (pembangunan) yang dapat menimbulkan dampak secara nyata (*significant*) terhadap

lingkungan dan sumberdaya di pesisir. Oleh karena itu, batas wilayah pesisir ke arah darat untuk kepentingan perencanaan (*planning zone*) dapat sangat jauh ke arah hulu, misalnya Kota Bandung untuk kawasan pesisir dari DAS Citarum. Jika suatu program pengelolaan wilayah pesisir menetapkan dua batasan wilayah pengelolaannya (wilayah perencanaan dan wilayah pengaturan), maka wilayah perencanaan selalu lebih luas daripada wilayah pengaturan.

Dalam pengelolaan wilayah sehari-hari, pemerintah (pihak pengelola) memiliki kewenangan penuh untuk mengeluarkan atau menolak izin kegiatan

pembangunan. Sementara itu, kewenangan semacam ini di luar batas wilayah pengaturan (*regulation zone*) sehingga menjadi tanggung jawab bersama antara instansi pengelolaan wilayah pesisir dalam *regulation zone* dengan instansi yang mengelola daerah hulu atau laut lepas.

Setelah kita berhasil menetapkan batas ke arah laut dari wilayah pesisir, maka kita dapat menentukan batas wilayah lautan. Menurut Pernetta dan Milliman (1995), wilayah lautan adalah perairan laut dalam atau laut lepas (*open ocean*) di luar paparan benua (*continental shelf*) (Gambar 1).



Gambar 1. Batasan Wilayah Pesisir (Pernetta and Milliman, 1995).

Karakteristik Ekosistem Wilayah Pesisir dan Lautan

Untuk kepentingan pengelolaan pembangunan sumberdaya wilayah pesisir dan lautan secara berkelanjutan, terdapat lima karakteristik utama dari ekosistem pesisir dan lautan yang harus dipahami oleh para perencana dan pengelola, serta kemudian dijadikan sebagai landasan dalam proses perencanaan dan pengambilan keputusan tentang pembangunan kedua wilayah tersebut.

Pertama, bahwa komponen hayati dan nir-hayati dari suatu wilayah pesisir membentuk suatu sistem alam (ekosistem) yang sangat kompleks. Keadaan yang kompleks ini disebabkan oleh kondisi lingkungan yang unik yang tersusun oleh berbagai ragam proses biofisik (ekologis) dari ekosistem daratan dan lautan. Faktor-faktor lingkungan (seperti angin, gelombang, pasang-surut, suhu, dan salinitas) di perairan pesisir sangat bervariasi dan secara gradual berubah dari arah darat ke laut.

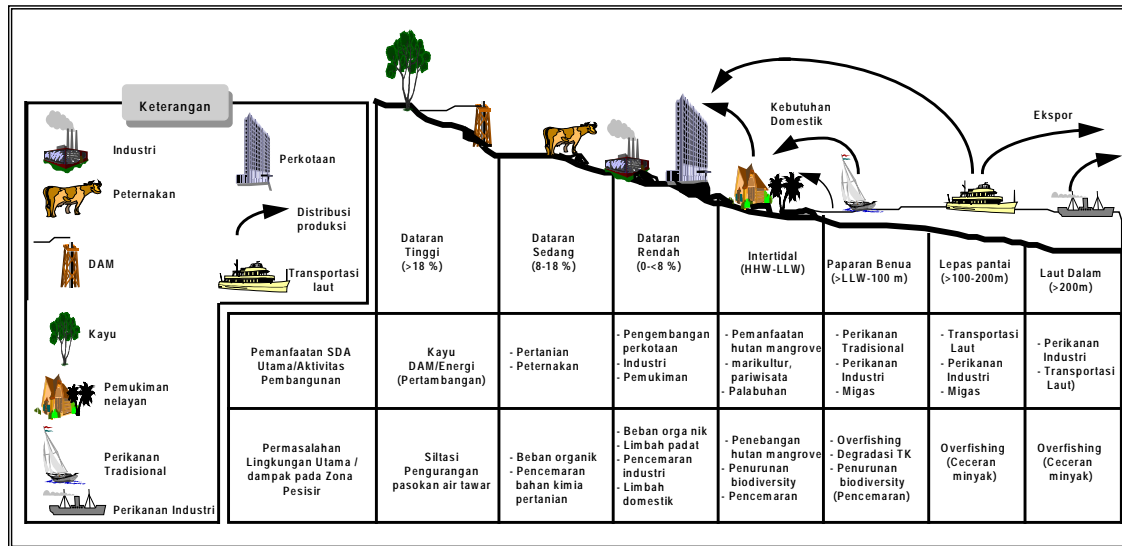
Oleh karena itu, ekosistem pesisir telah beradaptasi dengan keadaan lingkungannya, dan ekosistem pesisir dapat sangat tahan atau sebaliknya sangat rentan terhadap gangguan (perubahan) kondisi lingkungan baik yang disebabkan oleh kegiatan manusia maupun bencana alam. Contohnya, terumbu karang sangat tahan terhadap gempuran gelombang dan badai, tetapi ekosistem pesisir ini sangat rentan terhadap sedimentasi (pelumpuran). Hewan karang seringkali

sangat sensitif terhadap perubahan kecil dari salinitas atau suhu perairan, bahkan terhadap perubahan suhu perairan sekecil 2-4⁰C (UNESCO, 1993). Sebaliknya, ekosistem hutan mangrove sangat tahan terhadap perubahan suhu, salinitas, dan kandungan sedimen perairan. Akan tetapi, ekosistem mangrove sangat rentan terhadap perubahan aliran air tawar, sirkulasi air, dan tumpahan minyak.

Lebih dari itu, terdapat keterkaitan ekologis (hubungan fungsional) baik antar ekosistem di dalam kawasan pesisir maupun antara kawasan pesisir dengan lahan atas dan laut lepas. Dengan demikian perubahan yang terjadi pada suatu ekosistem pesisir (misalnya mangrove), cepat atau lambat, akan mempengaruhi ekosistem lainnya. Begitu pula halnya, jika pengelolaan kegiatan pembangunan (industri, pertanian, pemukiman, dan lain-lain) di lahan atas suatu DAS (Daerah Aliran Sungai) tidak dilakukan secara arif (berwawasan lingkungan), maka dampak negatifnya akan merusak tatanan dan fungsi ekologis kawasan pesisir dan lautan (**Gambar 2**). Fenomena inilah yang kemungkinan besar merupakan faktor penyebab utama bagi kegagalan panen tambak udang yang akhir-akhir ini menimpa kawasan Pantai Utara Jawa. Karena, untuk kehidupan dan pertumbuhan udang secara optimal diperlukan kualitas perairan yang baik, tidak tercemar seperti Pantai Utara Jawa. Contoh lain adalah pembuatan bendungan (*damming*) di daerah hulu suatu sungai akan memutus (memblokir)

jalur migrasi dari jenis-jenis organisme perairan (seperti ikan salmon, sidat, dan udang galah), sehingga merugikan kegiatan perikanan pesisir yang letaknya mungkin mencapai ratusan kilometer dari lokasi bendungan tersebut. Perubahan pola arus lautan yang diikuti dengan

perubahan suhu perairan dan penyediaan unsur hara dapat menurunkan populasi (stok) ikan di perairan pesisir, seperti yang telah ditunjukkan oleh dampak El Nino terhadap stok ikan sardine di Samudra Pasifik (UNESCO, 1993)



Gambar 2. Keterkaitan Ekologis dan Dampak Pembangunan Antara Ekosistem Darat dan Pesisir (Dimodifikasi dari ICLARM, 1995)

Kedua, dalam suatu kawasan pesisir (Kalianda - Bandar Lampung, misalnya), biasanya terdapat lebih dari dua macam sumberdaya alam dan jasa-jasa lingkungan yang dapat dikembangkan untuk kepentingan pembangunan, seperti tambak, perikanan tangkap, pariwisata, pertambangan, industri dan pemukiman.

Ketiga, dalam suatu kawasan pesisir, pada umumnya terdapat lebih dari satu kelompok masyarakat (orang) yang memiliki ketrampilan/keahlian dan kesenangan (*preference*) bekerja yang berbeda, sebagai petani, nelayan, petani tambak, petani rumput laut, pendamping pariwisata, industri dan kerajinan rumah tangga, dan sebagainya.

Padahal, sangat sukar atau hampir tidak mungkin, untuk mengubah kesenangan bekerja (profesi) sekelompok orang yang sudah secara mentradisi menekuni suatu bidang pekerjaan.

Keempat, baik secara ekologis maupun ekonomis, pemanfaatan suatu kawasan pesisir secara monokultur (*single use*) adalah sangat rentan terhadap perubahan internal maupun eksternal yang menjurus pada kegagalan usaha. Contohnya, lagi-lagi pembangunan tambak udang di Pantai Utara Jawa, yang sejak tahun 1982 mengkonversi hampir semua pesisir termasuk mangrove (sebagai kawasan lindung) menjadi tambak udang. Sehingga, pada saat akhir 1980-an

sampai sekarang terjadi peledakan wabah virus, sebagian besar tambak udang di kawasan ini terserang penyakit yang merugikan ini. Kemudian, pada tahun 1988 ketika Jepang memberhentikan impor udang Indonesia selama sekitar 3 bulan, karena kematian kaisarnya (rakyat Jepang berkabung, tidak makan udang), maka mengakibatkan penurunan harga udang secara drastis dari rata-rata Rp. 14.000,- per kg menjadi Rp 7.000,- per kg, sehingga banyak petani tambak yang merugi dan frustrasi.

Kelima, kawasan pesisir pada umumnya merupakan sumberdaya milik bersama (*common property resources*) yang dapat dimanfaatkan oleh semua orang (*open access*). Padahal setiap pengguna sumberdaya pesisir biasanya berprinsip memaksimalkan keuntungan. Oleh karenanya, wajar jika pencemaran, over-eksploitasi sumberdaya alam dan konflik pemanfaatan ruang seringkali terjadi di kawasan ini.

Isu tentang hak kepemilikan lahan dan alokasi sumberdaya merupakan sumber utama konflik di kebanyakan daerah pesisir. Lahan pasang-surut (tanah timbul), dasar laut pesisir, dan perairan pesisir pada umumnya tidak adak pemilikinya. Demikian juga tentang hak terhadap pemanfaatan sumberdaya yang terdapat di ketiga daerah tersebut, kebanyakan belum ada sistem pengaturannya. Oleh karena itu, sebagaimana diungkapkan di atas, daerah pesisir ini biasa disebut sebagai sumberdaya milik bersama, dimana berlaku azas pemanfaatan secara bebas oleh siapa saja (*open acces*). Memang, azas *open acces* ini sesuai untuk kondisi, dimana permintaan masyarakat terhadap sumberdaya jauh lebih

kecil dari pada kemampuan ekosistem pesisir untuk menyediakannya. Akan tetapi, ketika tingkat permintaan terhadap sumberdaya lebih besar ketimbang jumlah yang dapat disediakan oleh alam, maka sistem alokasi sumberdaya menjadi sangat penting untuk diterapkan. Apabila sistem alokasi sumberdaya semacam ini tidak diberlakukan, maka persaingan tidak sehat antar pengguna sumberdaya (*resource users*) akan muncul, kemudian menciptakan mentalitas "*free-for-all*" diantara pengguna sumberdaya, dan pada gilirannya akan mengakibatkan pengikisan sumberdaya (*resource depletion*) serta konflik sosial yang menjurus pada pembangunan yang tidak berkelanjutan.

Lebih jauh, suatu pola penggunaan sumberdaya pesisir dan lautan yang menguntungkan masyarakat secara keseluruhan acap kali bertentangan dengan pola penggunaan yang dapat memberikan keuntungan maksimal bagi sektor swasta. Fenomena semacam ini terjadi, karena banyak produk dan jasa-jasa lingkungan yang disediakan oleh ekosistem pesisir bersifat *intangibile* (tidak dapat dirasakan langsung atau belum mempunyai nilai pasar) bagi pihak swasta. Misalnya, hutan mangrove dapat memberikan keuntungan ekonomis yang sangat besar bagi masyarakat secara keseluruhan, jika dikonservasi sebagai habitat dan daerah pemijahan bagi biota perairan (perikanan); sebagai pelindung pantai dari gempuran ombak, tsunami dan badai; sebagai pelindung lahan darat dari perembesan air laut (*salt interusion*); sebagai pembersih alamiah pencemaran pantai; sebagai sumber plasma nutfah; dan lain sebagainya. Akan tetapi, dari sudut pandang

pengusaha swasta, lahan hutan mangrove akan memberikan keuntungan ekonomis maksimal, jika dikonversi secara total menjadi pertambakan udang, pemukiman (semacam Pantai Indah Kapuk), kawasan industri, atau peruntukan pembangunan lainnya.

PENENTUAN AGENDA PENELITIAN UNTUK Mendukung PENGELOLAAN WILAYAH PESISIR DAN LAUTAN SECARA TERPADU

Sebagaimana dimaklumi, bahwa kegiatan penelitian yang meliputi pengumpulan, pengolahan dan analisis data untuk mendukung implementasi pengelolaan sumberdaya wilayah pesisir dan lautan secara terpadu adalah sangat mahal dan memerlukan banyak waktu (*time-consuming*). Selain itu, kegiatan penelitian yang tanpa arah (tujuan) dan strategi yang jelas pada umumnya hanya menghasilkan data yang kurang atau bahkan tidak berguna bagi kepentingan perencanaan dan pengelolaan pembangunan sumberdaya pesisir dan lautan. Oleh karenanya, menjadi sangat penting untuk menentukan agenda (kebutuhan) penelitian berdasarkan pada kerangka sistem berfikir yang tepat dan benar.

Identifikasi kebutuhan penelitian untuk pengelolaan sumberdaya wilayah pesisir dan lautan secara terpadu hendaknya berdasarkan pada tiga hal utama: (1) karakteristik dan dinamika ekosistem pesisir dan lautan itu sendiri, sebagaimana telah diuraikan dalam Bab II makalah ini; (2) tujuan dari pengelolaan; dan (3) elemen dan proses utama dari kegiatan pengelolaan sumberdaya wilayah pesisir dan lautan secara terpadu.

Beranjak dari pengalaman negara-negara lain dan pustaka tentang pengelolaan sumberdaya wilayah pesisir dan lautan secara terpadu, dapat disimpulkan, bahwa tujuan akhir dan utama (*the ultimate goal*) dari pengelolaan kedua wilayah ini adalah untuk mencapai pemanfaatan secara berkelanjutan sumberdaya alam dan jasa-jasa lingkungan yang terdapat di wilayah pesisir dan lautan bagi kesejahteraan umat manusia. Pembangunan berkelanjutan (*sustainable development*), sebagaimana didefinisikan oleh *World Commission on Environment and Development* (1987), adalah "pembangunan untuk memenuhi kebutuhan generasi saat ini tanpa merusak atau menurunkan kemampuan generasi mendatang untuk memenuhi kebutuhannya".

Secara ringkas dapat diformulasikan, bahwa untuk mewujudkan pembangunan berkelanjutan dari sumberdaya wilayah pesisir dan lautan, prasyarat utama yang harus dipenuhi adalah bahwa laju (tingkat) permintaan total terhadap sumberdaya alam dan jasa-jasa lingkungan akibat kiprah kehidupan manusia beserta segenap kegiatan pembangunannya tidak melampaui kemampuan fungsional ekosistem wilayah pesisir dan lautan dalam menyediakan sumberdaya alam dan jasa lingkungan termaksud.

Ekosistem alamiah, seperti ekosistem pesisir dan lautan, menyediakan empat fungsi utama yang sangat diperlukan bagi kesinambungan pembangunan ekonomi dan kelangsungan hidup umat manusia itu sendiri (Ortolano, 1986; de Groot, 1992). *Pertama* adalah sebagai penyedia sumberdaya alam dapat pulih (seperti hutan, ikan, dan energi

matahari) dan sumberdaya alam tak dapat pulih (termasuk bahan tambang dan mineral) yang diperlukan untuk bahan baku pangan, papan, transportasi, industri dan kegiatan manusia lainnya. *Kedua* sebagai penyedia ruang (*space*) untuk tempat tinggal (permukiman); melakukan kegiatan budidaya pertanian dalam arti luas (termasuk perikanan dan peternakan) dan industri; rekreasi dan pariwisata; perlindungan alam; dan lain-lain. *Ketiga* sebagai penampung atau penyerap limbah (residu) sebagai hasil samping dari kegiatan konsumsi, produksi (fabrikasi), dan transportasi yang dilakukan oleh manusia. Keempat sebagai penyedia jasa-jasa kenyamanan (*amenities*) dan jasa-jasa pendukung kehidupan (*life-support services*), seperti udara bersih, siklus hidrologi, siklus hara, keanekaragaman hayati (*biodiversity*), alur ruaya (*migratory routes*) berbagai jenis fauna, dan lain sebagainya.

Dengan demikian, secara ekologis terdapat empat persyaratan utama yang dapat menjamin tercapainya pembangunan berkelanjutan sumberdaya wilayah pesisir dan lautan: (1) keharmonisan spasial, (2) pemanfaatan sumberdaya alam secara optimal dan berkelanjutan, (3) membuang limbah sesuai dengan kapasitas asimilasi lingkungan, dan (4) mendesign dan membangun prasarana dan sarana sesuai dengan karakteristik serta dinamika ekosistem pesisir dan lautan.

Keharmonisan spasial (*spatial suitability*) mensyaratkan, bahwa dalam suatu wilayah pembangunan, seperti Pantai Timur Kalimantan, Pulau Batam, dan Pantai Utara Jawa Barat, hendaknya tidak seluruhnya diperuntukkan bagi zona pemanfaatan, tetapi harus pula dialokasikan

untuk zona preservasi dan konservasi. Contoh daerah preservasi adalah daerah pemijahan ikan (*spawning ground*) dan jalur hijau pantai. Dalam zona preservasi ini tidak diperkenankan adanya kegiatan pembangunan, kecuali penelitian. Sementara itu, beberapa kegiatan pembangunan, seperti pariwisata alam, pemanfaatan hutan bakau dan perikanan secara berkelanjutan (*sustainable basis*) dapat berlangsung dalam zona konservasi

Keberadaan zona preservasi dan konservasi dalam suatu wilayah pembangunan sangat penting dalam memelihara berbagai proses penunjang kehidupan, seperti siklus hidrologi dan unsur hara; membersihkan limbah secara alamiah; dan sumber keanekaragaman hayati (*biodiversity*). Bergantung pada kondisi alamnya, luas zona preservasi dan konservasi yang optimal dalam suatu kawasan pembangunan sebaiknya antara 30 - 50 % dari luas totalnya.

Selanjutnya, setiap kegiatan pembangunan (industri, pertanian, budidaya perikanan, pemukiman dan lainnya) dalam zona pemanfaatan hendaknya ditempatkan pada lokasi yang secara biofisik sesuai, sehingga membentuk suatu mosaik yang harmonis. Misalnya, penempatan kegiatan budidaya tambak udang pada lahan pesisir bertekstur pasir atau sangat masam, atau berdekatan dengan kawasan industri biasanya akan menemui kegagalan.

Sementara itu, bila kita menganggap wilayah pesisir sebagai penyedia sumberdaya alam, maka kriteria pemanfaatan untuk sumberdaya yang dapat pulih (*renewable resources*) adalah bahwa

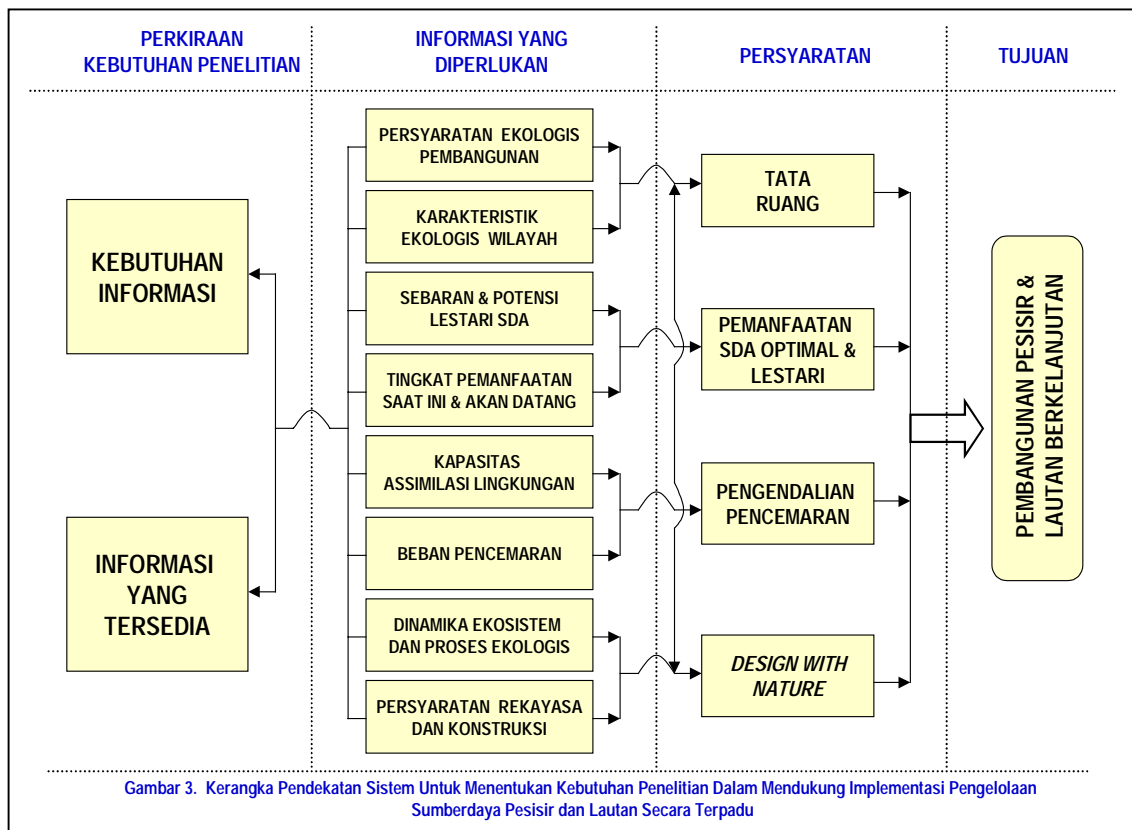
laju ekstraksinya tidak boleh melebihi kemampuannya untuk memulihkan dari pada suatu periode tertentu (CLARK, 1988). Sedangkan pemanfaatan sumberdaya pesisir yang tak dapat pulih (*non-renewable resources*) harus dilakukan dengan cermat, sehingga efeknya tidak merusak lingkungan sekitarnya.

Ketika kita memanfaatkan wilayah (perairan) pesisir sebagai tempat untuk pembuangan limbah, maka harus ada jaminan bahwa jumlah total dari limbah tersebut tidak boleh melebihi kapasitas daya asimilasinya (*assimilative capacity*). Dalam hal ini, yang dimaksud dengan daya asimilasi adalah kemampuan sesuatu ekosistem pesisir untuk menerima suatu jumlah limbah tertentu sebelum ada indikasi terjadinya kerusakan lingkungan dan atau kesehatan yang tidak dapat ditoleransi (KROM 1986).

Berdasarkan pada uraian tersebut di atas, maka penentuan agenda (kebutuhan)

penelitian untuk mendukung implementasi pengelolaan sumberdaya wilayah pesisir dan lautan secara terpadu seyogyanya mengikuti kerangka pendekatan sistem seperti disajikan pada Gambar 3. Dalam hal ini, tujuan akhir dari pengelolaan yaitu pembangunan berkelanjutan menentukan persyaratan pengelolaan lingkungan dan sumberdaya alam pesisir dan lautan. Selanjutnya, dari keempat persyaratan pengelolaan tersebut dapat dirunut informasi yang diperlukan untuk mendukung implementasi dari pengelolaan secara terpadu. Akhirnya, jika kebutuhan informasi tersebut dibandingkan dengan informasi yang tersedia saat ini, maka dapatlah ditentukan agenda penelitian yang harus dilakukan guna memenuhi kesenjangan informasi termaksud.

Oleh karena, sampai saat ini informasi yang tersedia tentang pesisir dan lautan belum dapat diketahui, maka saran tentang agenda penelitian berikut ini hanya didasarkan pada kebutuhan penelitian secara ideal.



(1) Penelitian yang berkaitan dengan pemanfaatan sumberdaya alam pesisir dan lautan secara optimal dan lestari:

- Jenis, kuantitas (potensi) cadangan, distribusi, dan tingkat pemanfaatan sumberdaya tak dapat pulih (*non-renewable resources*).
- Jenis, potensi lestari, distribusi, dan tingkat pemanfaatan menurut waktu (musiman) sumberdaya dapat pulih (*renewable resources*)
- Aplikasi teknologi penginderaan jauh, Sistem Informasi Geografis (SIG), akustik, dan lainnya guna merubah pola teknik penangkapan ikan dari bersifat "pemburuan" (tidak ada kepastian atau *uncertain*) menjadi bersifat "pemanenan" (ada kepastian).
- Simulasi dan pemodelan tentang respons stok ikan (khususnya yang bernilai ekologis dan/atau ekonomis penting) terhadap upaya penangkapan, gangguan lingkungan (*environmental perturbations*), dan fluktuasi alamiah.
- Jenis, luas dan distribusi ekosistem pesisir (seperti mangrove, padang lamun, terumbu karang, dan estuaria).
- Pemetaan daerah pemijahan, daerah asuhan, dan alur ruaya biota perairan yang secara ekonomis dan/atau ekologis penting.
- Aplikasi bioteknologi¹ untuk budidaya perikanan, baik di perairan payau maupun laut, yang meliputi:

(a) Perbaikan kualitas air untuk media budidaya dengan menggunakan "*biotreatment*" dan "*phytoremediation*" dengan menggunakan mikroba, tumbuhan (alga), dan hewan.

(b) Penanggulangan stres dan peningkatan daya kekebalan organisme budidaya melalui rekayasa genetik.

(c) Perbaikan kualitas induk organisme budidaya, sehingga bebas hama dan penyakit serta tahan terhadap serangan hama/penyakit, seperti dengan teknologi "*antisense/ribozyme*".

(d) Manipulasi siklus reproduksi organisme budidaya, melalui pengendalian hormon dari sistem reproduksi hewan budidaya (khususnya udang penaidae).

- Aplikasi bioteknologi untuk ekstraksi produk alamiah (*natural products* atau *bioactive substances*) dari biota laut, khususnya macroalgae, microalgae, invertebrata, dan mikrorganisme, untuk industri pangan, farmasi (obat-obatan), dan kosmetika.

(2) Penelitian yang berkaitan dengan tata ruang, rancang-bangun dan konstruksi wilayah pesisir dan lautan:

penggunaan organisme hidup atau bagian dari organisme tersebut (seperti sel atau enzim) untuk: membuat atau memodifikasi produk, memperbaiki sifat keturunan dari hewan dan tumbuhan, dan mengembangkan organisme untuk penggunaan tertentu, termasuk remediasi lingkungan yang rusak akibat pencemaran (Lundin and Zilinskas, 1995).

¹ Dalam hal ini bioteknologi diartikan sebagai

- Karakteristik fisik dan kimiawi lahan pesisir.
 - Penutupan vegetasi lahan pesisir.
 - Topografi dan batimetri.
 - Aspek geomorfologi dan geologi.
 - Aliran air tawar, aliran sedimen, dan pola erosi dan sedimentasi (*sediment budget*).
 - Aspek hidro-oseanografi: pasang-surut, arus, gelombang, paras laut, suhu, salinitas, dan karakteristik biologi-kimiawi perairan laut.
 - Aspek iklim dan pengaruhnya terhadap ekosistem pesisir serta organisme yang hidup di dalamnya.
 - Pemetaan daerah-daerah yang mengandung karakteristik lingkungan unik dan jasa-jasa pendukung kehidupan (*life-support systems*), sehingga perlu dilindungi (*preservation zone*).
 - Analisis tentang persyaratan biofisik atau ekologis (*biophysical or ecological requirements*) dari setiap kegiatan pembangunan (tambak, industri, pertanian tanaman pangan, pertambangan, pemukiman, pariwisata, dan lain-lain); dan kegiatan rekayasa serta konstruksi (*coastal and ocean engineering*).
 - Simulasi dan pemodelan tentang respons ekosistem pesisir terhadap kegiatan yang merubah bentang alam (*landscape*) wilayah pesisir dan kegiatan konstruksi, seperti reklamasi, pembuatan darmaga (*jetty*), dan pemecah gelombang.
 - Aplikasi teknologi penginderaan jauh, SIG dan sistem informasi lainnya dalam penyusunan tata ruang wilayah pesisir dan lautan.
- (3) Penelitian yang berkaitan dengan pengendalian pencemaran perairan pesisir dan lautan:
 - Identifikasi dan penghitungan beban pencemaran dari setiap jenis limbah yang masuk ke dalam ekosistem pesisir dan laut.
 - Kapasitas asimilasi ekosistem perairan pesisir dalam menerima limbah.
 - Distribusi dan nasib (*fate*) limbah yang telah masuk ke dalam ekosistem pesisir dan lautan.
 - Dampak pencemaran terhadap spesies, populasi dan ekosistem pesisir dan lautan.
 - Aplikasi SIG dan simulasi komputer untuk membuat perkiraan pergerakan dan nasib bahan pencemar di perairan pesisir dan laut, khususnya tumpahan minyak.
 - Aplikasi bioteknologi untuk pembersihan pencemaran pesisir dan lautan (bioremediasi).
 - (4) Penelitian yang berhubungan dengan penentuan daya dukung lingkungan bagi kegiatan pembangunan: tambak udang, pariwisata, pemukiman, kawasan industri, kawasan budidaya pertanian, dan sebagainya.
 - (5) Penelitian yang berkaitan dengan penentuan komposisi dan laju (tingkat) kegiatan pembangunan yang optimal

secara ekologis dan sosial-ekonomis di suatu wilayah pesisir.

PENUTUP

Untuk dapat melaksanakan kegiatan penelitian seperti disarankan di atas, maka diperlukan pengembangan dan perbaikan mutu sumberdaya manusia di bidang pengelolaan sumberdaya wilayah pesisir dan lautan secara terpadu. Pengembangan sumberdaya manusia hendaknya diarahkan untuk memenuhi kelemahan di tiga bidang utama: (1) pengelolaan eksplorasi dan produksi sumberdaya alam; (2) pengelolaan pencemaran; (3) pengelolaan perubahan bentang alam, rekayasa dan konstruksi; dan (4) pendekatan sistem dan interdisipliner untuk perencanaan dan pengelolaan secara terpadu.

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Hinrichsen, D. (1998) Coastal Waters of the World: Trends, Threats and Strategies, Island Press, Washington D.C., 274pp + xix, ISBN 1-55963-382-4.

Coastal Waters of the World

There is a very challenging job to be done, and there is no time to lose in doing it” - are the closing words of an extraordinary new book on the state of the world’s coast by Don Hinrichsen, a noted United Nations consultant on environment and population issues. Coastal Waters of the World, is an up-to-date assessment of trends affecting coastal resources and the majority of the world’s population who directly depend on them. The conclusion he draws is unambiguous and has clear implications for coastal management in Indonesia - unless we commit to an interdisciplinary, co-ordinated effort by governing institutions at all levels, private sector interests, and community groups working together towards a common set of goals then we shall continue to squander our rich coastal heritage and deny our future development potential!

His conclusion is based on a well researched analysis involving numerous field-based interviews of key informants from coastal fishers to senior policy makers and world renowned researchers in developed and developing countries. The analysis is supported by national and international databases as well as a comprehensive literature review. Unlike many global studies, these data are presented in a delightful narrative style to inform the reader in an informal, but authoritative manner.

The structure and style of the work clearly reflect the emphasis Hinrichsen places on making

information available to all concerned with the subject - high school students, politicians, villagers, researchers, bureaucrats and activists will all find information relevant to their interests and are likely to wish to probe specific subjects further. The book is divided into 18 chapters and three introductory sections; an eloquent foreword by Stephen Olsen (Director of the University of Rhode Island’s Coastal Resources Center), a moving prologue on the Kuna islands of the Caribbean (which is a microcosm of the pressures facing the world’s coasts) and a provocative introduction in which Hinrichsen notes that we are all coastal: “... no matter where we live, we are connected to the world’s oceans through an intricate drainage system of rivers and streams...”.

Fourteen chapters of regional analyses help place the nature and severity of coastal issues in a global context. The discussion of Indonesia’s coasts, for example, is located in a chapter on Southeast Asia, appropriately entitled “A Sea of Islands”. Quoting former Environment Minister, Emil Salim and a local fisher from Muara Angke, Sho Boen Shen, Hinrichsen weaves a depressing tale of overexploitation and waste. Without proper planning and management, including improved regional coordination, he predicts a bleak future for coastal areas of Southeast Asia and points to the likelihood of increasing conflict between resource users.

In the current climate of political and economic reform, it is

H.A. Lessios and Ian G. Macintyre (Eds) (1997),
Proceedings of the 8th International Coral Reef
Symposium, Panama, June 24-29, 1996, Published by
the Smithsonian Tropical Research Institute, Balboa,
Republic of Panama, ISBN 0-935868-90-9 (Two
Volumes), pp. 2115

Proceedings of the 8th International Coral Reef Symposium, Panama

The 8th ICRS held in Panama in 1996 was unique because it brought together a larger than usual number of social scientists and policy makers to share ideas with the coral reef scientists; the latter being the backbone of previous symposia. The two volume proceedings contain 340 manuscripts covering a multitude of coral reef topics. This reviewer believes the papers contained within the proceedings will prove useful to the growing numbers of coral reef scientists, managers and policy-makers from Indonesia.

Since the two volume set is 2115 pages in length I feel it will be most useful in the space provided to describe the proceedings format and then list a few of the many topics covered in the two volume set that may be of particular interest to Indonesian coastal and coral reef managers. The proceedings are divided into thirty-nine subsections according to topic. The topics are largely scientific, policy or management focused. Within each subsection the reader will find papers authored by a distinguished group of globally recognized coral reef scientists, policy-makers and managers.

Many of the papers research, and provide findings on non-Asian coral reef regions in the world, including the Western Indian Ocean, Caribbean and South Pacific including Australia. Indonesian coral and coastal managers looking to answer questions of a more local nature may find some of the many lessons

Simposium Terumbu Karang Internasional ke-8 (8 th ICRS) yang berlangsung di Panama tahun 1996 memiliki keunikan, karena simposium ini menghimpun lebih banyak dari jumlah biasanya, para pakar sosial dan penentu kebijakan, berembung bersama untuk saling tukar pikiran dengan pakar terumbu karang, kelompok yang belakangan ini menjadi tulang punggung simposium sebelumnya. Kedua volume (jilid) prosiding ini mengandung 340 naskah yang mencakup beraneka ragam topik terumbu karang. Penelaah buku ini berpendapat bahwa karangan-karangan yang terdapat dalam prosiding akan sangat bermanfaat bagi para ahli terumbu karang, pengelola dan penentu kebijakan di Indonesia yang jumlahnya terus berkembang.

Mengingat kedua jilid itu berjumlah 2115 halaman, saya merasa akan sangat berguna bilamana pada ruangan yang tersedia itu ada "bagian" yang dapat memuat atau melukiskan format dari prosiding dan kemudian membuat daftar yang berisi beberapa dari sebegitu banyak topik atau materi tersebut yang mungkin akan diminati oleh pengelola wilayah pesisir dan terumbu karang di Indonesia. Prosiding ini telah dibagi dalam tiga puluh sembilan sub bagian sesuai dengan topiknya. Penggolongan topik tersebut pada dasarnya adalah dipusatkan kepada lapangan ilmiah, kebijakan atau mengenai pengelolaan. Dalam masing-masing sub bagian, pembaca akan

Cicin-Sain, B and R.W. Knecht (1998).
Integrated Coastal and Ocean Management:
Concepts and Practices, Island press,
Washington D.C., 517pp + xxiii, ISBN 1-
55963-604-1, RRP \$32.50 (paperback).

Integrated Coastal and Ocean Management

It is most appropriate that in this, the International Year of the Ocean, a major text on ocean and coastal management has been published. Produced with Support from the International Oceanographic Commission (IOC), "Integrated Coastal and Ocean Management" is a seminal work and now rivals the Coastal Zone Management handbook of John Clark (reviewed in Pesisir dan Lautan Vol 1) as the key reference in this field.

Written by two leading academics from the University of Delaware, Biliانا Cicin-Sain and Robert Knecht and by two supporting authors, Dosoo Jang and Gregory Fisk, the book was conceived during a sabbatical break at IOC and built on a major survey of coastal management experience in 29 countries. The survey provides a comprehensive update of coastal management experience in developed and developing countries (including Indonesia). Blended skillfully with a vast reference literature, a comprehensive review of the evolution of coastal management concepts during the past 25 years, and the extensive personal experience of the principal authors (Robert Knecht was an architect of the US coastal zone program from 1972-81), the resultant text is replete with principles which reflect the growing maturity of coastal management programs.

Unfortunately, as with much of the global coastal management literature in recent years, Indonesian audiences may

Adalah sangat tepat bahwa di Tahun Samudera Internasional ini, telah diterbitkan satu buku utama mengenai pengelolaan lautan dan pesisir. Diterbitkan dengan dukungan Komisi Oseanografi Internasional (International Oceanographic Commission, IOC), "Integrated Coastal and Ocean Management" merupakan hasil karya berpengaruh dan kini mendampingi buku John Clark, yang berjudul "Coastal Zone Management" (telah diulas dalam Pesisir & Lautan, Vol. 1, No. 1), sebagai rujukan utama bidang ini.

Disusun dan dituliskan oleh dua akademisi terkemuka dari "University of Delaware", yakni Biliانا Cicin-Sain dan Robert Knecht serta dua penulis pendukung yakni Dosoo Jang dan Gregory Fisk, buku ini dirancang saat cuti panjang di IOC dan disusun berdasarkan satu survei utama terhadap pengalaman pengelolaan wilayah pesisir di 29 negara. Survei tersebut memberikan informasi mutakhir yang menyeluruh mengenai pengalaman pengelolaan wilayah pesisir di negara maju maupun negara yang sedang berkembang (termasuk Indonesia). Dirangkum secara seksama dengan kepustakaan yang luas, kajian ulang yang menyeluruh mengenai evolusi dari konsep-konsep pengelolaan pesisir selama 25 tahun terakhir, serta pengalaman pribadi yang luas dari dua penulis utamanya (Robert Knecht adalah salah satu arsitek dari program wilayah pesisir Amerika Serikat dari 1972

Pacific Circle Consortium
and Oregon Sea Grant (1996)
Coastal Zones of the Pacific;
A Descriptive Atlas, Oregon
Sea Grant, USA,
ISBN: 1-881826-06-6

Coastal Zones of the Pacific Atlas

The Coastal Zones of the Pacific Atlas is an outcome of the Ocean Project, an initiative of the Pacific Circle Consortium of educational agencies established by the Center for Educational Research and Innovation of the Organization for Economic Cooperation Development. The informative and illustrative book is an excellent general reference for anyone who does not understand the Coriolis effect or quickly needs a definition of the word *detritus*.

The 160-pages atlas begins with common coastal zone issues, including conservation and sustainable yield. The book then covers environmental dimensions, human dimensions, the greenhouse effect, the ozone layer, coastal management, original peoples, protected species, and protected areas before concluding with a What Can We Do section. Each topic briefly answers what, why, who, where, when and how and is accompanied by clear diagrams and illustrations. The book's readability is enhanced by its simple layout.

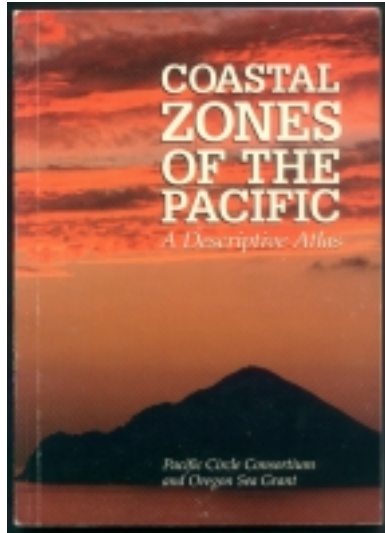
The atlas defines the coastal zone and describes the types of coasts found in the Pacific, but excludes explanations of coastal zones in specific countries, including Indonesia. As a reference book, the glossary should be more comprehensive in the quantity and variety of terms used within the atlas. The book is recommended as a quick reference.

Atlas Wilayah Pesisir pada Samudra Pasifik merupakan satu hasil karya "The Ocean Project", sebagai suatu kegiatan dari Konsorsium Lingkar Pasifik yang merupakan gabungan lembaga pendidikan yang dihimpun oleh Pusat Penelitian Pendidikan dan Inovasi (Center for Educational Research and Innovation), bagi Organisasi Pengembangan Kerjasama Ekonomi (Organization for Economic Cooperation Development). Buku yang sarat dengan ilustrasi dan informasi ini adalah rujukan umum yang sangat baik bagi mereka yang tidak memahami apa yang dimaksud dengan efek *Coriolis* atau ingin dengan cepat mengetahui definisi dari kata *detritus*.

Atlas setebal 160 halaman ini dimulai dengan pemaparan isu-isu umum di wilayah pesisir, termasuk pelestarian dan pemanfaatan yang berkelanjutan. Selanjutnya buku ini menerangkan dimensi-dimensi lingkungan, dimensi-dimensi kemanusiaan, efek rumah-kaca, lapisan ozon, pengelolaan pesisir, penduduk-penduduk asli, jenis-jenis yang dilindungi, juga daerah-daerah yang dilindungi, sebelum kemudian

ditutup dengan bab "Apa yang dapat kita lakukan". Setiap topik menjawab secara singkat mengenai "apa, mengapa, siapa, dimana, kapan, dan bagaimana", yang pemaparannya dibantu dengan berbagai diagram dan gambar-gambar yang jelas. Kemudahan dalam membaca buku ini juga ditunjang oleh tata letaknya yang sederhana.

Although Indonesian scientists will find the atlas too general, students will find it useful to identify issues and develop questions for further It can also be used as a good example of a research framework. The atlas is designed to stimulate thought, originate ideas, and lead students to particular investigations.



Farah Sofa
CRC/URI
Proyek Pesisir
Jakarta

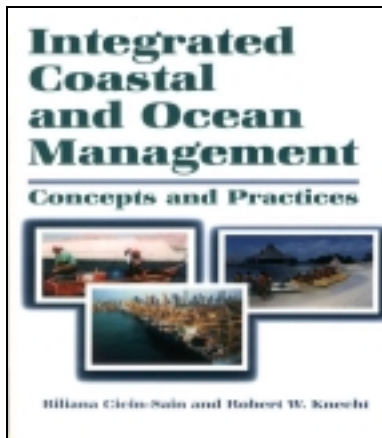
Buku Atlas ini mendefinisikan wilayah pesisir dan menguraikan jenis-jenis pantai di sekitar Samudra Pasifik, namun tidak memberikan penjelasan mengenai wilayah pesisir di negara-negara tertentu, termasuk Indonesia. Sebagai sebuah buku rujukan, maka daftar istilah hendaknya dapat dibuat lebih komprehensif, baik dalam jumlah maupun keragamannya sebagaimana yang tertera dalam atlas tersebut. Bagaimanapun, atlas ini direkomendasikan sebagai suatu rujukan cepat.

Sekalipun ilmuwan Indonesia akan menilai bahwa atlas ini bersifat terlalu umum, namun bagi pelajar dan mahasiswa akan sangat bermanfaat untuk mengidentifikasi permasalahan dan mengembangkan pertanyaan-pertanyaan yang lebih mendalam. Selain itu, buku ini dapat dipergunakan sebagai suatu contoh yang bagus dari satu kerangka kerja penelitian. Atlas ini dirancang untuk merangsang pemikiran, menelurkan berbagai gagasan, dan menuntun pelajar dan mahasiswa menuju suatu penelitian tertentu.

Farah Sofa
CRC/URI
Proyek Pesisir
Jakarta

find some of the terminology and explanation of concepts confusing. For example, from the outset of the work, the term “integrated coastal and ocean management” is described as ICM! Later in the work (including the glossary), ICM is then defined in several quite different ways. While this complaint may be considered overly sensitive, experience with programs such as the Indonesian MREP project has shown how important consistent use of terminology is to audiences for whom coastal management is a novel concept.

Indonesian audiences, especially those involved in recent years with NGO marine programs and projects such as MREP, COREMAP and Proyek Pesisir will see much familiar material in this work and are likely to find the clear layout and carefully organized structure of the work helpful in using material from the book. Although it contains more conceptual material and less practical guidance than the Clark Handbook, this book is a deserved (and very well priced) addition to the bookshelves of all coastal management researchers and educators.



Ian M. Dutton
CRC/URI
Proyek Pesisir
Jakarta

sampai 1981), maka hasil akhir dari tulisan ini sarat dengan prinsip-prinsip yang merefleksikan perkembangan kematangan program-program pengelolaan wilayah pesisir.

Namun disayangkan, sejalan dengan maraknya perkembangan karya tulis mengenai pengelolaan wilayah pesisir akhir-akhir ini di seluruh dunia, para pemerhati di Indonesia mungkin menemukan pemakaian beberapa terminologi dan penjelasan mengenai konsep-konsep membingungkan. Sebagai contoh, sejak awal istilah “integrated coastal and ocean management” didiskripsikan sebagai ICM! Kemudian di bagian selanjutnya dari buku ini (termasuk dibagian daftar istilah-istilah), ICM kemudian diuraikan dalam berbagai pengertian yang cukup berbeda-beda. Walaupun keluhan ini dapat dianggap sebagai kepekaan yang berlebihan, namun pengalaman yang dapat diambil dari pelaksanaan program-program semacam proyek MREP di Indonesia, menunjukkan pentingnya penerapan suatu istilah dengan pengertian yang konsisten, khususnya bagi pembaca yang baru mulai mengenali konsep pengelolaan wilayah pesisir.

Pembaca Indonesia, terutama mereka-mereka yang dalam beberapa tahun terakhir ini terlibat dalam program-program bahari dari lembaga swadaya masyarakat (LSM) dan proyek-proyek seperti MREP, COREMAP dan Proyek Pesisir, akan menemukan banyak materi yang sudah tidak asing lagi dalam buku ini. Besar kemungkinan mereka akan mendapati bahwa tata letak yang jelas dan struktur buku yang disusun dengan teliti sangatlah membantu dalam menggunakan berbagai materi yang terdapat buku ini. Sekalipun buku ini mengandung lebih banyak hal-hal yang

bersifat konseptual dan kurang memiliki petunjuk pelaksanaan praktis dibandingkan dengan buku panduan dari John Clark, namun demikian buku ini layak (serta dalam harga yang wajar) untuk ditambahkan sebagai koleksi di almari buku dari semua peneliti dan pendidik di bidang pengelolaan wilayah pesisir.

Ian M. Dutton

learned from the findings of these papers useful. For example, in Volume One the reader will discover such diverse topics as Coral Reef Ecosystems: How much greater is the whole than the sum of the parts?; Reef management in developing countries: The Philippines as a case study; Tropical marine fisheries and the future of coral reefs: A brief review with emphasis on Southeast Asia; and The status of Southeast Asian coral reefs.

In Volume Two the reader will find papers on a variety of topics including: Effects of fishing and reef structure on east African coral reefs; Sample program design and environmental impact assessment on coral reefs; Reefbase: A global database of coral reefs and their resources; Estimating the carrying capacity of coral reefs for scuba diving; The role of science in the establishment and management of marine protected areas in southeast Asia; Advances in environmental mooring technology; Communicating marine science to non-scientists; Coral reef conservation management: Providing scientific training to the community; and The economic benefits of tourism in the marine reserve of Apo Island, Philippines.

The proceedings of the International Coral Reef Symposia (ICRS) always maintain a high standard of publication and these volumes are no exception. They will be a very valuable addition to the libraries of all researchers, educators and agencies concerned with coral reef management in Indonesia. Given the current high level of interest in Indonesian's diverse marine ecosystems, it will be wonderful to see increased representation of Indonesian papers. The next ICRS is scheduled to be held in Bali in 2000 - that will be finally opportunity to report progress in coral reef research and management in the proceedings of future symposia.

Karla M. Boreri

dapat menemukan antara empat hingga empat belas karya tulis terpisah yang disusun oleh kelompok utama pengelola, [enentu kebijakan dan pakar terumbu karang yang telah terkenal di dunia.

Banyak diantara naskah tersebut merupakan hasil penelitian dan menyajikan temuan-temuan mengenai wilayah-wilayah terumbu karang dunia di luar Asia, termasuk bagian barat Samudera Indonesia, Karibia, dan bagian Selatan Samudera Teduh termasuk Australia. Para pengelola pesisir dan terumbu karang Indonesia yang mencari jawab atas pertanyaan-pertanyaan yang lebih bersifat setempat (lokal) mungkin bisa mendapati bahwa banyak pelajaran yang diturunkan dari temuan-temuan dalam prosiding ini bermanfaat. Sebagai contoh, dalam jilid satu pembaca akan menemukan topik-topik yang melebar misalnya Ekosistem Terumbu Karang : seberapa luas keseluruhannya dibandingkan jumlah komponen-komponennya, Pengelolaan Terumbu Karang di negara sedang berkembang: Filipina sebagai kajian kasus, Perikanan laut di daerah Tropika dan masa depan terumbu karang: kajian singkat dengan penekanan pada terumbu karang Asia Tenggara.

Dalam jilid dua, pembaca dapat menemukan aneka ragam topik yang bermanfaat, termasuk Pengaruh penangkapan ikan dan struktur (susunan) terumbu terhadap terumbu karang Afrika bagian timur; Reefbase: sebuah pangkalan data tentang terumbu karang untuk penyelaman scuba, peranan ilmu pengetahuan dalam penetapan dan pengelolaan wilayah-wilayah bahari yang dilindungi di Asia Tenggara.

Kemajuan-kemajuan dalam teknologi penambatan yang akrab lingkungan, mengkomunikasikan ilmu-ilmu kelautan kepada khalayak awam (bukan ilmuwan), Pengelolaan Pelestarian Terumbu Karang: Penyelenggaraan Pelatihan Ilmiah bagi masyarakat dan keuntungan-keuntungan ekonomi yang didapat dari Pariwisata pada daerah suaka kelautan di P. Apo, Filipina.

Prosiding dari simposium internasional tentang Terumbu Karang senantiasa menjaga tingkat standar publikasi yang tinggi, dan tidak terkecuali kedua jilid ini. Buku-buku ini akan sangat berharga sebagai tambahan khazanah pustaka bagi semua peneliti, tenaga pendidikan dan dinas-dinas yang berkepentingan dalam pengelolaan terumbu karang di Indonesia. Mengingat tingginya tingkat minat atau keinginan tahu mengenai ekosistem Kelautan Indonesia adalah sangat menggembirakan untuk menyaksikan peningkatan artikel tentang Indonesia yang dapat merinci mengenai kekayaan alam terumbu-terumbu nusantara termuat dan tercantum dalam prosiding simposia semacam ini, di masa-masa yang akan datang.

Karla M. Boreri

sometimes difficult to convince policy makers of the importance of continuing to invest in soundly based natural resource management programs. A cursory review of Hinrichsen's work emphasizes why such investment not only makes good sense, but is essential to the long term survival of coastal populations. If we are all, as Hinrichsen contends, "coastal people", then failure to implement programs for sustainable use of our coastal resources will ultimately reduce the quality of our lives and the quality of our life support systems - if you have any lingering doubts about that conclusion take a day trip (as Hinrichsen did) to Jakarta Bay !

Ian Dutton
CRC/URI
Proyek Pesisir
Jakarta

Guidelines to Authors

Manuscripts format. Manuscripts should contain a cover page that includes the title, the name(s) of the author(s) and their address(es). Each research paper, note and review article should have an abstract of not more than 300 words. For manuscripts written in Bahasa Indonesia, it must have an abstract in both Bahasa Indonesia and English. The abstract should state concisely the purpose of the paper, procedures followed, significant findings and major conclusions. Research papers must be submitted according to the following format: *Introduction, Material and Methods, Results, Discussion, References and Appendix* (if required). Research notes should combine *Results and Discussion* sections, whilst all other forms of manuscript should list references at the end of the text.

Manuscript should be typed in Word Perfect (ver. 5.1 or later version) or Microsoft Word (ver. 5.0 or later version), used Times New Roman font type size 12, double-spaced, with margins 2.5 cm on A4 size paper. The right margin should not be justified and words to be printed in Italics should be underlined. Metric measurements should always be given, or where appropriate the metric equivalents given in parentheses. All pages including tables should be numbered. Footnotes should be avoided and bound manuscripts will not be accepted.

Citations and References. Within the text, citation should be cited by author(s) and date in parenthesis as follows: (Bengen and Widinugraheni, 1995; Dartnall and Jones, 1986; Kenchington, 1978). For references cited with three or more authors “et al.” should always be used.

Unpublished studies may be referred to as personal communications giving the name and short address e.g. (Darmawan, PKSPL- PB, and personal communication). It is the author’s responsibility to obtain permission from the colleague whose work is cited in this way.

References should be listed in alphabetical order. The names of all authors and the full title of the paper must be supplied together with the years, volume and first and last pages.

If publication is in press, the reference should be cited as completely as possible and then by including (in press).

Examples of acceptable referencing format to the journal are provided below:

Bengen, D. G. and P. Widinugraheni, 1995. Sebaran Spasial Karang dan Asosiasinya dengan Karakteristik Habitat di Pantai Blebu dan Pulau Sekepal, Lampung Selatan. *Prosiding Seminar Nasional Pengelolaan Terumbu Karang Jakarta*, 10 - 12 Oktober 1995 : 81 - 95.

Dartnall, A.J. and M. Jones (eds) 1986. *A Manual Survey Methods, Living Resources in Coastal Areas*. Australia Institute Marine Science, Townsville.

Kenchington, R. A. 1978. *Visual Survey of Large Areas of Coral Reefs*. In D. R. Stoddart and R. E. Johannes (eds). *Coral Reefs: Research Methods*. UNESCO, Paris.

Tables. Tables are to be compiled on separate sheets. Tables are numbered consecutively. A title should be provided for each table and they should be referred to in the text.

Illustrations. Graphs, photographs, maps, etc will be designed as figures. All illustrations should similarly be numbered consecutively and referred to in the text. Each should be identified by the fig number, author, and abbreviated title on the back. Poor contrast graphics will not be accepted. Photographs should be in glossy print. The size of the lettering being appropriate to that of the illustration size, but taking into account the possible need for reduction in size (up to 50 %).

Proofs. Only one set of proofs will be sent to the main authors, showing the final layout of the paper, as it will appear in the journal. Proof corrections must be limited to typographical errors. Corrected proofs should be returned to the Editor within (7) days of being received by author.

Offprints. Ten offprints of each paper will be provided free of charge. Additional copies may be purchased on an “offprint order form” which will accompany the proofs.

TUJUAN

- * Meningkatkan kepedulian masyarakat luas terhadap manfaat dari pengelolaan sumberdaya pesisir dan lautan secara terpadu.
- * Merangsang dialog di antara para praktisi dan pakar pengelolaan sumberdaya pesisir dan lautan.
- * Membagi pengalaman dan pengetahuan di antara seluruh pemerhati masalah-masalah pengelolaan sumberdaya pesisir dan lautan.

RUANG LINGKUP

Teknis, hukum, politik, sosial dan kebijakan yang berkaitan dengan pengelolaan sumberdaya pesisir dan lautan.

SASARAN PEMBACA

Pejabat pemerintah dari seluruh tingkatan, kalangan akademik, para peneliti dan praktisi, serta berbagai kalangan pemerhati masalah-masalah pengelolaan sumberdaya pesisir dan lautan

FORMAT

- * Makalah penelitian dan kajian kebijakan (tidak lebih dari 3.000 kata)
- * Laporan singkat (menggunakan data yang lebih terbatas dan tidak lebih dari 1500 kata)
- * Artikel kajian (tidak lebih dari 8.000 kata)
- * Komentar (opini tentang naskah yang telah diterbitkan dan berbagai macam isu lain yang sesuai dengan ruang lingkup jurnal (tidak lebih dari 1.000 kata).
- * Tinjauan Buku

OBJECTIVES

- * Increase public's awareness of the benefits of integrated coastal and marine resources management.
- * Stimulate dialogue between practitioners and scientific community.
- * Share experience and learn lessons within the coastal and marine management community.

SCOPE

Technical, legal, political, social and policy that related to the management of coastal and marine resources.

TARGET AUDIENCE

Government officials at all levels, academics, researchers and practitioners involved indisciplineline of coastal and marine resources management.

FORMAT

- * Research and policy review papers (up to 3,000 words.)
- * Research notes (usually based upon more limited set of data and not exceeding 1,500 words.)
- * Topic review articles (not more than 8,000 words).
- * Comments (opinions relating to previously published material and all issues relevant to the journal's objectives, not more than 1,000 words)
- * Book review

Petunjuk Penulisan

Format Naskah. Naskah harus memiliki halaman depan yang memuat judul naskah, nama dan alamat penulis. Setiap naskah harus memiliki abstrak dengan jumlah maksimal 300 kata. Untuk naskah dalam bahasa Indonesia, abstrak dibuat dalam bahasa Indonesia dan bahasa Inggris. Abstrak secara ringkas mensarikan maksud dan tujuan penelitian, prosedur pelaksanaannya, hasil-hasil dan kesimpulan utamanya. Naskah hasil penelitian disampaikan dalam format berikut: **Pendahuluan, Bahan dan Metodologi, Hasil, Pembahasan, Daftar Pustaka** dan **Lampiran**. Untuk naskah laporan singkat, **Hasil dan Pembahasan** digabungkan. Untuk seluruh jenis naskah harus mencantumkan **Daftar Pustaka** pada akhir tulisan.

Naskah ditulis dalam program-program pengolah kata seperti Word Perfect versi 5.1, Microsoft Word versi 5.0 atau versi terbaru lainnya, menggunakan huruf Times New Roman ukuran 12, menggunakan 2 spasi dengan lebar margin 2.5 cm pada kertas ukuran A4. Margin teks tidak harus rata kanan, dan kata-kata yang dicetak miring hendaknya digaris bawah. Hasil pengukuran disajikan dengan satuan metrik, atau diberi keterangan nilai ekuivalennya dalam kurung. Semua halaman termasuk tabel harus bernomor. Catatan kaki sebaiknya tidak digunakan dan naskah tidak boleh dijilid.

Rujukan dan Daftar Pustaka. Di dalam teks, rujukan ditulis sebagai berikut : Bengen and Widinugraheni, 1995; Dartnall and Jones, 1986; Kenchington, 1978). Untuk rujukan yang ditulis oleh 3 orang atau lebih, penulisannya menggunakan *et. al.*.

Rujukan untuk tulisan yang tidak dipublikasikan harus dianggap sebagai komunikasi pribadi dengan mencantumkan nama dan alamat singkat contohnya: Darmawan, PKSPL-IPB, komunikasi pribadi. Ijin untuk mencantumkan rujukan tersebut merupakan tanggung jawab penulis.

Daftar pustaka disusun menurut abjad nama penulis pertama. Daftar pustaka tersebut memuat nama semua penulis, judul naskah, tahun, volume dan halaman yang dirujuk.

Jika tulisan yang dirujuk masih dalam proses akan diterbitkan, hendaknya dituliskan “(in press)”.

Untuk lebih jelasnya, berikut adalah penulisan daftar pustaka:

Bengen, D. G. and P. Widinugraheni, 1995. Sebaran Spasial Karang dan Asosiasinya dengan Karakteristik Habitat di Pantai Blebu dan Pulau Sekepal, Lampung Selatan. Prosiding Seminar Nasional Pengelolaan Terumbu Karang Jakarta, 10 - 12 Oktober 1995 : 81 - 95.

Dartnall, A.J. and M. Jones (eds) 1986. A Manual Survey Methods, Living Resources in Coastal Areas. Australia Institute Marine Science, Townsville.

Kenchington, R. A. 1978. Visual Survey of Large Areas of Coral Reefs. *In* D. R. Stoddart and R. E. Johannes (eds). Coral Reefs: Research Methods. UNESCO, Paris.

Tabel. Setiap tabel harus diketik pada halaman terpisah. Penomoran tabel dilakukan secara berurutan. Setiap tabel harus diberi judul. Penomoran harus diidentifikasi dalam teks (*Tabel**).

Gambar. Grafik, Foto, peta dan sebagainya dikategorikan sebagai gambar. Semua gambar dinomori dan disesuaikan dengan teks naskah. Penomoran gambar dilakukan secara berurutan dan harus diidentifikasi dalam teks (*Gambar**). Berilah keterangan untuk setiap gambar di halaman belakangnya dengan mencantumkan nomor gambar, nama penulis dan judul gambar. Grafik yang kurang jelas tidak akan diterima. Foto dicetak pada kertas yang mengkilap. Ukuran kertas harus sesuai dengan ukuran gambar tetapi sedapat mungkin sudah mempertimbangkan pengecilan ukuran hingga 50%.

Proofs. Satu eksemplar naskah yang siap cetak akan dikirimkan kepada penulis utama. Koreksi terhadap naskah pada kesalahan ketik. Naskah yang telah dikoreksi mohon dikembalikan paling lambat 7 hari setelah diterima kembali oleh penulis.

Offprints. Penulis utama akan mendapatkan sepuluh lembar “offprints” secara cuma-cuma. Apabila ingin mendapatkan tambahan “offprints” hendaknya mengisi dalam “Daftar pemesanan offprints” yang dikirimkan bersamaan dengan naskah siap cetak.

