Implementing Policy and Strategy for Coral Reef Rehabilitation and Management: Lessons Learnt from an Indonesian Effort

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Abstract

Indonesia boasts the most diverse coral reef systems in the world and, with some 85,707 km$^2$ of coral, contains approximately one-eighth of the world’s coral reefs. However, the quality of coral reefs in Indonesia is declining rapidly. Anthropogenic threats range from destructive fishing practices to pollution and from dredging to tourism-related damages. For the above reasons, there is an urgent need for rehabilitation and management designed to guarantee sustainable use of Indonesia’s finite and valuable marine resources. The Coral Reef Rehabilitation and Management Program (COREMAP) was launched by the Indonesian government in 1998. The overall COREMAP goal is the protection, rehabilitation and sustainable use of coral reefs and associated ecosystem in Indonesia that will, in turn, enhance the welfare of coastal communities. This program is being implemented over a period of 15 years, and involves three phases. The specific COREMAP Phase I (the subject of this paper) objective is to establish a viable framework for a national coral reef management system in Indonesia. The program strategy acknowledges that community-based management of coral reefs in Indonesia cannot be successful on a large scale without a supporting framework to contain external threats. This framework needs to include: (i) an effective national strategy for coral reef management; (ii) secure user rights for coastal communities; (iii) effective enforcement to protect communities against external threats; (iv) greater awareness among decision-makers of the threats facing the reefs; (v) effective monitoring systems; and (vi) strengthened management capacity. The COREMAP program addresses these aspects during the initiation phase. This paper describes the policy and strategy and explains the rationale behind their implementation.

Introduction

The Indonesian archipelago is the largest archipelago in the world. It stretches along the equator and is roughly 5,000 km long and 2,000 km wide. It consists of more than 17,000 islands with, altogether, about 81,000 km of coastline. Some of the large islands are Papua (Irian Jaya), Kalimantan, Sumatra, Sulawesi (Celebes), Java, Madura, Bali, and Nusa Tenggara (Lesser Sunda Islands). While the land area is only 1.94 million km$^2$, the archipelago sea area covers about 3.1 million km$^2$. Indonesia’s 200-mile exclusive economic zone (EEZ) adds a further 2.7 million km$^2$ of sea area. Overall, the seas and coastal areas are the dominant physiographic features of Indonesia (Soegiarto and Polunin 1981).

Owing to the warm, humid tropical climate and high rainfall, the Indonesian archipelago is blessed with various ecosystems, which flourish along the coasts of the islands and island groups. These ecosystems are the most productive of the archipelago’s ecosystems; but, unfortunately, they are also very sensitive and vulnerable to environmental changes and pressures arising from natural or human-induced processes. Coral reef ecosystems, distributed widely in the archipelago, are mainly in the form of fringing reefs. However, there are also limited barrier reefs and atolls.

Coral reefs are a unique and complex tropical shallow water ecosystem. Coral reefs function as living environments, provide physical protection for the ecosystems, are sources of numerous...
living resources, and are exquisite examples of natural beauty. As a living environment, coral reefs function as a habitat for numerous organisms. Many species are of economic importance. The interdependencies of these organisms with the environment, as well as with other organisms, make the web of life in the coral reef ecosystem one of the most complex on earth, comparable to the humid tropical forests.

Coral reef scientists have noted that Indonesia is the center of coral diversity. It has been reported that 75 genera and about 450 species of scleractinian corals have been recorded in Indonesian and surrounding waters (Borel-Best et al. 1989; Tomascik et al. 1997; Veron 1996).

There are various figures on the extent of coral reef in Indonesia, from a low estimate of 42 000 km$^2$ (Bryant et al. 1998) to 75 000 km$^2$ (Cesar 1996) and as high as 85 700 km$^2$ (Tomascik et al. 1997). COREMAP (Coral Reef Rehabilitation and Management Program) is tasked with providing information on the breadth of Indonesian coral reefs and its geographical distribution. The work is carried out by using remote sensing technology and is almost completed although it still needs an agreement from related technical agencies on some technical bases. It is hoped that, by the end of Phase I (extended to end 2003), the map will have been completed and agreement reached, so that more definite and reliable figures can be used to estimate the value of coral reefs resources.

For centuries, Indonesian coastal communities have benefited from the reefs, be it from renewable resources, such as the variety of reef dependent fish, mollusks, seaweeds and other living resources, or from the non-renewable ones, such as coral rocks, gravels, sand and seashells. More than 10 per cent of the Indonesian fisheries are related to coral reef fisheries. Unfortunately, however, uncontrollable increases in use cause over-fishing and damage to the ecosystem. In the last few decades, the coral reefs in Indonesia have experienced increased human-induced pressures, such as destructive fishing practices that use explosives and toxic chemicals and cause devastating and widespread destruction. Over-extraction of coral rocks, gravels and sand, as well as increasing land-based and marine-based pollution add to the serious disturbances to the coral reef ecosystem throughout the Indonesian archipelago. These human-induced pressures, combined with the natural disturbances such as volcanic activities, earthquakes, tidal waves (tsunami), cyclones, climate change and the outbreak of crown-of-thorns starfish (Acanthaster planci), are damaging many reefs in Indonesia. A 1996 economic analysis of Indonesian coral reefs (Cesar 1996) showed that the net cost to Indonesia of large-scale poison fishing amounted to US$48 million in a period of four years. The losses attributed to blast fishing in areas with tourism benefits are estimated at more than 50 times the benefit occurring to the blast fishing.

Suharsono (1998) reported that only about 6 per cent of coral reefs in Indonesia are in excellent condition (75 to 100 per cent coral cover). The rest are in various degrees of damage. Around 40 per cent is in poor condition (less than 25 per cent coral cover); 31 per cent is in moderate condition (26 to 50 per cent cover), and only about 23 per cent is in good condition (51 to 75 per cent cover). In 1998, in view of the critical level of coral reef degradation in Indonesia and the ecological and socioeconomic importance of this resource, the Indonesian government established a long-term action plan called COREMAP, which stands for the Coral Reef Rehabilitation and Management Program. It is supported by the World Bank, Global Environment Facility (GEF), Asian Development Bank (ADB), Australian Development Aid (AusAid), and other donor agencies and countries.

This program will be implemented over a period of 15 years, and involve three phases – Phase I, initiation phase - 3 years; Phase II, acceleration phase - 6 years; and Phase III, internalization phase - 6 years.

This paper deals with the implementation plan of Phase I of COREMAP. This implementation was to have occurred during the period 1998-2001, but was extended until the end of 2003 to provide additional time required for recruiting consultants and procuring equipment.

**Background of the program**

The Coral Reef Rehabilitation and Management Program (COREMAP) was established by the Government of Indonesia (GOI) to safeguard its coral reefs, the most extensive in the world. The COREMAP goal is the protection, rehabilitation and sustainable use of coral reefs and associated ecosystems in Indonesia. This, in turn, will en-
hance the welfare of coastal communities. The program’s prime objective is to establish viable reef management systems in priority sites. These systems are to be operational, fully decentralized to the regional governments, and institutionalized.

The program at present works in 9 of Indonesia’s 32 provinces, with pilot projects in 4 provinces (West Papua (formerly Irian Jaya), South Sulawesi, East Nusa Tenggara (Flores), and Riau).

The World Bank and GEF support of the program comes through a new adaptable program loan (APL) instrument, that provides a long-term commitment to the program subject to satisfactory performance of each phase as determined by benchmark indicators and independent evaluations. Other donors support the COREMAP through complementary parallel projects, following a common design framework.

The program strategy is based on the realization that community-based management (CBM) of coral reefs in Indonesia cannot be successful on a large scale without a supporting framework to deter external threats. This framework needs to include: (i) an effective national strategy for coral reef management; (ii) secure user rights for coastal communities; (iii) effective enforcement to protect communities against external threats; (iv) greater awareness amongst decision-makers of the threats facing the reefs; (v) effective monitoring systems; and (vi) strengthened management capacity. The COREMAP has made the strategic decision to address these aspects during the initiation phase, and to introduce interventions at the site level over a period of 15 years. Lessons learned from pilot locations are applied to a later, expanded acceleration phase. The program strategy therefore involves (a) program maturity, where the initial focus on a strong central project team and national components leads progressively to a decentralized program management at the district level; and (b) geographical expansion, from the initial four sites to priority coral reef sites in 10 provinces.

**The setting of national policy and strategy**

**Policy**

Sustainable coral reef management requires an integrated and solid basic framework to guide stakeholders. The framework needs to form the basis of the national policy, to be adopted and implemented by relevant government institutions, and supported by all levels of society. This framework is required because existing laws and regulations for the management of coral reefs in Indonesia are, as yet, insufficiently comprehensive for the management of natural resources.

The National Policy Concept for the Management of Coral Reef in Indonesia (the national policy) was developed in 2001 as a guideline to assist policy and decision-makers involved in coral reef management. There are three important issues requiring consideration – (1) increased coral reef degradation; (2) the need for economic development, specifically for coastal communities; and (3) the rights and responsibilities of the central government, regional governments and communities.

**Formulation process**

The formulation of the national policy concept involved a preparation stage, literature study, development analysis and conceptualization of the policy. Each stage comprised a number of activities, i.e. meetings, discussions, public consultation (national and regional), team meetings and workshops (national and regional). To consolidate the national policy concept, several meetings, discussions and workshops were held in Jakarta and in the regions (provinces and districts).

**Aims, objectives and targets**

The policy was designed:

- As a reference or input to assist government institutions and regional authorities prepare regulations;
- As guidelines and directions for the management of coral reefs; and
- As an academic document that can be used in formulating laws and regulations on coral reef management.

The specific aims of the national policy are:

1. To balance the use of the reefs, based on available scientific data and the carrying capacity of the environment;
2. To develop management systems that consider national economic priorities, the
local community and the conservation of coral reef resources;
3. To develop cooperative coral reef management systems involving all parties;
4. To implement formal and informal regulations; and
5. To create an incentive for equitable and balanced management.

It is recognized that successful coral reef management is a combination of science, law and administration relevant to the social, economic and political situation of a province or area and involving all stakeholders in its planning and implementation.

The targets for the policy are:
1. To increase stakeholders’ awareness and participation in management of coral reefs;
2. To delegate authority for the management of coral reefs to regional government;
3. To encourage a cooperative approach among stakeholders in the management of coral reef ecosystems;
4. To reduce coral reef degradation;
5. To create a mechanism and framework for the management of scientific data concerning potential, utilization and carrying capacity of coral reef ecosystem; and
6. To implement community-based management in natural resource, especially coral reef management.

Basis of law

The source law for the national policy is the Indonesian Constitution 1945, specifically section 33, and other national laws and regulations, as well as various provincial and district regulations.

The challenge of coral reef management

Several studies on the use of coral reef resources have shown that the degradation of coral reefs is generally caused by either human activity (anthropogenic causes) or natural causes. Human activities causing the degradation of coral reefs include (1) coral mining and taking; (2) catching fish using destructive methods; (3) over-fishing; (4) water pollution; (5) coastal development; and (6) development of surrounding areas.

The degradation of coral reefs by natural causes is related to global warming, storms, earthquakes, floods, tidal waves (tsunamis) and other factors, e.g. El Nino, La Nina, etc.

All human-induced problems can be traced back to underlying factors that form the “root” of the problem. These are:

1. Inconsistency in the application of policy;
2. Insufficient management;
3. Inadequate law and/or enforcement;
4. Lack of awareness and knowledge about the importance and strategic value of coral reefs in various groups (i.e. politicians, entrepreneurs, the public);
5. Poverty;
6. Greed;
7. Limited capacity and capability of management;
8. Damaging nature of market demand/consumer behavior;
9. Culture/customs/manners; and
10. The status of coral reef areas open to the public.

Rationale for the national policy

National issues

Coral reefs become degraded as a result of changes in human activity and natural conditions. Such changes have resulted in reduced productivity of coral reef resources and reduced biological diversity. The reduced coral reef productivity aggravates the condition of the coastal communities that are dependent on these natural resources.

The government has been aware of and concerned about the condition of coral reefs for a long time. However, this awareness has not yet prevented the continuing degradation of the reefs.

One reason for this is that existing laws and regulations have not been consistently and continuously enforced. This failure has been exacerbated by the fact that the authority and responsibility of government institutions have been poorly defined.

Poor management of coral reefs by the Government is due to:
1. The lack of awareness of the value and the real economic benefits arising from coral reef ecosystems;
2. The weak horizontal and vertical coordinating capacity within and between government institutions;
3. Coral reefs having not yet become a priority issue in the political agenda of the nation’s leaders;
4. The poor allocation of funds for managing coral reefs;
5. The poor lobbying skills of environmental groups interested in the conservation and management of coral reefs;
6. Programs that are dependent on one approach, namely the management of conservation areas (national parks, etc);
7. Inconsistent and weak law enforcement; and
8. Coastal communities having not yet been involved in the management of coral reefs.

Effective management of coral reefs in Indonesia thus requires:

1. Clear allocation of authority and jurisdiction among regional governments, provinces, districts or subdistricts/villages in accordance with Act No. 22/1999 t;
2. Clarification and improvement of the various laws and regulations that relate to the management of coral reef resources;
3. Improvement of interagency linkages;
4. Increased funding for coral reefs management;
5. Development of the capacity of personnel to enforce the law;
6. Improved monitoring and evaluation capacity of those involved in implementing coral reef management programs;
7. Commitment to implementing nationally ratified international laws that relate to natural resources management; and
8. Improved attitude towards the role and function of non-governmental organizations, higher education institutions, the local community, and the private sector, etc.

Regional issues

The introduction of Act 22/1999 by the regional government has created the opportunity for local communities to secure greater rights to manage natural resource, especially coral reefs, within their region. However, it should be realized that this has increased the responsibility of local communities. If communities claim and obtain rights to manage coral reef resources in their area, then they should also accept the obligation or responsibility to continuously manage these coral reefs. The responsibility given to communities means that they have an obligation to take on the burden of the sustainable use of the resource. Costs incurred include those associated with management, technical assistance, administration, law enforcement, monitoring resource quality, a likely decrease in the number of fishing units, reduction in fishing areas, reduced incomes at specific times, and the creation of alternative income generating opportunities, etc.

At the regional level, communities are empowered to formulate and plan the management of natural resources under Law No. 22/1999. Under this authority a community for a specific area/region has exclusive rights to the coral reef resources in their area. The definition of area is based on the guidelines under Law No. 22/1999 and several other regulations. Communities have the right to manage, with other parties (private sector), in such a way as to gain income in order to cover the costs incurred in sustainably using their resources. Some of the costs will be borne by the government. Despite this community empowerment, national and regional governments cannot avoid responsibility for coral reef management because some situations, such as uncontrolled population growth, technical issues, etc., will not be easily handled by the community and require government involvement.

Such involvement may include the creation and protection of the rights of a community to manage an area in order to provide a sense of ownership of and responsibility for these resources; the preparation of mechanisms to draw technical assistance and to stimulate innovations from within the community; the creation of schemes for the management of funds; and preparation and coordination of government agencies involved in supporting/helping community management.

It is noted that many coastal communities may have no interest in or capability to manage the reef resource. Rights need to be given only to those people who have shown interest in managing the coral reefs. In addition, governments should focus on assisting with laws and regulations for coastal communities that comprise a majority of poor fishers. Appropriate
laws in such cases may include the prohibition of the use of non-traditional fishing gear within waters under the community’s control.

The national policy should also consider the management of coral reefs as part of the broader coastal ecosystem that includes, for example, mangroves, seagrass beds, and other wetlands. Therefore, the policy should be designed to address two basic needs – the need to protect and conserve coral reef resources; and the need to manage coral reef resources nationally, to address conflict over its use, and to obtain a balance between use and conservation.

The policy must acknowledge the implications of Law No. 22 of 1999 concerning regional government. This law states that the jurisdiction of regional governments in the management of coastal and marine areas extends to 12 nautical miles. With decentralization, both planning and management are essential and must be implemented by regional governments. Problems or issues must be addressed and resolved through conflict resolution mechanisms involving the various primary stakeholders’ interests and perceptions at the appropriate local and regional level.

Many of the scientific and technological principles underlying the management of coral reefs are readily available and easily learned. However, experience and knowledge from one site is often not easily applied to another site. The successful management of coastal resources has to be through the integration of science, policy, law and administration, taking into consideration the social, economic and political situation in each area.

The national policy must create conditions for voluntary partnership between all levels of government that play an important role in the management and conservation of the coral reef in their area. In the meantime, the national government needs to provide funds to organize and improve the administration of management programs that were formerly done at the provincial level. Provinces may receive funds from the national government to develop and implement management programs in accordance with the existing national regulations. The regulations should also refer to the international environment regulations.

As a broad outline, the national government role in the management of coral reefs should be to:

1. Assist in the arrangement of management programs at the regional level;
2. Ensure transparent and open management of assistance funds;
3. Evaluate the implementation of management programs according to appropriate standards;
4. Undertake research for which there is insufficient regional capacity;
5. Actively build the regional capability;
6. Campaign for the national interest in each region; and
7. Arrange and evaluate developments in each region.

Integration of the national policy

Because coral reef management cannot be separated from the management of the broader coastal ecosystem, the national policy must adopt an integrated approach. In addition, the policy must be in line with national political development and implementation Act No. 22/1999 of the regional government. The policy presented a framework to assist the implementation of regional autonomy in the management of coral reef resources in every region.

The national policy is based on the following principles:

- A balance between use and conservation of coral reefs;
- Management conforming with the needs of local communities and national economic priorities;
- Reliance on the execution of formal and non-formal regulations to reach the objective of optimal coral reef management and use;
- Creation of incentives for continuous and fair management;
- The search for cooperative management approaches;
- Formulation of management programs based on available scientific data and the carrying capacity of the environment;
- Acknowledgement of traditional laws and community institutions regarding coral reef management;
- Strengthening of regional authorization in coral reef management in accordance with the spirit of regional autonomy.
These eight principles and the basis of decentralization, whether in planning or implementation, are of great importance and must be upheld. The background and issues, along with the differences in perception and interests, of the majority of stakeholders in each location must be taken into account so that suitable compromises are devised and adopted. It needs to be remembered that, while much scientific knowledge and many technological principles are relatively easy to obtain from various sources in this world, they cannot always be easily transferred from one locality to another.

The national policy aims to balance conservation and use, involving the integrated actions of central and regional governments, civil society, the private sector, higher education institutions and non-governmental organizations. This policy aims to both respond to and anticipate the various causes of the increasing degradation of coral reef ecosystems in Indonesia.

Strategy

In 1999-2000, the PMO-COREMAP in cooperation with the Marine and Coastal Resources Studies Center of IPB (PKPSL – IPB) prepared a Draft on National Policy and Strategy on the Management of Coral Reefs in Indonesia. The Draft was presented, discussed and improved through a series of seven provincial workshops (Makassar/South Celebes; Jayapura/Irian Jaya; Pekanbaru/Riau; Lombok/West Nusatenggara; Kupang/East Nusatenggara; Padang/West Sumatera and Manado/North Celebes) and culminated in a national workshop in Jakarta. The final draft that was fully endorsed by all stakeholders, was then submitted and accepted by PMO-COREMAP. Subsequently the draft was presented to the World Bank.

It was suggested by the World Bank that the policy be separated from the strategies and action plans, and be submitted to the Department of Marine Affairs and Fisheries (DKP), Dewan Maritim Indonesia, and other relevant Departments, for integration into the general policy on the development and management of the marine environment and fisheries.

It was further agreed that the "strategies and action plans" component be presented and discussed, with further inputs from all stakeholders being explored through a series of four district workshops and a national workshop.

The draft material to be discussed at the district level workshops was the edited and revised version of the strategies and action plans (PKSPL-IPB and COREMAP 2000), endorsed by all stakeholders in the series of seven provincial workshops and the national workshop mentioned above. The inputs and proposals from the four district workshops were duly integrated into the revised text of the draft and presented in the national workshop. In turn, the inputs and proposed improvements from the national workshop were integrated into the final version of the “Strategies and Action Plans on the Management of Coral Reefs in Indonesia”.

In accordance with the national policy, the strategy and action plans do not specify activities. The detailed activities to be undertaken are selected by stakeholders in accordance with the specific situation, conditions and characteristics of each location. The document provides only guidelines or factors that should be considered if a region or area is planning to manage their coral reefs. Therefore, it should be considered as a living document that should be updated, or revised in accordance with the overall planning of local, regional and national developments.

Strategies and action plans

Strategy 1: Empowerment of coastal communities whose livelihoods are directly and indirectly dependent on the management of coral reef ecosystems

Many coastal communities rely, either wholly or partly, on coral reef ecosystems for their livelihood. It is essential that these communities become involved in the management of the resources so that utilization is optimal, sustainable and equitable. Interest shown by the general public is a major factor in the success of coral reef management programs. Therefore, efforts to empower coastal communities should be directed towards increasing economic activities, management capability and the understanding of ecological functions. To be effective, the rights and obligations of the local communities in the management of ecosystem must be clarified.

Other income generating activities need to be developed to compensate those who are obliged
to decrease their dependency on coral reefs. These activities must be developed in accordance with the ability of the local people and market demands.

Strategy 1 has five action plans: (i) development of sustainable options for income generating activities for coastal communities; (ii) development of appropriate and environmentally friendly technologies for coastal communities exploiting the coral reef ecosystem; (iii) enhancing the awareness of coastal communities and officials about their responsibilities in the management of coral reef ecosystems; (iv) delegation of rights, responsibility and legal status for the management of coral reef ecosystems to coastal communities; and (v) enhancing the participation of non-governmental organizations in programs empowering coastal communities.

**Strategy 2: Reduce the rate of coral reef degradation**

A wide range of activities can have significant impacts on coral reef health. Some of these impacts are generated from within the community and can be reduced through improved technology, improved management, or through the implementation of different income generating activities. However, there are also a number of activities that occur outside the community and that have equally damaging effects. These might be related to poor agricultural practices in the coastal zone, industrial outputs upstream of a community, deforestation leading to siltation, etc.

Improved management could handle problems at the local, regional or national level. By connecting to the regional autonomy, this strategy could improve cooperation between national, provincial and regional governments to implement coral reef management.

Strategy 2 has six action plans: (i) development of specific management techniques or technical interventions, that conform to local conditions; (ii) formulation of appropriate criteria for evaluations undertaken in Environmental Impact Assessments (EIAs) of development projects that directly or indirectly influence coral reef ecosystems; (iii) preparation and dissemination of appropriate methods to enhance and strengthen voluntary compliance; (iv) development of conservation programs for coral reef ecosystems integrated with the economic needs of coastal communities; (v) enhancement of the effectiveness of law enforcement for various activities causing degradation of coral reef ecosystems; and (vi) control and limitations on the trade of coral reef resources having commercial value, and prohibition of the trade of protected coral reef biota.

**Strategy 3: Manage coral reefs based on ecosystem characteristics, utilization potential, legal status and the existing coastal community's wisdom**

The condition of coral reefs differs from one marine region to another. Therefore, no uniform management scheme can be implemented. Each and every type of coral reef cluster needs its specific management approach that has to be in accordance with its characteristics and the characteristics of human communities surrounding the ecosystem. It is essential to obtain a better understanding of the reef systems before management plans are developed and to continue research to inform the management process.

Strategy 3 has five action plans: (i) development of information and mapping system for the utilization and management of coral reef ecosystems; (ii) development of research and study agendas related to the rehabilitation and recovery of coral reefs and the sustainable utilization of coral reef resources by allowing local research institutions and universities to play an active role; (iii) classification and grouping of coral reef clusters into several types of management categories; (iv) development of demonstration or pilot programs for each type of management category; and (v) protection and conservation of invaluable coral reef ecosystems with respect to national, regional, and international considerations.

**Strategy 4: Formulate and coordinate action programs incorporating government and local government agencies, the private sector, and other sectors in the community-based management of coral reef ecosystems**

The principle of autonomy and integrated management has to be translated into action plans, so that all stakeholders are given the opportunity to cooperate in the community-based management of coral reefs.
Strategy 4 has three action plans: (i) integration into the management and use of coral reef ecosystems of the government, regional government, private sector, non-governmental organizations, universities and local communities; (ii) provision of technical and financial assistance to strengthen the capability and capacity of community and regional governments to prepare coral reef management plans; and (iii) preparation of personnel and facilities required for the field monitoring, control, surveillance, and assessment of coral reef management involving all levels of communities.

Strategy 5: Develop and strengthen commitments, capacities and capabilities of all parties involved in the implementation of the management of coral reef ecosystems

The management of coral reef ecosystem needs appropriate institutional support. Programs to increase the quantity and quality of human resources in these institutions are very important.

Clearly some institutions, both governmental and non-governmental, are more able to provide technical assistance to the communities than others. Therefore, the first part of the action plan must focus on a "needs assessment" for the key institutions that have been identified as being able to offer support.

In addition, there must be a targeted and coordinated approach amongst all parties delivering services in coral reef management. Such an approach avoids excessive duplication and allows a framework for knowledge-sharing. Much of this strategy is targeted at making improvements in the responses and support given by regional governments to coral reef management initiatives. The principles of coral reef management and regional autonomy have to be formulated into action programs providing opportunities for all parties involved in the management of coral reef ecosystem to cooperate. This cooperation makes it easier to establish and implement a community-based management system.

Strategy 5 has four action plans: (i) enhance the quantity and quality of human resources in relevant institutions through recruitment, training, and formal and informal education; (ii) strengthen the capability of local institutions to manage coral reef ecosystems; (iii) strengthen the capacity and capability of regional government in the management of coral reef ecosystem; and (iv) strengthen community commitment to the framework of managing coral reef ecosystems.

Strategy 6: Develop, safeguard and strengthen community support for managing coral reefs by increasing awareness of the community at all levels about the ecological and socioeconomic importance of coral reef ecosystems

Community awareness about coral reefs is the main factor for the successful implementation of the management programs. Therefore, it is imperative that a priority be increasing public awareness of the importance of coral reefs for both livelihood and development in Indonesia.

Strategy 6 has four action plans: (i) dissemination of information on laws and regulations about the management of coral reef ecosystems; (ii) increased community participation in activities related to the management of coral reef ecosystems; (iii) promotion of coral reef management programs to the community at large; and (iv) increased political support for the promotion of the importance of sustainable coral reef management for Indonesian economic development.

Strategy 7: Improve various laws, regulations, and regulatory systems concerning the management of coral reef ecosystems and redefine development success criteria in order to reflect the need to conserve these ecosystems

Various laws and regulations concerning aspects of the management of coral reef ecosystems need to be improved, especially from the point of view of law enforcement and the conformity of regulations in Indonesia with international environmental norms. On a national scale, how the law on regional autonomy relates to the management of marine areas containing coral reef ecosystem demands a judicial review. Finally, redefinition of development success criteria is imperative, since presently regional development success criteria are primarily focused on reaching economic targets.

Strategy 7 has two action plans: (i) improvement of various laws and regulations related to the management of coral reef ecosystems; and (ii) improvement and redefinition of various
regional development success criteria by including various success indicators (such as economic efficiency; equity in the distribution of development products; and sustainability of the environmental functions of the resources.

Strategy 8: *Increase and strengthen partnerships between the national government, regional government, the private sector, and the community in developing environmentally friendly economic activities in the framework of sustainable utilization of coral reef resources*

Enabling coastal communities to participate effectively in economic activities is the key to success in the management of coral reefs on a national scale. Expanding and facilitating the access of coastal communities to information, markets, capital and legal assistance can reduce the dependence of these communities on the destructive use of coral reef resources. Through technical assistance, the provision of services, and the introduction of programs incorporating partnership with various market agents, the lives of people in the communities can be improved.

Strategy 8 has two action plans: (i) provision of environmentally friendly technical and non-binding financial assistance by the government, regional government and the private sector to community groups involved in economic activities within coral reef ecosystems and their surroundings; and (ii) improvement of services provided by the government, regional government and the private sector to facilitate people’s access to science and technology, capital, markets, management and information relevant to economic activities in coral reef ecosystems and their surroundings.

Strategy 9: *Increase and reaffirm the commitment of government, regional government and communities to funding best practice management of coral reef ecosystems, and seek additional funding from domestic and foreign institutions*

The availability of funds for the management of coral reef ecosystems is a decisive factor in the successful implementation of various government and regional government programs. Thus, it is necessary to encourage national and regional governments to enter into a commitment to provide funds for the management of coral reef ecosystems. Finally, financial support should be sought from domestic and foreign institution.

Strategy 9 has three action plans: (i) provision of budgets for the management of coral reef ecosystems from the national development budget (APBN) and from the local development budget (APBD); (ii) acquisition of nonbinding foreign funding sources; and (iii) mobilization and use of community funds to manage coral reef ecosystems.

**Lessons Learned**

The lessons learned are still largely untried as most of the activities involve the establishment of only very basic infrastructure. Furthermore, the document has not yet been distributed to all of the potential stakeholders. To date, the main lesson learned relates to the need for patient advocacy if the Strategy and Action Plan is to be accepted by the community.

At first there seems to be problems at the district level. Some districts, even though lacking experience and human resources, had their own Action Plans. This meant that the Academic Draft of Government Regulation prepared by COREMAP-PMO and concerning fisheries resources conservation in Indonesian waters came close to being rejected. However, eventually, the draft, which was designed to be a guide for the preparation of regulations at all levels, was accepted and even appreciated.

**Closing Remarks**

The process of preparing the National Policy, Strategies and Action Plans on the Management of Coral Reefs in Indonesia was interactive and participatory and involved all stakeholders in coral reef ecosystems. The document presents a comprehensive approach to coral reef management.

The document contains only general guidance and factors that should be considered when a region or district plans to manage its coral reef ecosystem. It does not detail activities to be implemented. These detailed activities should be prepared and planned according to the priorities suggested by the local situation, coral reef condition, human resources and financial resources available. The document can also be used as an academic draft for preparing and improving rules and regulations and for preparing a program of sustainable coral reef management activities.
Under the agreement with the funding agency, the World Bank, the policy document is to be promoted to agencies which have activities or authority associated with marine resources. So far, it has been officially handed to some ministries, such as the Ministry of Marine Affairs and Fisheries (DKP), the State Ministry for Environment (Men LH), the Ministry of Forestry, the National Development and Planning Agency (Bappenas), and the provinces and districts of the COREMAP pilot sites. The Strategy and Action Plan will shortly be distributed by the Ministry of Marine Affairs and Fisheries.

References


