

On the Way to Management of West Sumatra's Coastal Ecosystems

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Abstract

Various impacts on the coast of the Indonesian province of West Sumatra are presented together with activities and achievements to address them, e.g. public awareness, public relations and capacity building, including the establishment of a marine protected area.

Introduction

Research by the Indonesian Institute of Sciences (LIPI) (Nontji 1999) has revealed that 85% of Indonesia's coral reefs (which cover 25% of the coral reef area in the world) are negatively influenced by humans and some 70% are in poor condition.

Indonesia has addressed the situation by implementing conservation-oriented projects and raising public awareness to rehabilitate and manage its coral reefs. It has established marine protected areas and marine parks now covering 28,000 km². The government celebrated the Year of Marine Tourism (1996), participated in the International Year of the Reef

(1997) and the International Year of the Oceans (1998) and hosted the 9th International Coral Reef Symposium of the International Society of Reef Studies (2000). It established a National Council for the Sea (DKN) in 1996, the Indonesian Maritime Council in 1998 and most importantly, the Ministry for Marine Affairs and Fisheries (DKP) in 1999.

The above are examples of what have been achieved on the national level. On the provincial level, West Sumatra can serve as an example of how things do work or do not work.

West Sumatra: A Case Study

West Sumatra, one of 27 Indonesian provinces, represents approximately 1% of the area of Indonesia. It consists of about 100 islands, some 1,400 km of coastline and 20,000 km² of territorial waters. The exclusive economic zone of West Sumatra is about 140,000 km²; and 6,000 fishers operate in the waters.

The coastal area is regulated and under control through laws and regulations, mainly national but also some regional regulations. There are 26 existing regulations that directly concern marine matters.

Several years of research on the

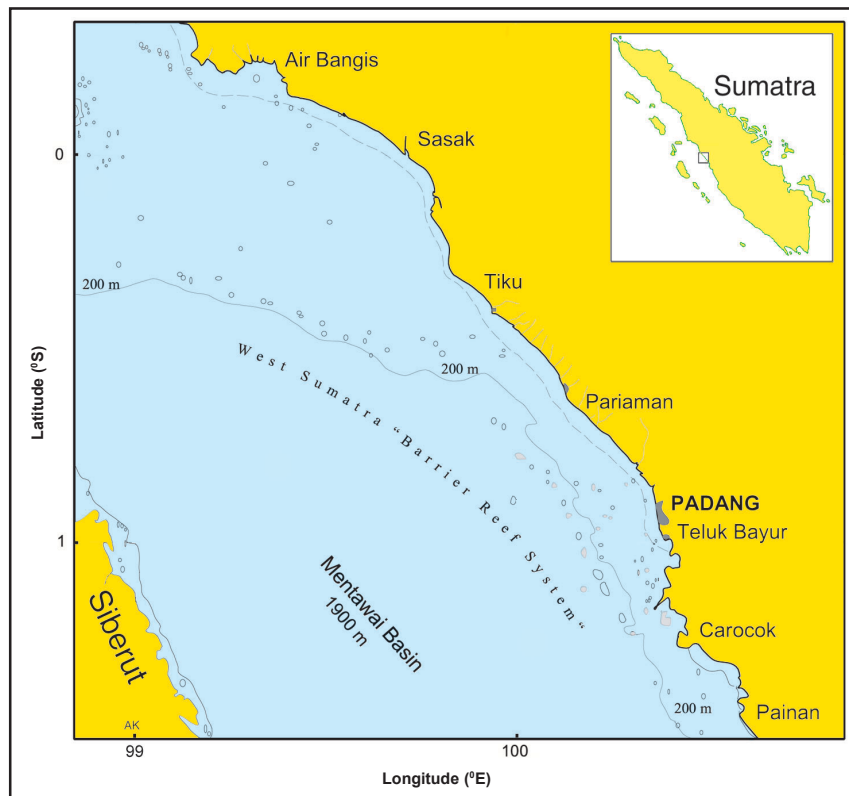


Fig. 1. Part of the territorial waters of West Sumatra Province. Note the string of islands and breaking reefs paralleling the coast, named iBarrier Reef System. This map also displays Siberut island, where Sarabua Bay is located.

West Sumatra "Barrier Reef System" (Fig. 1) have resulted in insight into problems with the implementation of regulations and in the compilation of some scientific information. Patch reefs and fringing reefs are both around coral islands (in the north) or volcanic islands (in the south) also along the main coast of Sumatra. There are also reefs around the Mentawai islands, some with mangroves and seagrass beds. The percentage cover with live coral for various locations shows both reefs with almost no corals left, but also reefs with a very high cover. More than 150 hard coral species were identified and the total reef area is estimated at 900 km². The reef fish diversity was found to be high for Indian Ocean reefs. Some new species (both fish and coral) were found here and new westernmost distributions for Pacific species were confirmed. Several studies on degradation of reefs with different natural and anthropogenic influences highlighted the heterogeneity of reef communities in the region and identified significant differences between inner and outer shelf reef sites.

More scientific details about the

coral reefs and their fishes can be found in Kunzmann (1997a, 1997b), Wallace (1997), Randall and Kunzmann (1998a, 1998b), Steffen (1998), Kunzmann et al. (1999), Kunzmann (2000) and a number of Indonesian and German theses on the website: <http://www.zmt.uni-bremen.de/projects/Indonesia/iczmthses.html>.

Along the coast of Padang, many users of the coastal area with differing significance for and impact on the coast are found. These include numerous villages and the provincial capital with one million inhabitants, and sectoral activities such as agriculture, forestry and mining, collectively causing heavy sediment, fertilizer and waste and sewage loads washed down in rivers to the coastal areas. The local industry mainly comprises palm oil, rubber and cement, and is feeding a large commercial port in Teluk Bayur, equipped with separate coal and cement terminals. A fishing harbor, plywood factory and oil landing pier can also be found, all in Bungus Bay (Fig. 2).

Industrial and fishing activities interfere with tourism activities, as in Pasir Kandang and Bungus. In the



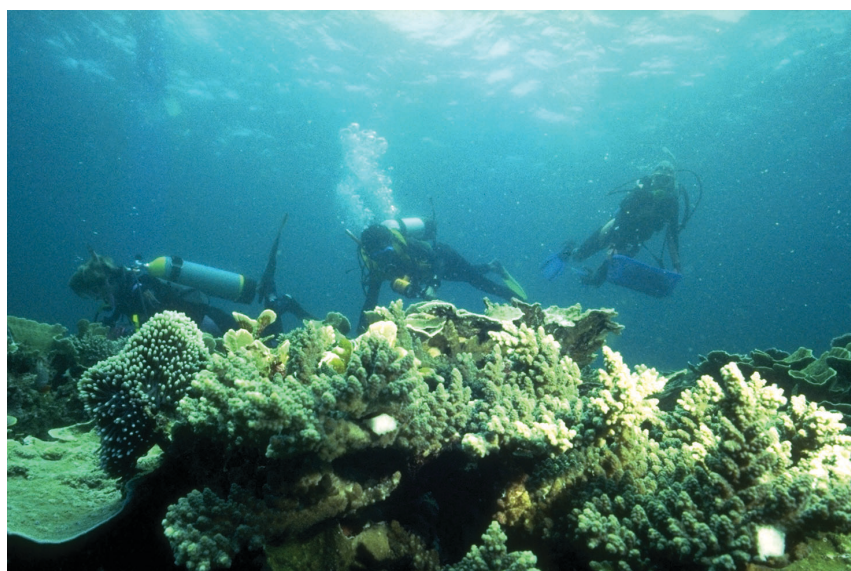
Bungus Bay, 20 km south of Padang (West Sumatra). Construction of an oil pier in the middle of a coral reef ecosystem.

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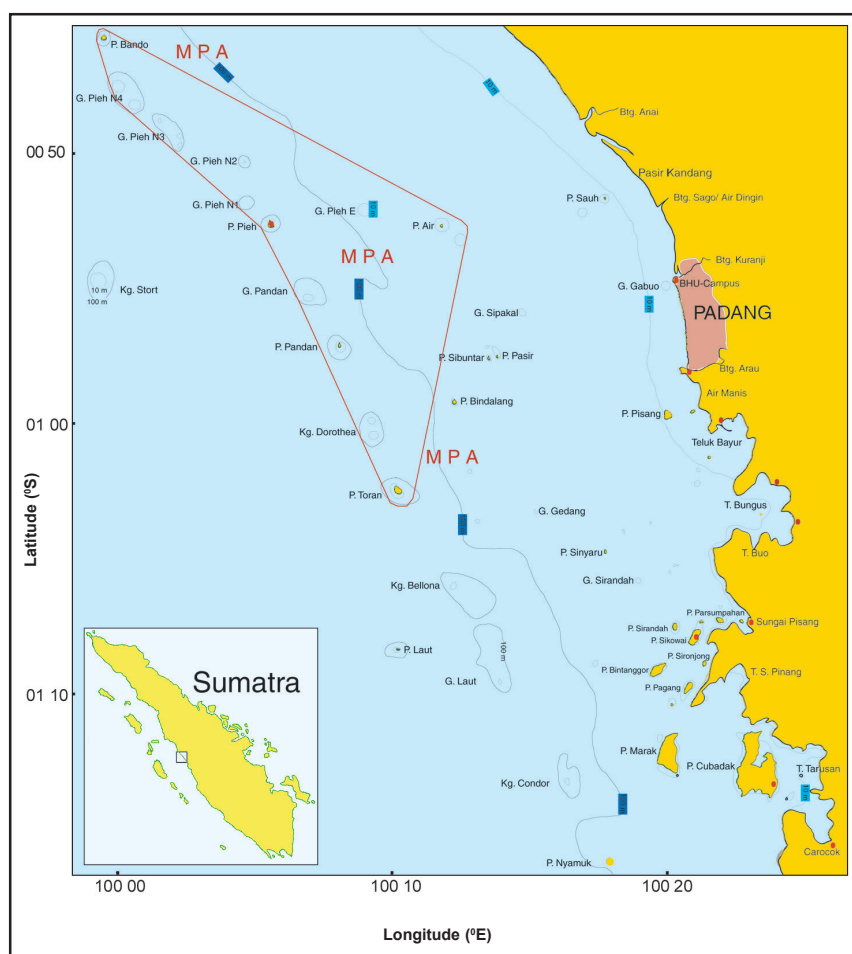
case of the Bungus Bay plywood factory, studies indicate a direct negative influence over the past years (Nusyirwan 1995). Overexploitation of selected fish stocks, are mainly due to more than 300 Bagan units operating in the Padang area (Ortmann 1995; Rohdenburg 1995; Maack 1996). Illegal fishing is also practiced in artisanal fishing areas and overlaps largely with Bagan fishing (Sofyani 1994, Abdurrahman 1995; Evarita 1995; Siregar 1995; Syufri 1995). In addition to the use of destructive fishing methods, unwise use of marine resources, which includes shell and coral mining (Syarif 1994) and harvesting of turtle eggs and adults (Hendra 1997; Setiawan 1999), is seriously increasing.

West Sumatra faces the problem of fishing with explosives and cyanide, on both a small and large scale (Kunzmann 1997a, 1997b, 1998). Dugout canoes use self-made mini bombs inshore, while larger vessels from Jakarta and Sibolga use big bombs on the outer islands. Fishing using various cyanides for fish and lobsters is done from canoes and small boats with hookah-diving in the inshore areas. A large-scale enterprise, heavily engaged in the live reef fish trade for groupers and wrasses for export to Hongkong, is operating on the Mentawai islands, ironically with its base in the Sarabua Bay, which is supposed to be a marine park. In addition, there are still anomalies facts about

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Intact reef formation in 3-6 m depth on Pieh Island, 12 nautical miles west of Padang. Joint Indonesian German coral reef monitoring team at work.



licenses from fishing authorities for export of CITES-listed species (Convention on International Trade with Endangered Species). However, since the enterprise is paying taxes, providing income and loans for numerous fishers and investing in education and training, the operations are tolerated, although it is obvious that a few people earn a fortune while the fishers get only a small amount. As a consequence of several years of destructive fishing, the reefs of the Mentawai islands are in a degraded condition.

Activities and Achievements

Activities and achievements to change things for the better include:

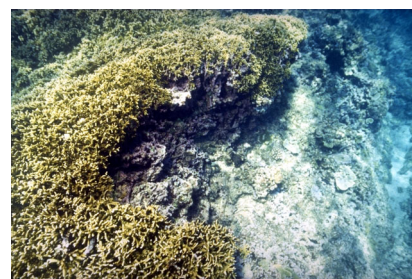
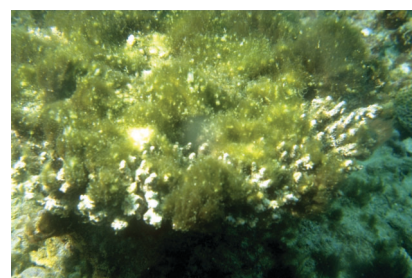
public awareness (PA), public relations (PR) and capacity building (CB).

The first activity was raising awareness on the university campus and within the provincial and municipal government. In 1992, the general attitude towards the sea can be best described by citing a university official: "As long as the water is blue and looks beautiful, and as long as fish is sold on the market, our seas must be in good condition." Since the fisheries faculty of Bung Hatta University was very much oriented towards catching, processing and selling fish, other marine ecosystems had little attention. The existence and importance of coral reefs, mangroves

and seagrasses was conveyed to students, staff and university administration, as well as to key figures of the provincial government, who were in charge of budgets or research plans for the university. Also, the Governor's office and the provincial offices for fisheries (Dinas Perikanan), conservation (BKSDA) and the Navy were involved in these very first awareness-raising activities.

At the same time, a long-term research and monitoring program was started, involving students, staff and scientists from other universities. Preliminary results on the status of the reefs were presented in science meetings and workshops (Kunzmann et al. 1993; Kunzmann and Efendi 1994, 1996; Zimmermann and Kunzmann 1994) and resulted in a proposal to protect Pulau Pieh and surroundings and a first application for a marine protected area (MPA) in 1993.

Formal cooperation with the Navy was established including bringing out moorings and having radio communication via a hotline.



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With the help of an island guard, who was trained and equipped with binoculars and an FM radio, four fishing vessels were caught by the Navy within six months, illegally fishing using explosives. The crew was put in jail and the vessels were confiscated temporarily. The legal authorities had to deal with considerable issues in processing the first trial ever. Finally, a verdict with 18 months jail for the captain and engineer and 13 months jail for the crew was issued. This case was intensively covered by the local media and contributed substantially to public awareness and opinion formation.

At this point, the PA activities were largely extended, in order to reach the fishers and other local coastal communities. The universities' community service program (*pengabdian masyarakat*) completed a training module on the significance of coastal ecosystems. The local mass media was provided with articles and reports and subsequently, TV and radio requested interviews and comments. These activities were repeated at regular intervals.

PA and PR work for scientists was also implemented. Apart from publications in local, national and international journals and magazines, numerous oral and poster presentations at workshops, seminars and conferences were given, in order to make the reefs and their problems known. In the monograph *Coral Reefs of the World* by UNEP/IUCN (1988), the coral reefs of West Sumatra are only minimally mentioned. The international database *Reefbase* has reported on West Sumatran reefs since 1997. An invitation to foreign expert scientists for joint work on the marine ecosystems led to a number of publications and identification of new coral fish species. The

opportunity of having experts in place was used to simultaneously organize a number of advanced training courses, which contributed significantly to the capacity building of university staff and students, including other universities of the area.

An educational PA program was initiated eventually, resulting among others in two Indonesian language brochures, one about reefs for children (Tata 1993), the other about the seas for students (Soule 1994), and an Indonesian version of a BBC video on coral reef destruction in Southeast Asia (Kunzmann et al. 1998).

While PA and PR activities were implemented, the search for alternative income sources for fishers and/or their families was continuously pursued. The most promising were:

- seaweed culture with fisher communities on Pini Island (Busch 1995; Endri 1995; Metha 1995; Septiani 1995);
- marine tourism with the coastal community of Sungai Pesisir (Efendi et al. 1999 and several unpublished reports on turtle conservation (Hendra 1997,

1999)).

- potential of marine natural products (Handayani et al. 1997a, 1997b); and
- activities in rehabilitation of reefs and coral farms (Freytag 2001; Johan et al. 2000; Zakaria in prep.).

Other important steps in the development process were the formation of a provincial team of marine affairs by the planning department BAPPEDA in 1995 (similar to the National Council for the Sea DKN) and the signing of cooperation agreements in marine sciences between the Bung Hatta University and other Indonesian universities (Bogor, Ujung Pandang), with LIPI's Indonesian Institute of Sciences Oceanography Division and with the Center for Tropical Marine Ecology (ZMT) in Germany. As a result and recognizing the newly developing local expertise, the university was rewarded with the chair of one of seven *iSIMPULs* (regional knot) of the Indonesian Association of Coral Reef Studies (IACRS). Later on, the participation in the World Bank/ADB project COREMAP (Coral Reef Monitoring and Management



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Diver of the joint Indonesian-German Monitoring team performing a line-intercept-transect at one of the reefs of the Padang Islands.

Project) and the establishment of a Coral Reef Information and Training Centre (CRITC) were offered.

With the new infrastructure and secure funding in place as of 1996, it was possible to perform thorough studies on socioeconomics of the coastal communities with detailed stakeholder analyses (Efendi et al. 1998; Zein 1998).

Additional measures, which were implemented in the process of PA building, comprise a scientific reference collection of corals and fish (Yunaldi 1997, 1999; Jonker and Johan 1999a, 1999b; Suprihanto 1999) and a semi-public seawater aquarium, which was built together with volunteers from Voluntary Service Overseas (British) and Overseas Development Bureau (Australian). The collection was supported with input from the Western Australian Museum in Perth and the Museum Naturalis in Leiden, where co-samples were identified, labeled and stored. Both the collection and the aquarium, which were shown to every official visitor, were frequently the ignition point of discussion on marine conservation efforts and the budgets needed for it. With the spotlight on coastal problems, a number of theses on corals, mangroves and commercially important fishes were produced (see website following). In 1998, a website <http://www.zmt.uni-bremen.de/projects/Indonesia> was created, where a coastal profile of West Sumatra with information about the coastal zone, some aerial and satellite pictures are displayed.

The application to protect at least one and possibly three or more of the Padang islands submitted to the local authorities in 1993, reached the national Conservation Office in the Forest Department in 1994 and resulted in action in late 1996. Officers from the national Conservation Office did field checks,

drew maps with potential boundaries and communicated with provincial and district level authorities as well as coastal communities. The full documentation and the draft decree were ready to be signed by the Forestry Minister in 1998. However, due to the financial crisis, the establishment of a new president and the appointment of three new forestry ministers within one year, the official release was only in 2000. The MPA of Pieh Island is 40,000 ha. The area includes Pieh Island in the center and islands and reefs both from outer and inner shelf regions included (Fig. 2). This is a great step ahead given the problems faced by the people of West Sumatra in conserving some of their reefs, particularly when much older plans for a marine park at Sarabua Bay at the Mentawai Islands are still pending.

Because this procedure was lengthy and people were never sure of getting the MPA at all, the university agreed in 1997 to buy Pieh Island. Due to the extremely complex land ownership relationships among the Minangkabau people (the prevailing ethnic group of West Sumatra), where the local *adat* rights conflict with the central law, it was only possible to lease the island for 20 years. This compromise was difficult to achieve, but crucial in demonstrating to fishers and local people the importance of these reefs not only to science, but to their livelihoods.

Lessons Learned and Next Steps

It was necessary to emphasize public awareness not only among coastal people and the local government but also among scientists. Training and capacity building of young scientists, administrators and the navy proved

to be a crucial part of the process. Involving mass media at an early stage and giving continuous information to the public helped tremendously to obtain necessary support from all involved parties. Public relations is crucial to the process. Another important lesson was the determination to follow-through to the end e.g. the painstaking process of the court trial for illegal blast fishing. Patience and persistence in pursuing good ideas also helped establish the MPA.

The timing of the setup (1997) was also optimal for implementing an MPA. The local government was prepared, the public was informed, coastal communities were involved, a local nongovernment organization (NGO) and a national NGO were ready to facilitate. The university, the Mayor of Padang and the Governor of West Sumatra were strong supporters in the background. Three years later, though, with several new people in key positions, the enthusiasm and momentum were lost. There is a risk that MPA Pieh Island will become a "park on paper" only.

At this stage, it is necessary to reactivate people and jointly develop a management plan, which will be broadly accepted. The same people who were involved in the socioeconomic assessments and so-called socialization of the former concept should be part of a new participatory approach. Support from successful examples like Coastal Resources Management Project or TNC (The Nature Conservancy) project is necessary and the establishment of the INCUNE (Indonesian Coastal Universities Network) is an important step forward. Bung Hatta University, together with a local NGO and the provincial planning board, have submitted such a request to the new Ministry for Marine

Affairs and Fisheries and asked the Center for Tropical Marine Ecology (ZMT) in Bremen for support. It is hoped that it will become an important part of a long-term Action Plan in Marine Science and Technology Cooperation, which is presently being negotiated between the Governments of Indonesia and Germany.

Incentives and alternative income sources are needed to stop illegal fishing. The provincial government of West Sumatra should introduce a soft and wisely managed small scale marine tourism program, where many coastal people are involved and can find sufficient and sustainable ways to support their families.

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