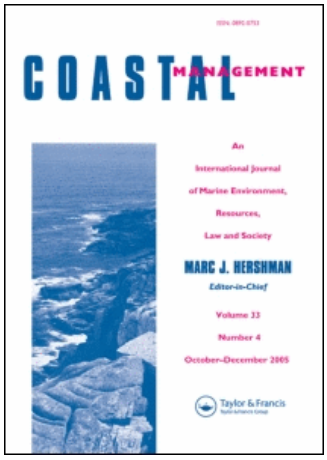

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Community Participation in Marine Protected Area Management: Wakatobi National Park, Sulawesi, Indonesia

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Coral reef areas are threatened worldwide by growing populations, tourism development, and use of poison and dynamite in fishing in areas adjacent to the reefs. The designation of marine protected areas is one strategy for addressing these problems. Wakatobi National Park, established in Eastern Indonesia in 1996, contains

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approximately 50,000 ha of coral reefs and a resident population of Sama-Bajo people whose traditions and current livelihoods tie them closely to the sea. The present research, using participatory rural appraisal methods, focused upon the impact of the designation of the Marine Park on their lives and investigated the potential for public participation in park planning and management. The Wakatobi Park Management Plan does not address the needs and interests of local people. Priority should be placed on adaptation of park zoning and protection regulations to accommodate the livelihood requirements of indigenous communities.

Keywords Indonesia, marine protected areas, participatory management

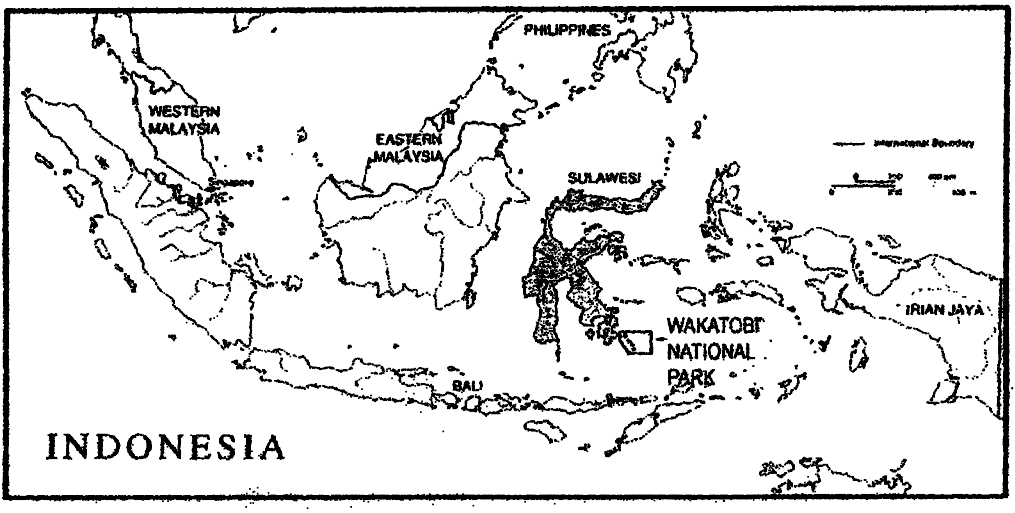
Introduction

This study examined Wakatobi[1] National Park (WNP), marine protected area (MPA) in Southeast Sulawesi, Indonesia (Figure 1a,b). Indonesia consists of 17,500 islands and has an estimated population of 206 million people. It is the largest archipelago state and one of the world's largest biodiversity centers of coral ecosystems (Lubis & Nearne, 1994; Sloan & Sugandhy, 1994; Watson, 1995). According to the Indonesian Institute of Science (LIPI), only 7% of Indonesia's reefs remain in good condition, 30% have vanished, and the rest remain in critical condition (Republic of Indonesia Department of Foreign Affairs, 1995).

Sixty percent of Indonesia's population lives in coastal areas. Much of the settled coastal area is subject to "over-exploitation or excessive consumption of the resources" and "threats to the coastal and marine environments from pollution and destructive techniques of utilization" (State Ministry for the Environment, 1997, p. 567). According to Indonesia's State Ministry for the Environment (1997), constraints to the sustainable development of coastal and marine resources are poverty and the lack of sustainable livelihoods for people in coastal communities. In many coastal areas, the land is unsuitable for agricultural activities (Widjaja-Adhi & Karama, 1994). Local communities must rely on the sale of fish and other marine products to support their families. Identified human activities of concern include physical damage caused by anchors and ship grounding, coral mining, and overexploitation of reef fisheries (Tomascik, 1993; Alder, 1995; CANORA (Asia) Incorporated, 1996).

WNP, or *Taman Nasional WAKATOBI,* was designated as a marine protected area in July 1996 by the decree of the *Keputusan Menteri Kehutanan* Number 393/Kpts-VI/1996. The park covers an area of 1.39 million hectares (13,900 km^2) and includes all coral reefs (*Karang*), islands, and communities within its boundaries (Departamen Kehutanan, 1997). The Wakatobi area was designated in an effort to protect coral reefs with high biological diversity and to halt the use of destructive fishing techniques.[2] A preliminary draft of a zoning system for WNP was prepared in 1996, and a complete management plan, including a revised zoning system, was developed in January 1998. The 1998 Management Plan is based on a centrally planned and controlled system of management which has been used with limited success in other MPAs in Indonesia (Sloan & Sugandhy, 1994; White et al., 1994; Alder, 1996).

Conventional management schemes for areas such as WNP assume that it is possible to manage resource and environmental use through rules and regulations (i.e., limitations on catch sizes, closure of fishing grounds) (Wells & Brandon, 1992). Local communities are expected to comply with these new regulations, even if the regulations have adverse effects on their livelihoods. This approach can lead to conflicts over resource use and discourage local support for the MPA, commonly resulting in local noncompliance with park rules. In addition, MPAs in developing countries frequently do



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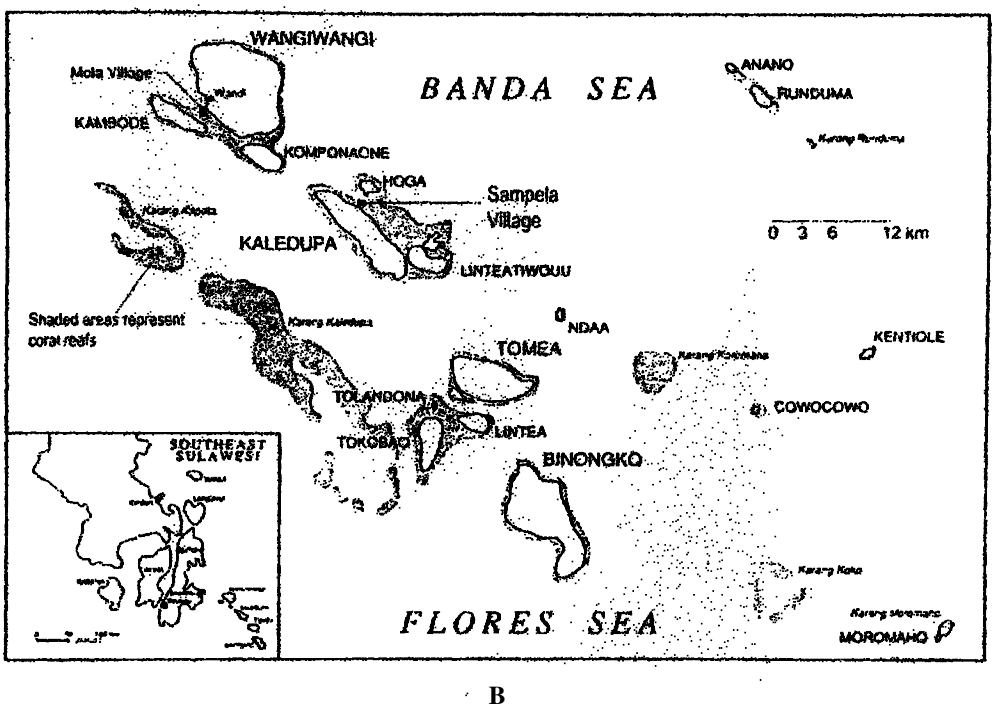

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Figure 1. (A) Map of Indonesia and Wakatobi National Park. (B) Map of Wakatobi National Park and Southeast Sulawesi.

not have sufficient financial and human resources to effectively monitor the management plan, making it difficult to enforce local compliance with the regulations. These effects of conventional management regimes have reduced the effectiveness, efficiency, and equity of MPA management in Wakatobi National Park. Numerous authors have suggested that the success of MPA management schemes can be enhanced by increasing local community involvement in the planning and management process (Wells & White, 1995; Kenchington & Kelleher, 1995; Agardy, 1997), and this research was designed to

explore this possibility, with specific reference to WNP. Field research was conducted from September to November 1997 and from September to December 1998, as the management plan for the new park was being developed and in the first year after its adoption.

MPAs, Coral Reef Ecosystems, and Coral Reef Management

Historically, MPAs have been established for one of two reasons: (1) a condition existed that threatened the marine area, or (2) the area was believed by some stakeholder or user to have some special value (Gare, 1975; Agardy, 1997). The resulting MPAs tended to be single-purpose protected areas, developed on the basis of international concerns for biodiversity conservation and coral reef preservation (Pomeroy, 1995). Meanwhile, national management objectives tend to emphasize economic development and often are based on promoting tourism. As reef-based tourism is typically thought to have few negative impacts on reef ecosystems (Salm, 1985; Clark, 1991), conservation areas that allow for some tourism activities are able to simultaneously meet national and international objectives for management. International and national management objectives often do not address socioeconomic and cultural aspects of fisheries management, with the result that they tend to neglect the needs of local fishing communities (Pomeroy, 1995). However, available literature also suggests that successful management at the local level (meaning that the needs of the local communities are met) holds the greatest potential for meeting global, national and local reef management objectives (Bailey & Zerner, 1992; White et al., 1994; Pomeroy, 1995).

The overriding management priority for MPAs continues to be conservation of global biological diversity. Nevertheless, over the past 15 years, support for developing multiple-purpose MPAs has grown, representing a shift to more integrated approaches to resource management (Alder, 1996a; Agardy, 1997). In particular, by designating park zones, developing regulations and permit systems for the control of resource extraction, and engaging in various forms of public education, managers believe that they can achieve conservation goals related to biodiversity and habitat preservation and also accommodate the needs of multiple users, thereby addressing social equity concerns (Alcala, 1988; Clark, 1991; Lafolley, 1995; Kenchington & Kelleher, 1995; McClanahan & Karuna-Arara, 1995).

MPAs in Indonesia, where our research took place, fit within a dominant pattern of limited success within developing countries (Hutomo et al., 1993; Alder, Sloan, & Uktolseya, 1994). The nontransferability of occidental management regimes to the developing world has been well documented in the literature on MPA and fisheries management (Pomeroy, 1991; White et al., 1994; Wells & White, 1995; Alder, 1966; Neilson & Vedsmand, 1999).

In developing countries such as Indonesia, many of the coastal inhabitants are subsistence fishers. The rules, regulations, and maximum yield quotas associated with the imposition of an MPA frequently create a situation in which conservation policies and regulations conflict with the needs and interests of local people. Indonesian government policy supports community-based management regimes, and acknowledges that sustainable coastal management and regulatory enforcement in Indonesia cannot occur without community support. Implementation is affected, however, by a number of factors including an expanding and mobile human population, emerging national and international markets for valuable marine resources, the nature of the live-reef fish trade, a lack of defensible marine boundaries, the government's centralized policies, and a history of corruption at all levels (Bailey & Zerner, 1992; Lubis & Nearne, 1994; Sloan & Sugandhy 1994; Ruddle, 1996). Within the wide range of cultural, political, and economic issues affecting natural resource conservation and marine resource use in Indonesia (Hirsch &

Warren, 1998; Li, 1999; Zerner, 2000), a series of more narrowly focused issues related to management of Indonesian MPAs have been identified by various authors, such as the conflicting needs and objectives of multiple users, severely limited financial and human resources, poor coordination among agencies, and jurisdictional disputes (Yates, 1994; Alder, 1995; Wicaksono, 1995; Kusuma-Atmadja & Purwaka, 1996).

One particularly contentious aspect of MPAs, at the local level, is the imposition of a "core zone," or "strict reserve area," in which all extractive practices are forbidden. Core zones are designed to address overfishing, which is frequently identified as a major contributor to coral reef degradation (Alcala, 1988; McManus et al., 1992; Roberts & Polunin, 1993; Laroche & Ramananarivo, 1995; Jennings & Polunin, 1996; McManus et al., 1995; Russ & Alcala, 1996; Coblentz, 1997; Wantiez, Thollot, & Kulbricki, 1997). Overfishing occurs when cash-poor fishers resort to overexploiting fisheries to increase incomes (Amar, Cheong, & Cheong, 1996; Maragos, Crosby, & McManus, 1996; McManus, 1996; McManus, 1997). Associated practices include the targeting of predator species (Jennings & Lock, 1996) and high-frequency fishing (Roberts, 1995; Jennings & Lock, 1996; McManus, 1997).

The net effect is a shift in trophic balance (Jennings & Polunin, 1996; Jennings & Lock, 1996). Declining yields resulting from overfishing generate, in turn, a marked increase in destructive fishing practices (Carter, 1997; Alcala & Gomes, 1987). Fertilizer bombs and potassium cyanide poison both cause irreparable damage to coral reef ecosystems (McManus, 1996; Ruddle, 1996). Other destructive fishing practices include dropping anchors and traps directly onto the reefs and using live coral to cover and disguise certain types of traditional traps.

Because of the nonextractive nature of most reef-based tourism activities, tourism is often thought to have a low ecological impact relative to fishing (Salm, 1985; Clark, 1991). However, tourism has both direct and indirect negative impacts on corals and reef communities (Rouphael & Inglis, 1997; Ross, 1997). Physical contact with the reef resulting from activities such as boating, reef walking, swimming, snorkeling, and SCUBA diving can cause serious damage (Clark, 1991; Hawkins & Roberts, 1992, 1993; Allison, 1996; Rouphael & Inglis, 1997). Indirect impacts are usually associated with the building of infrastructure to serve tourists, the use of reef resources to meet the increasing tourist demand for food, and the subsequent use of the coastal waters for waste assimilation (Tilmant, 1987; Lundin & Linden, 1993).

From an ecological perspective, much evidence supports the hypothesis that developing marine reserves can result in maintenance of species diversity and increased population (McClanahan & Karuna-Arara, 1995; Russ & Alcala, 1996; Wantiez, Thollot, & Kulbricki, 1997). Nevertheless, MPAs throughout the world, and particularly in developing nations such as Indonesia, are falling short of their mandates for marine conservation. Inefficient, insufficient, and inequitable management regimes are frequently cited as a major impediment to the improvement of MPA effectiveness (Kenchington, 1990; Roberts & Polunin, 1993; Hale & Lemay, 1994; Kenchington & Kelleher, 1995; Ticco, 1995; Wells & White, 1995; Alder, 1996; Agardy, 1997). These management issues were the focus of our research.

The Study Area and the Research Project

WNP and Mola Village: The Management Context

WNP is under the jurisdiction of the Buton Regency. WNP comprises four large islands, the largest of which is Wangi wangi. Kecamatan Wangi Wangi (KW), located on Wangi wangi, is the administrative center of the islands in WNP and is the access point from

Bau-Bau to Tomea, Kaledupa, and other islands in the region. The population resident in or near the park is approximately 76,000 people.

WNP has five zones. Local fishing activity is prohibited in three of these: the core zone, the restricted zone, and the tourism zone. These three zones include most of the desirable fishing territory for people living in the village of Mola, which was the main focus of our research (Figure 2).

General regulations regarding fishing are complex. Numerous Acts, Regulations and Decrees pertain to the management of WNP. Regulation No. 9/1985 is of notable importance as it provides the basis for the administration of commercial and subsistence fishing activities. Others that are important include the fisheries regulations, PERDA (Peraturan Daerah Propinsi Daerah Tingkat I), the most significant of which is Fisheries Regulation No. 3/1985. The latter includes rules for taxation and zones for fishing, with criteria for types of activities and equipment that may be employed within each as well as types of boats and nets permissible for catching different marine species. Historically, and including the time of our research, Indonesian fishers have not required fishing licenses, although they do need permits. Letters of permission (permits) for the commercial catching of fish are available from local officials. Foreign companies are subject to separate regulations, which require licenses and must go to the Head of the Provincial Marine and Fisheries Office in Kendari to obtain a fishing license. Licenses are only provided if recommended by the Head of the District Marine and Fisheries Office. In 1999, a new government decree required that Indonesian and non-Indonesian fishers require licenses that stipulate the type of boat licensed and the fishing grounds permitted.

Regulations also specify taxation rules for local fishers. Fishers are taxed 6% of the basic price per kilogram. The basic price varies from season to season.

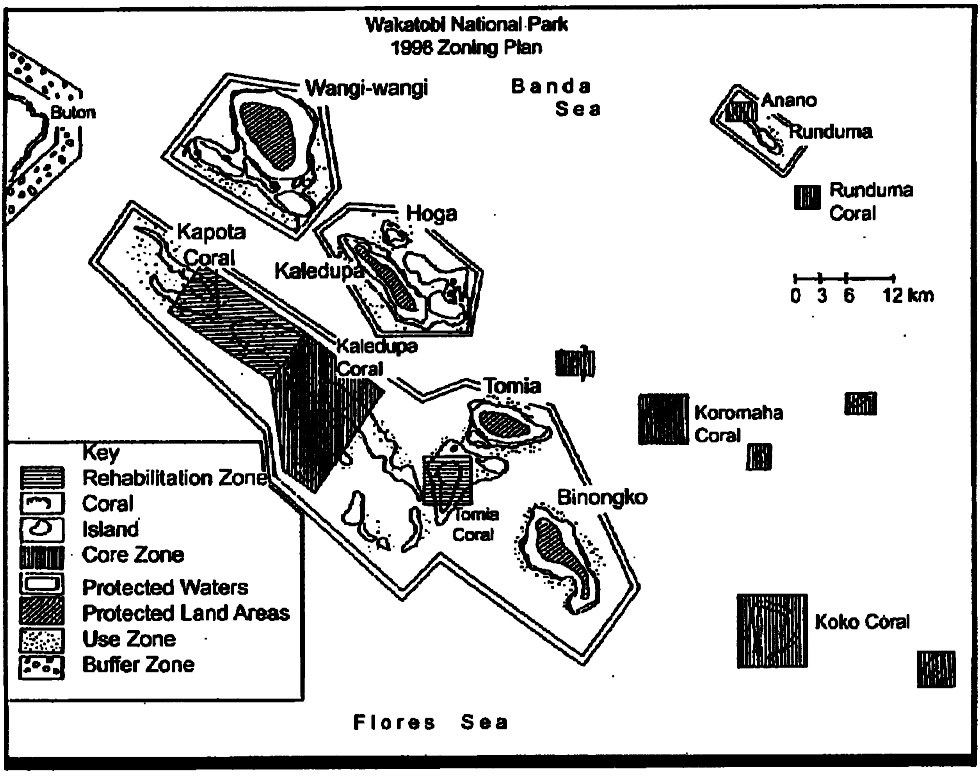

Figure 2. Map of Wakatobi National Park, showing zones.

Resident fishing communities live in the intertidal zones of the park and belong to an ethnic group called Sama or Sama-Bajo (Sather, 1997; McAllister, 1996). The largest of the Sama-Bajo communities in WNP live in Mola village, located in the coastal zone near Wangi wangi's most densely populated area, Wanci (Figure 2). Census data from 1995 were the most recent available at the time of the study. At that time, Mola village had a population approaching 5,000 people, or about 7% of the total population within WNP. Significant new housing construction visible during the period of our study indicates that the population is growing. One reason for selecting Mola village as our research site was a general perception among officials that the Mola community (and Sama-Bajo people more generally) is a major contributor to marine resource conservation problems in WNP.

The *Camat* is the head of the subdistrict government. The *Camat* works with the police, navy, army, and local village leaders to manage the coastal areas of WNP and to monitor the activities of local and outside fishers (Table 1). The head of the District Marine and Fisheries Office also plays an important role in regulating these activities. At the village level, villagers respect the village head (*Kepala Desa*) as both a formal and an informal leader, and he is involved in all village activities. Villagers also report to other informal leaders who are respected members in the community.

The Research Project

Field research for this study was conducted in 1997 and 1998, just prior to and shortly following approval of the WNP management plan. The purpose of the research was twofold: (1) to examine implications of implementation of the management plan for residents of the WNP area, focusing on one case study community, Mola village; and (2) to examine the potential for integration of effective community-based management strategies into the management plan for WNP. The research approach was based on previous studies in the Philippines, where MPA management involving community participation has been successful (White et al., 1994; Wells & White, 1995).

Information gathering at the village level was conducted via individual and group interviews, using interpreters who speak the local language; through field observation and the associated preparation of maps, calendars, and transects in consultation with villagers; and through a variety of participatory appraisal techniques, including problem analysis, examination and analysis of photographs, semistructured interviews, focus groups, and unstructured discussions. One hundred fifty-seven semistructured interviews were carried out at the village level in 1997, and 133 in 1998. Many, though not all, of the 1998 interviews were carried out with the same interviewees as in 1997. Research questions, researcher, and research assistants differed for the two periods, with the focus in 1997 being on anticipation of implementation of the park management plan and in 1998, on early postapproval experience with implementation.

This type of research is limited both by sampling approach and by method. Sampling at the village level was largely purposive and opportunistic, based on who was available and interested in speaking with the researchers during the time they were resident in the case study village. Although the combination of methods used meant that, in each research period, approximately 5% of residents contributed to the information base of the research, we cannot say that this group is fully representative of the community as a whole. In particular, women were underrepresented in our study samples, relative to their demographic presence in the village. Methods used came largely from the set of techniques associated with Participatory Rural Appraisal. Strengths and limitations of these techniques have been well documented elsewhere (Chambers, 1994a, 1994b; Grenier, 1998). In our case, the opportunity to return to the community after one year and to

Table 1
Roles of key actors in coastal area protection in WNP

Key actor	Role in coastal area management
Camat, Wanci	Representative of the *Bupati* (Governor) at the *Kecamatan (regional)* level Administrative subdistrict government, especially for coastal area management, in absence of permanent office to handle coastal area affairs Part of the Muspika (Musawara Pimpinan *Kecamatan*, WNP coastal area patrol team), which includes representatives of the police, army, and navy
Army (*Angkatan Darat*), Wanci	Representative of the central government in WNP
Police (*Polres*), Wanci	Maintenance of community safety and management of social and political aspects of the community Law enforcement and arrests of offenders, including those who degrade the coastal environment
Navy (*Angkatan Laut*), Wanci	Coastal area law enforcement and coordination of efforts with the police and the army to apprehend and process offenders
Department of Forestry and Natural Resources, Kendari and Buton	Administration of environmental conservation Coordination of activities with the Wakatobi National Park Office in Buton
Department of Fisheries, Buton	To assist the *Bupati* as the administrator of fisheries development, specifically fishing, aquaculture, and coastal resource conservation, in the Buton Regency Administration of commercial and subsistence fishing Law enforcer against offenders who use bombs, potassium cyanide poison (KCN), and illegal fishing gear Administration of the BANKAB Project
Department of Tourism, (*Dinas Pariwisata),* Kendari	Administration of accommodation, promotion and guide licensing

Source: Key informant interviews—Kendari, Buton, and Wanci, 1997.

probe for certain issues and concerns that seemed to merit clarification was of considerable value in overcoming the inherent limitations of the method.

Resource Management Issues in WNP

Local and external key informants identified the major contributors to coral reef degradation as coral mining, fishing with fertilizer bombs, fishing with cyanide, harvesting of giant clams, and exploitative activities of outside fishers. According to the Head of the Provincial Forestry and Natural Resources Office, Wanci and Kaledupa are the most problematic areas. Secondary concerns were the impacts of boating activities in reef areas, the overharvesting of mangrove wood for fuel, oil pollution from boats anchored in the harbor, and the disposal of household wastes from coastal villages.

Coral mining was legal until 1992. According to the village heads and the village elders, the use of dead coral stone for the foundation of houses did not occur before the 1960s; before then, only traditional houses of wood and bamboo were built. Now there is a growing local demand for coral stone. Villagers first used coral stone in the 1960s and 1970s to build fences. The stones were then used to build roads through the village in the 1970s and 1980s and, subsequently, to build foundations for houses, as it is believed that stones make a house stronger. Coral stone has also been used to "modernize" traditional houses. For the Mola, coral stones are a free resource, and as such, the mining activity is very profitable. Only Sama-Bajo people in WNP mine coral, and women typically dominate in this activity.

Local people reported to us that the use of bombs by fishers started in 1943, during Japanese occupation. The Japanese taught fishers to use fertilizer bombs[3] to increase their yields. It is difficult to determine who the bombing groups are or where they come from because some carry guns, which makes it unsafe to approach them, and because everyone is aware that this is illegal activity. This problematic situation is exacerbated by large fish-buying companies from outside Indonesia, which provide equipment, boats, and gear and use Indonesian fishers as cheap labor. In this manner, they are able to circumvent Indonesian law, which generally only allows fishing for research purposes by non-Indonesian companies in Indonesian waters. While these companies are not specifically interested in "bomb-caught" fish, they have the reputation of encouraging any strategy that increases desired catches. Some outside companies are interested in a varied catch, while others target shrimp, bonito grouper, wrasse, or trout.

According to key informants from the Army, an undetermined number of Mola residents die each year from bombs. Three weeks before 1997 field research began, a blast occurred in the community. Interviewees reported that someone died, but no one reported it or would testify that it happened. Officially, bombing incidents should be reported to the police. If the police are unable to handle the situation, they must inform the army. According to key informants from the army, it is difficult for witnesses to report such incidents because of death threats by the bombers. Table 2 summarizes the situation from the perspective of law enforcers.

Some of our local respondents reported that local people are still engaged in illegal activities, while others suggested, during our 1998 interviews, that all poisoning and bombing by local fishers had ceased. In 1997, during the first period of fieldwork, our research found that five individuals were known to use bombs and that bomb-making materials were apparent in the village. Follow-up research in July 2000 indicated that, while the level of illegal activity among local fishers is decreasing and is probably much lower than among outsider fishers, there may still be local people using bombs for fishing purposes.

The practice of fishing with potassium cyanide (KCN) has been encouraged by

Table 2
Law enforcement obstacles created by Mola and outside fishers

Key informant	Law enforcement challenge
Camat	Inability to obtain written reports (confidentiality issue) from the *Kepala Desa* about Mola fishers who are/were known to participate in destructive or illegal practices. Without the written reports, the *Bupati* is unable to act
Army	Inability to locate and arrest Mola fishers who participate in destructive or illegal practices as the community protects its members (no witnesses) Unwillingness of the village heads (*Kepala-Kepala Desa)* to cooperate with the army and report incidents involving destructive or illegal practices by Mola villagers Difficulty in obtaining proof of illegal fishing activity by way of verbal or written reports, and unwillingness of witnesses to come forward and testify
Police	Mola villagers do not understand the language of the law and its application to the protection of the coastal environment The poor attitude of Mola people toward law enforcers Unwillingness of witnesses to report incidents to the police The use of fertilizer bombs by some Bajo in fishing activities under the guise of using traditional fishing methods
Navy	Community support of law enforcement actives is low
Head of the Department of Forestry and Natural Resources, provincial level	Trying to protect the marine resources from economic exploitative practices of local fishers while at the same time considering their socioeconomic needs
Head of the Department of Fisheries, District level	Insufficient staff to monitor activities in the large coastal zone of WNP There is no set punishment for suppliers of bombs Lack of defined territories for fishing groups in WNP causes territorial conflicts Absence of legal boundaries allows outside fishers to exploit fisheries at will Concerning fishers who use bombs, the punishment is too lenient (three months in jail), and as such is not a deterrent to repeat offenders

Sources: Interviews with the *Camat*, army, police, navy, Department of Forestry and Natural Resources, and the Department of Fisheries, 1997.

companies from Hong Kong and is directly related to the illegal poaching of the rare Napoleon wrasse, *Cheilinus undulatus*, for the Asian live fish trade markets. According to regulation, foreign fishing companies found using KCN are subject to the immediate confiscation of their licenses by the District Marine and Fisheries Office; however, our research indicates that enforcement of this regulation is inconsistent.

In response to market demands, fishers extract giant clams, which live among live coral. It is very difficult to pry them loose, and their harvest greatly contributes to coral reef degradation.

Outside fishers come from Sinjai and Selayar in South Sulawesi, from Bokori Island in the Kendari region, and from Maluku and Irian Jaya to exploit fisheries in WNP. They have more modern fishing equipment and boats than local fishers. Non-Indonesian fishers come from Hong Kong, Singapore, and the Philippines. Key informants reported that foreign boats fish illegally in the offshore zones of the Arafura Sea, Banda Sea, and Sulawesi Sea.

Anchoring boats to the coral reefs and propelling boats along the reef at low tide with bamboo poles further contribute to coral reef degradation in WNP. In addition, boats commonly become impaled on coral reefs in low tide or because of poor navigation through the coral reef areas. Reasons suggested by key informants include poor navigation skills, lack of essential navigation equipment, poor visibility in the rainy season at night, and/or poor reef identification markers.

Village-Level Activities and Relationships with the Coastal Environment

Interviews with the *Kepala Desa* from Mola indicated that over 95% of all households in the three villages rely on marine resource extraction as a primary source of income. Fishing, coral mining, a live turtle-trade operation, and small-scale reef gleaning were the most prevalent activities. Small- and large-scale fishing and turtle catching are Mola activities that occur in areas both near to and far from the village. Fishing and turtle catching activities typically occur during September and November and between February and April. Rough water, hurricanes, and tidal waves occur during the rest of the year (monsoon season), making it dangerous to be out to sea.

Fishing with hooks and lines is the most commonly used method (more than 80% of fishers), followed by nets (approximately 20%) and then spears (fewer than 5%). Approximately two-thirds of fishers specified that they are involved in the live fish trade and sell their catch to one of five live fish buyers or fish managers from the villages. Other fishers sell their catch to collector boats (which take the fish to Baubau to be sold) or at the local Mandati Market, or keep them for personal consumption.

Mola fishers[4] indicated that the Kapota coral (76%) and the Kaledupa coral (52%) are their primary fishing grounds, with fewer fishers (25%) fishing closer to the village in the waters surrounding Wangi wangi Island. Other fishing areas include the area around Kaledupa Island and the Koko coral (both 8%), Tomia Island and the Tomia coral (7%), the Koromaha coral (5.6%), and the Runduma coral (1%). With the exception of the islands of Wangi wangi and Kaledupa, these coral reefs are in WNP zones that do not allow local fishing (Figure 2).

Small-scale fishing activities (involving one or two people) typically occur at *Karang* (coral reef areas) Kapota, Lia, and Tomea, and in waters surrounding Mola village. In some instances, activities also take place out of the WNP area and, at times, in foreign waters. Giant clam, *bubuli* (soft clam), anchovies, sea cucumber, lobsters, *lolak* (a species of mollusk), *sisik* (turtle), sea urchins, sponges, shellfish, stingrays, and coral reef fish, including *Ikan Sunu* (grouper), *Kakap* (yellowtail), *Ikan Merah* (red snapper), and *Kerapu* (stonefish), and Napoleon wrasse are caught in Karang Kapota, Lia, Tomea, and

in Mola waters. Bonito is caught offshore from Mola village and in Maluku, where turtles are also caught. Some fishers hunt sharks in Australian waters. Some turtles and fish are stored in collector pens in the village for prospective buyers. Occasionally villagers keep fish in pens to enjoy their aesthetic value. Live fish are sometimes stored in floating nets or cages, pending sale to the local Mandati market or distribution to other villagers. On occasion, fishers sell live fish to other villagers or to small fish collectors. These collectors in turn sell their stock to buyers from Bali, Hong Kong, Taiwan, Singapore, and the Philippines. The stock sale price is decided by the *Palele* (fish broker) and fluctuates according to local market prices (dead fish) and seasonal prices (live fish).

The live fish trade operates on a larger scale and activities are carried out under the direction of fishing managers. We were told that there are at least five fishing managers in Mola village and about five more in other parts of WNP. The interviewed fishing manager has five groups of fishers working for him with 98 fishers in total. Four 5 GT (gross ton) engine-powered boats go out with a maximum of 20 fishers per boat. The boats carry 20–50 kg canoes used by fishers. Catches comprise various species of groupers and *Ikan Merah*: Although fishing is a year-round activity, it is dependent on buyer demand. Fishers typically go out for two weeks at a time, return home to rest for a few days, and then set out again. Fishing occurs in *Karang* Kapota, Kaledupa, Tomea, and Binongko, and in other undisclosed territories. The live fish caught through these operations are held at permanent floating net cages on the Kaledupa coral, where they are kept until transport boats from Bali arrive to take the fish. The fish are then taken to Bali, where they are prepared for transport to the other locations mentioned above.

In Mola village, 63 women and 17 men mine dead coral in reef areas around Mola, *Karang* Lia, and from Usuno, Kanawi, and Karang Kapota reefs. Coral mining is illegal and difficult, but persists. Mola villagers who mine coral do so primarily to obtain money for their children's education and to buy food. Coral mining has traditionally been one of the few income-generating activities available to widows. According to the *Kepala Desa*, it is difficult to find an alternative job for the coral miners.

Additional activities carried out in areas close to the village (within 1,400 m) include fish entrapment, shrimp and lobster collection, reef gleaning (collection of small marine animals such as sea cucumbers and sea urchins, in periods of low tide), traditional subsistence fishing, turtle raising, and mangrove cutting. Mola villagers use the open sea area immediately in front of the village to anchor lobster and shrimp collecting cages and fishing nets. *Karang* Kapota and its areas of sea grass in the reef flat areas support reef-gleaning activities by women and children. Sea urchins, lobsters, and sea cucumbers are common catches. In addition, villagers harvest sea grass in this area for feeding penned turtles. Subsistence fishing occurs in areas of *Karang* Kapota, or in small coral reef areas between Wangi wangi, Kapota, and nearby islands, where fish commonly spawn. This makes using lines, *bubu* traps, and small fishing nets more productive. However, according to Mola fishers, these are the areas commonly targeted by KCN fishers, and they have decreased in productivity.

Villagers use the water underlying the village for the majority of their waste disposal. While preparing meals, women typically throw food scraps into the water. Garbage of all types, including bottles (plastic and glass), plastic bags, cigarette boxes, paper and wrapping, and food waste, are a common sight in all spaces around the houses. These items cover the seabed and settle in areas encased by coral walls. A few areas for burning of garbage, however, were observed in the village. All human waste goes directly into the water. Women wash clothes at the side of their houses, and the laundry detergent is also a pollutant.

Sama-Bajo people such as the Mola are not farmers, and no naturally occurring soils exist in or adjacent to Mola village. Some villagers, however, apply imported soil

to the surface of the coral foundations. In this manner, they are able to grow corn, coconut, paw-paw, cactus, banana, and *pohon ara* (a type of fruitless tree) trees for private use. The only types of animals in the village are free-range chickens and ducks, stray cats, and caged exotic birds.

Prospects for Community Participation in WNP Management

Results of our local interviews indicate a clear distinction between villagers' general support for conservation of marine resources and their lack of support for and/or questions about the park as a suitable vehicle for achieving conservation goals.

Interviewed fishers all described their ideal role in the management of the resources in WNP as being protectors or caretakers of marine resources. More than 85% of these fishers indicated that they would like to help prevent the use of destructive fishing methods (specifically bombs and cyanide) within the park. Fishers from the Mola villages consistently suggested that they could help park rangers monitor the reefs by reporting people who use bombs and cyanide. Less common suggestions included telling the destructive fishers that they were not allowed to use those methods (2%) and driving away the fishers who use destructive methods (6%). Other groups of fishers indicated a desire to cooperate with the government and park staff and support protection of the park's resources, but did not specify what form this support would take. Coral miners did not express a similar desire to become involved with management or to cooperate with park officials. They commented that they would like to be responsible for making sure that coral mining activities were not interfering with fish habitats and that they would be willing to change their occupation if alternatives were made available.

Community members generally agreed that conserving and preserving marine resources was a good idea, as they hoped that it would lead to an increase in fish abundance. However, all fishers and coral miners explicitly stated that conserving resources should not lead to further restrictions on their source of livelihood. The prevailing attitude among community members was that traditional activities (fishing with nets, spears, or hooks and lines; mining coral stone; harvesting mangrove wood) were not contradictory to conservation principles, as the impacts of such activities were minimal. In their opinion, conservation could be accomplished by prohibiting activities that they believe have negative impacts or cause destruction of habitat, such as using bombs, cyanide, or traps to catch fish, or mining live coral.[5] Fishers said that they were hopeful the park would eventually become a place in which only traditional fishing equipment was used. They hoped that the rangers would stop people from using bombs and cyanide, which would allow the reefs to recover and the fish to come back. Just less than one-third of the 123 fishers interviewed in 1998 indicated that they hoped the restrictions on fishing activities in the park would eventually result in greater numbers of fish.

Almost all respondents in the villages indicated that they would like to prevent outsiders (non-Wakatobi residents) from extracting marine resources from WNP (only three people did not support this idea). The major reason for limiting outsiders was a belief that it was mostly outsiders who were using destructive fishing methods within the park. Coral miners did not feel that their activities were harming the environment. Female coral miners explained that women from the village have been mining coral stone for a long time and that ample dead stone is still available. They could not identify any negative impacts of their activities.

Community attitudes toward endangered and restricted species were generally that conservation of these species is a good idea, providing that the methods applied for conservation (area closure vs. prohibiting capture of a single species) do not result in a net economic loss on their behalf.[6] As Napoleon wrasse are very valuable, fishers are

disgruntled that catching this fish is prohibited. Many villagers were unhappy that certain shells and giant clams were not allowed to be harvested, as these are favorite foods.

Despite their support in principle for conservation and protection of coral reef resources, our interviewees expressed fervent disapproval of the restrictions that the creation of the park had placed on their lives and were concerned about further restrictions. The communities' prevailing overall attitude towards the park and its management was negative and pessimistic. Most people felt that the park would not have any direct benefits for them and would likely continue to restrict their activities.

The majority of people in the village (90%) stated that they were not well informed about WNP and did not understand its purpose because they had never been formally informed about its purpose by park rangers or other government officials. Others (10%) indicated that the official functions of the park were to protect the natural beauty of WNP by conserving its resources and promoting tourism.[7]

Community information about the park tended to be limited to information about restrictions on resource use. However, of the 133 people interviewed in 1998 after the Management Plan was officially mandated, nearly 80% were not able to identify the locations of the zones in the park. Furthermore, most people (80%) did not distinguish zones by purpose (i.e., core zone, rehabilitation zone, etc.) but rather as fishing zones or restricted/prohibited zones (in which fishing was not allowed).

Nearly half of the fishers (48%) identified the islands of Koko, Koromaha, and Ndaa as areas around which fishing was prohibited. Fewer than 10% of fishers also identified the Tomia/Binangko coral as a restricted area, and only two groups of fishers (4% of total respondents) mentioned that the Kaledupa coral was restricted. Several fishers from neighboring Sampela village were also aware that fishing around Hoga Island was restricted because Hoga is part of a tourism zone.

Because local people had little information regarding the national park, many misconceptions existed. Our interviewees associated all of the restrictions on resource use with the establishment of the national park. However, several of the restrictions (such as bans on coral mining and catching endangered species such as Napoleon wrasse) are based on national laws and had little to do with the establishment of the park. Nevertheless, since park rangers are responsible for providing information on and enforcing both national and park-related restrictions, community members associate all restrictions with the establishment of the park.

Fishers also were not familiar with the purposes of the various zones in the park. Although fishers generally appreciated that area closures were meant to conserve resources so that the resources (i.e., fish) could be replenished, they did not perceive that their fishing activities might have a role in the rehabilitation process. Nearly all fishers (85%) stated that fish were less abundant than in previous years. According to fishers, the reduction in fish abundance was uniquely linked to destruction of coral reef habitat due to the use of destructive fishing practices such as bombs and cyanide by outsider fishers. In contrast to much of the management literature, which links the need for conservation to overfishing, our interviewees did not mention overfishing or overextraction of resources leading to decreased fish abundance. There was a general belief that the ocean has abundant resources available for the communities' needs, despite the decrease in fish catches over the past years. Since they do not connect their own activities to overfishing, fishers who use traditional methods do not understand why the park management staff want to restrict their activities or what purpose is served by limiting traditional fishing activities.

In addition, villagers were generally unsure about plans to expand tourism in the park. Several mentioned that it was necessary to protect the coral so that the tourists could look at it, but people were unaware of the amount of emphasis the park manage-

ment plan places on tourism development in the area. Furthermore, community members were not aware of the impacts (both positive and negative) that increased tourism development could have on their lifestyle (Simpson & Wall, 1999).

Almost all community members commented that they did not understand how the park was to be managed. There was widespread disapproval and confusion about the new rules and regulations, and people indicated that they felt that these restrictions made their lives increasingly difficult. Several people commented that saving the fish seemed to be more important than saving the people, and comments such as the following from a group of fishers in Mola Selatan were not uncommon: "This park makes our life difficult. All coral that provides for us is already closed, and we are restricted from fishing there. For the Mola community, we get everything from the sea, all our daily needs; we only buy wood and drinking water and rice, so when the sea is restricted we can not live."

Local Concerns Affecting Community Involvement in WNP Management

Effective involvement of local residents in externally imposed schemes for resource management, including the designation of MPAs such as WNP, will require that conservation and protection address and acknowledge locally based resource-related problems and concerns with respect to both subsistence and income-producing activities. Based upon this research, five commonly identified areas of local concern were identified; these are discussed in the following subsections.

Efficiency and Conservation in Resource Use. Concerning fishing and turtle-catching activities, current handling, storage, and transportation practices of Mola villagers result in the loss of a high percentage of their catch. In addition, territorial conflicts between Mola and Kaledupa fishers regarding who has first right to fish the Kaledupa reefs creates a context in which cooperation in monitoring total catches and in promoting conservation is difficult or impossible. Further, these conflicts have the potential to result in a net overexploitation of the Kaledupa reefs. In addition, some villagers may still be using cyanide to catch Napoleon wrasse, although it is widely recognized that this practice threatens marine life and represents a nonsustainable use of marine resources. Similarly, our research suggests that some Mola fishers may be persisting in using fertilizer bombs even though this practice is shunned by most community members and is prohibited by coastal area law enforcers and by the Marine and Fisheries Department.

Coral Mining. Illegal coral mining is an essential source of income for some Mola villagers, especially widows. Miners report that they only harvest dead coral, however the silt and sand disturbed from the seabed on an ongoing basis may have an impact on nearby live coral reef ecosystems. As the coral mining activity is viewed as a traditional source of income for some Mola villagers who have no other viable source available, it is likely to continue unless economic alternatives are developed.

Livelihood Alternatives. Mola community members need new opportunities to develop their skills and to create business ventures for economic benefit with minimum impacts on the environment. This particularly applies to land-based ventures. This study found a large discrepancy between money earned in high-income and that earned in medium- to low-income families. High-income families are typically involved in large-scale commercial fishing or turtle-catching businesses that employ other members of the community. There are, however, individuals from lower income brackets in the community with skills such as boat building, carpentry, and roof making who could potentially

develop lucrative businesses, with funding assistance and access to suitable markets. In order to assist them, a local credit union was established during the first period of our research (1997) to assist villagers in starting new small-scale income-generating activities. Low formal education levels in the village population were identified by a number of our interviewees as an additional barrier to the development of alternative livelihood activities.

Waste Management in Village Areas. The Mola villagers' use of the coastal waters surrounding their village as a waste sink is an emerging area of concern for some people. A local nongovernmental organization (NGO) is working with villagers on waste- and water-related issues and has established a pilot project for human waste based on septic systems. Many Mola villagers, however, are not very concerned about the impacts of using the coastal waters surrounding their village for waste disposal because this activity is a normal part of their lifestyle. It is not possible to say definitively if there is a correlation between illness in the community and waste-related pollution in the waters surrounding village homes, because Mola villagers tend to use traditional healing and medicines as opposed to going to local doctors. Thus, no records were available for study. If plans to promote ecotourism in Mola village ever are implemented, the presence of garbage in the waters around the village and the use of seawater for disposal of human wastes are likely to be identified as increasingly undesirable.

The External Contexts. Coastal area law enforcers, facilitating NGOs, the WNP Office, and the Marine and Fisheries Offices need to address factors external to the Mola community contributing to nonsustainable resource use. For example, while WNP administrators tend to hold Mola villagers largely responsible for overfishing and damage to coral in the reef areas of WNP, our research suggests that an unknown proportion of the damage is done by fishers coming from other areas, including countries other than Indonesia. Similarly, government initiatives to eliminate the use of bombs and poison by Mola fishers need to take into account persistent reports that these activities are engaged in and promoted by nonlocal residents. In our research, coastal area law enforcers did acknowledge that outside fishers use bombs and KCN as part of their practices, but they did not have information available about the frequency or scale of use.

Implications for WNP Management Objectives and Strategies

A key requirement in making positive use of the five key aspects of local concern discussed above is the identification of management objectives supported by both the local communities and government agencies. Based on our interviews with local residents and WNP and government agents, and analysis of the available documentation, five common management objectives have been identified:

1. Eliminate the use of bombs and cyanide in the park
2. Conserve the coral reefs
3. Conserve mangrove and sea grass resources
4. Increase and diversify economic activity
5. Increase tourism development in the park[8]

Government agencies and community members often have different ideas with respect to the process through which these objectives are to be achieved. Since both parties have similar objectives, however, a basis exists for development of constructive partnerships between government workers and community members.

The 1998 WNP Management Plan promotes marine conservation by imposing a

zoning scheme that restricts access to, and resource extraction from, the most heavily used areas of the park. Adherence to the restrictions and regulations in this plan will result in a significant economic loss to members of the Bajo communities who live in the park, as their lifestyle, culture, and history revolve around the extraction of marine resources. The 1998 management plan was developed with minimal consultation with the local communities and as a result does not adequately address the needs and interests of park residents. Wakatobi residents are concerned about the impacts that the park has had, and will continue to have, on their lives, and villagers expressed feelings of animosity toward the park. Given that residents believe they are not able to abide by the regulations imposed upon them (without incurring financial loss), and that the park management does not have sufficient financial or human resources to closely monitor those restrictions, it is likely that villagers will not abide by the regulations. This will limit the effectiveness of the park's identified strategies for conserving biological diversity and for preventing further destruction of the reefs.

However, the effectiveness of the WNP management system could be increased through the development of more equitable regulations, and the organizational refinement of management strategies regarding (a) the clarification and dissemination of information, (b) the fishing permit system, (c) zoning, (d) monitoring and enforcement, (e) coral mining, and (f) tourism development.

Clarification and Dissemination of Information. There is a need to distribute information openly and to increase communication among communities, government agencies, and NGOs in WNP. In particular, ambiguities in management processes and activities need to be clarified, and information pertinent to the management of the park should be circulated to the general population. Limited communication among stakeholders and within various stakeholder groups is one contributing factor to inefficient and ineffective management of the park's resources. Limited contact between park management and local communities is exacerbating local resentment toward the park in general and toward the restrictions contained in the management plan specifically. Villagers' lack of access to clear information about the park and the lack of clearly defined communication channels makes it difficult for them to become actively involved in identifying park management strategies for conservation that could support, rather than reduce, their efforts to meet their income needs and subsistence requirements.

The System of Fishing Permits and Licenses. The system of fishing permits and licenses is unclear and confusing to fishers. Four different government agencies administer fishing permits and licenses, with limited coordination. The absence of clear procedures fosters an environment in which corrupt and collusive behaviors by some officials are able to continue. Because many different permits are available, there is uncertainty among fishers regarding which permit is most legitimate. This lack of clarity is being abused by authorities in two ways: first park rangers are able to tell fishers that they do not have the correct permit and ask them for money (as a fine for not having the correct permit); second, it was reported to us that at least one individual was selling permits for the designated nonfishing zones in WNP. If the system of permits were clearly known to all individuals, these activities would be less likely to continue undetected. Effective implementation of a new government regulation, passed in 2000 (142/2000), may assist in clarifying this situation.

Zoning. The 1996 and 1998 zoning plans for WPA are not functionally effective and, at the time of our research, were not advancing park management goals. Fishers do not intend to abide by the restrictions on their fishing areas, and the park managers do not

have sufficient resources to monitor the restricted areas. Fishing and other activities are continuing in the restricted zones, especially at the Kapota and Kaledupa atolls. Our research suggests that removing some restrictions and/or rethinking the zoning system for WNP may be of value.

Monitoring and Enforcement. Given the size of WNP (13,000 km^2) and the limited funding and resources available to the park managers (1 boat, 53 park rangers), monitoring the zoning scheme and ensuring local adherence to the regulations in the park present significant challenges. Villagers have expressed a strong interest in environmental stewardship during our research. Many interviewees noted the historically strong cultural and spiritual ties which Sama-Bajo people have with the sea, stressing that their economic activities were only one aspect of a way of life that grows out of a relationship with the marine environment. Villagers are not likely, however, to be willing to participate in monitoring or enforcement of regulations that they believe to be ill advised. Nor are they likely to be willing to assist in enforcing regulations if they know that officials are disregarding regulations or engaged in corrupt practices. These problems will not be solved easily, however, effective monitoring and enforcement is unlikely to occur until they are addressed.

Coral Mining. Coral mining activities in the Mola village represent an essential source of income to widowed women. Coral stone is a staple building product for villagers. It is likely that demand for coral stone will remain high as population growth in the villages continues and new houses are required. As of August 1999, information regarding the environmental impact of coral mining activities remained speculative and no formal studies had been undertaken.

Tourism Development. Although developing marine-based tourism in WNP is strongly emphasized in the 1998 WNP Management Plan, few tourism facilities exist in the park (limited to one hotel on Wangi wangi Island, one homestay on Hoga Island, and one dive operation with a maximum capacity for 15 tourists on Tomia Island). Tourism activities are generally limited to high-priced private dive tourism operations through which contact with local communities is limited, as are the local benefits.[9] Despite the prominence of tourism development in park plans, the park's remote location makes it likely that tourism-related activities will not be a major source of potential income for villagers in our research area for the foreseeable future. While tourism development should probably have a place in park plans, its current place of prominence should probably be reconsidered. This, in turn, may allow for more constructive and serious consideration of support in park management strategies for other livelihood alternatives for local residents.

Conclusions

The results of this study are supported by previous research regarding the importance of and need for greater community participation in resource and environmental management, and greater community participation in MPA planning and management (White & Palaganas, 1991; Buhat, 1994; Wells & White, 1995; Alder 1996; Christie & White, 1997; Gilman, 1997; Veitayaki, 1998; Neilson & Vedsmand, 1999). Results of our research indicate that barriers are formidable, but also identifiable, and that strategies can be found to overcome them. By focusing on common objectives, by making clear and transparent communication a priority, and by exhibiting a willingness to compromise, it should be possible to develop management plans that more effectively address the needs

of the communities, meet conservation goals, and reduce conflicts such as those that have arisen in the early stages of implementing the plans for WNP. Community involvement is no panacea. It is necessary but not sufficient to ensure success in resource conservation. Broader political, economic, and social issues affecting, for example, governance and institutional development, policy development and implementation, and market forces and activities, are all significant. Nevertheless, our research indicates that increased attention to the community side of their implementation is both necessary and possible if MPAs are to be a useful resource management approach for developing nations like Indonesia.

Notes

1. The name "Wakatobi" is an acronym created from the names of the four largest islands in the Tukang Besi archipelago: Wangi wangi, Kaledupa, Tomia, and Binangko.

2. The marine surveys indicating the high biodiversity of the Wakatobi area were conducted by volunteer researchers from Operation Wallacea, a nonprofit research organization based on Hoga Island. These researchers were also responsible for identifying the use of bombs and cyanide as the primary threats to the area's coral reefs.

3. This type of bomb is made with plant fertilizer and the ignition powder from matches.

4. A total of 72 fishers from Mola Utara and Mola Selatan participated in the map exercise. Total percentages amount to more than 100% because many fishers fish in several locations.

5. Fishers did not indicate that they understood that fish stocks may decline as a result of extraction (regardless of method) by a greater number of fishers (due to population growth). Further studies are required to determine the sustainability of fishing activities and to determine if fishing by traditional methods would be sustainable if a greater number of fishers were fishing.

6. This information is primarily related to the closure of the Koko and Koromaha coral. These areas are designated as part of the 1996 Management Plan's "core zone" because they are giant clam habitat. Fishers, although they would like to harvest the giant clams, would prefer that the area be open to fishing, as their fishing activities do not disrupt the clams.

7. These fishers had been informed by the park rangers that Hoga Island was a tourism zone.

8. Tourism development could be cited as a subset of economic development. However, it is mentioned separately because of the emphasis put on tourism development in the 1998 WNP management plan.

9. The dive operations for the Waktobi Islands tend to be all-inclusive dive trips, in which the tourists stay on the large dive boats. During July 2000, expansion at the dive resort resulted in increased local hiring as well as the scheduling of a regular weekly ferry service from Kendari, 240 km away, to Tomia Island, where the resort is located. As of summer 2000, a local airport was also under construction on Tomia Island. The resort has also signed an agreement with the Environmental Study Centre (PSL) of Haluleo University in Kendari to enlist its assistance in environmental management and in community involvement with respect to the resort's tourism activities.

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