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## THE INDONESIAN CORAL REEF REHABILITATION AND MANAGEMENT PROGRAM: LESSONS LEARNED IN COMMUNITY-BASED REEF MANAGEMENT AT SENAYANG AND LINGGA ISLANDS, RIAU

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### ABSTRACT

*The Coral Reef Rehabilitation and Management Program (COREMAP) is a 15-year program of the Government of Indonesia. It has been working at several sites in Indonesia since 1998 to achieve sustainable use of coral reefs through the delegation of management authority to local communities. The establishment of effective models for participatory and community-based management is the core of this program. The model for community-based management includes community participation, community capacity building, promotion of alternative income generation, establishment of coral reef management plans, community marine sanctuaries and community reef watcher programs. This paper describes the experiences and lessons learned in Phase I of the COREMAP Project in implementing community-based reef management at Senayang and Lingga Islands, Riau Province. It is argued that the involvement of the community in the planning and implementation process of coral reef management will improve the management and conservation of coral reef ecosystems. It is hoped that the Indonesian experience will contribute to the comparative literature on coral reef management.*

**Key words:** CBM, Seed funds, Village grants, AIGA, and CRMP

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### INTRODUCTION

Indonesian coastal habitats are under stress and most people agree that improved management is needed to protect the coastal resources of the country (e.g. Nontji, 2000; Patlis, et al., 2001; Pet-Soede, et al., 2002). This has been recognized since the end of the 1970s when it became apparent that coral reefs, coral communities and their associated habitats were under threat due to lack of effective management measures. The

growing awareness of the economic and ecological benefits of coral reefs has resulted in an emphasis at the national level on improving coastal resources management in Indonesia. Numerous coastal zone management projects have been, and continue to be, carried out by the Government of Indonesia. COREMAP is one of the largest ongoing coastal resources management projects in Indonesia focusing on coral reef management issues. Nevertheless, the road to improved management of coral reefs in

Indonesia is long and there remains a lot of work to be done by all stakeholders.

Many scholars (e.g. Cicin-Sain & Knecht, 1998; Hinrichsen, 1998; Kay & Alder, 2000; White & Vogt, 2000) argue that the problems of coral reef management are not just environmental but also socio-economic issues. For example, poverty compels coastal communities to use dynamite and cyanide on reefs in a desperate attempt to put food on the table. In order to tackle the pervasive poverty problem, managers often focus on improving the community's income, with the hope of bringing about a shift to appropriate fishing methods. Collaborative and community-based management strategies are powerful tools to address the problems of resource management at the local level (Kay and Alder, 2000). Community-based management is a strategy undertaken through the active participation of local people in the planning and implementing of projects (Sandolo, 1994). Five principles are commonly used in the implementation of community-based management, these include: (i) bottom-up approach; (ii) participation of all stakeholders; (iii) conservation and sustainable use; (iv) linkages between local management prescriptions, and regional and national policies and strategies; and (v) social and/or economic benefits (Drijver and Sajise 1993, as quoted in Kay and Alder, 2000). The purpose of this paper is to evaluate the application of the community-based management (CBM) approach in COREMAP Phase I.

## MATERIALS AND METHODS

Data for the case studies were collected using a combination of desktop document analysis and semi-structured questionnaires, followed by in-depth

interview with key persons at national and local government offices, and NGO staffs.

## RESULTS AND DISCUSSION

### 1. CBM and Co-Management in Senayang and Lingga Islands

The CBM and Co-management concepts are approaches to enhance community participation in marine environmental programs. The CBM concept was introduced to many regions in the world in the late 1970s and early 1980s. Its primary objective was to encourage and empower the local community to be involved in the management of their environment through the design and development of relevant programs. There was, and still remain, several approaches in community-based management in the world; however, there is no standard for implementing CBM, particularly in marine and coastal areas community-based coastal resource management (CBCRM) (Pomeroy & Carlos, 1997). The application will depend on each situation, socio-cultural aspect, and the political atmosphere in the sites. For example, three community-based management approaches have been employed by *Proyek Pesisir* in "community-based coastal resources management in North Sulawesi, Indonesia" (Crawford et al, 1998). They were: (1) community-based village-level marine sanctuaries; (2) community-based village-level integrated coastal management plans; and (3) community-based village-level ordinances and policies.

This approach was a key factor in the success of the project's efforts for coral reef management as a whole. Gawell stated that no coral reef management program can be successful without the full involvement of resources users, and the success of the program is significantly

determined by them (Gawel, 1984 as cited by White et al, 1994). This approach also became an important issue in the international forum for world coral reef management. One of the six principles of coral reef management resulting from a major global workshop on coral reef management sponsored by International Coral Reef Initiative (ICRI) held in the Philippines in 1995 confirmed that:

“integrated coastal management, with its special emphasis on community participation and benefits, provides a framework for effective coral reef and related ecosystem management.”(ICRI, 1995 as cited by Cicin-Sain & Knecht, 1998).

One of the important ways to achieve expected outcomes in community-based management activities is to encourage a high level of community participation in the planning and implementation processes. The experience has shown that the appointment of a competent extension officer is critical in facilitating community-based management activities (Crawford et al, 1998). The extension officer (in COREMAP called field facilitator) acted as a coordinator for community-based activities, with technical support provided by a senior field manager. Technical support was also provided by the COREMAP project through its consultant specialists (based in Jakarta), and local government agencies (provincial and district).

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The COREMAP CBM process in Senayang and Lingga Islands involved a consortium that comprised two non-government organizations (NGOs) and a local University. All full-time facilitators were based in villages, except the senior field facilitator who was based in Tanjung Pinang (the capital of Riau Archipelago district). The seven field facilitators were based in Medang, Temiang, Mamut, Senayang (Penaah) and Pasir Panjang (Sub-district of Senayang) and Limbung and Sekanah (Sub-district of Lingga). The CBM activities in Senayang and Lingga Islands commenced at the end of 1999 and lasted to mid 2003. Several CBM activities were conducted during that period, including community socialization activities and community capacity building; disbursement of seed funds for local projects; village grants; establishment of coral reef management plans (CRMPs); and the implementation of the community reef watcher program.

CBM activities in the marine sector are relatively new in comparison to those in other sectors, i.e. forestry and urban sectors (Pomeroy & Carlos, 1997), therefore, COREMAP held additional training on marine community-based management facilitation techniques for the field facilitators to enhance their knowledge on marine issues prior to and during deployment.

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### 2.1. Community Socialization

The first question that should be addressed in community-based and co-management initiatives is: "Who are the people targeted to be involved in the program?" The decision about the people targeted to be involved in program participation is critical to its success. This truism has important implications for the design of community-based and co-management initiatives (Jentoft et al, 1998). Defining the community as a target group is an essential factor in success. The failure to define the "community" will result in failure of the co-management program as a whole.

The community can be defined in one of three ways: (i) using a geographical boundary, where the community can be seen as a group of people that live in an area; (ii) functional groups, in which the community is seen as a group of people who share activities or functions in an area, such as fishers group; and (iii) traditional approach whereby the scope of the community includes a group of people who conduct social interaction tied to place, history and identity (Jentoft et al, 1998). Thus, a community can be defined as "the interacting groups of people who share a common functional link such as relationship, occupational interest, place of residence, or region" (Mantjoro, 1996).

The objectives of the community socialisation activities are to develop community understanding of the program. The activities will be carried out through formal and informal meetings with

residents inside and outside the targeted village. As an "agent of development", the field facilitator should be involved in all community activities, e.g., religious, sport, and social village activities.

### 2.2. Capacity Building and Public Education

The objective of capacity building and public education is to strengthen the capability of community groups in managing their resources. The identification of existing community groups and/or the facilitation of the formation of new groups is a central focus of the capacity building activity. In some areas that already have implemented a traditional management system, the extension officer should also liaise with the community traditional leaders before developing and implementing any new initiatives.

Public education is a continuous process. The education activities usually follow a non-formal approach, in small groups or one-on-one contact, with a focus on resource management and methods (White & Vogt, 2000). To strengthen community capacity, it is necessary for the project to conduct training, workshops and other public education activities on marine and coral reef ecology, and sanctuary concepts as part of the public education process.

As part of developing the community capacity and commitment to the project or to manage a marine sanctuary, COREMAP provides a small grant. This grant is used for funding some early action programs to address community concerns, gain commitment and, hopefully, address coastal management problems. In some cases, this grant was also used as a 'community trust fund', which was used for funding the items of common needs of the community, e.g. garbage boxes, repair of the mosque,

church, community hall, etc. This activity is aimed at encouraging the local community to join with the environmental program and build community trust in the coastal program.

To strengthen and build community capacity, COREMAP conducted training and workshops in all seven COREMAP villages in Senayang and Lingga Islands. These included training of organizations and community groups. The community was also trained in leadership subjects in particular for the village motivator. The village motivator's duties as on-site assistant to the field facilitator were to run the community-based management activities in their village. The village motivator was also expected to become an informal leader, or at least a key advisor to the recognized community leader. COREMAP's seven village motivators (one per village) were democratically elected by the villagers. Thirty-one community groups were established in Senayang and Lingga Islands with approximately 440 active members, including women. At least three community groups were established per village, selected from production, conservation, and gender groups (Sudiarno, 2003).

The conservation group dealt with coral reef management and coastal environment. It focused on assessment of reefs, mangroves and marine species for village coral reef management plans. It also dealt with monitoring and surveillance of local reef sanctuaries. The production group concentrated on economic assessment. This group was to make proposals for alternative income generation and to enhance the economic value of the local fishery catches. Equality in the roles of men and women was an issue that was addressed by the gender group. This group had the duty to develop and implement economic activities to increase family income while the men went fishing. The

management of the village library was also one of the functions of the gender group. Community capacity building activities included some training sessions i.e. training of community members on village coastal resource profiling; training on financial management of community groups (POKMAS); and training and workshop on community participation for coral reef management.

### **2.3. Site Selection of The Marine Sanctuary**

Based on the community maps and data collected by the village surveys, the community, with the assistance of the extension officer can continue to select the appropriate site for the local marine sanctuary. A series of formal and informal meetings should be held in order to decide on the appropriate site for establishing local marine sanctuaries. In some cases, the local university or research centre may also provide technical assistance to the community to help decide on the site of the marine sanctuary.

All marine and reef sanctuaries in COREMAP sites were designed using the World Conservation Union (IUCN) standard guidelines for the establishment of Marine Protected Areas. The community decision on the marine sanctuary included a map and zoning to be included in the integrated coastal management plans for the reef management area. All seven villages in Senayang and Lingga Islands delineated sanctuaries as 'no-take' zones with technical advice from scientists from Riau University and LIPI. The total area of those sanctuaries was about 260 ha with an average living coral covering of about 20%, and 58 ha of mangroves (Dirhamsyah, 2004). The sanctuaries are close to populated areas making them easy to monitor. Each sanctuary comprised a core zone (no-take zone) and a buffer zone.

The area surrounding the sanctuaries, including the whole reef management area less the sanctuary (no-take zone), was managed as a multiple-use zone where traditional and modern fishing gear and/or non-destructive fishing activities were allowed.

In establishing coral reef and mangrove sanctuaries the inhabitants of the seven villages actively participated in mapping and developing historical transects and identifying environmental problems for their areas (COREMAP PMO, 2002; Sudiarno, 2003). Noteworthy was the inclusion of both women and youth in active participation.

#### 2.4. Seed Funds and Village Grants

Seed funds and village grants were funds to communities provided by COREMAP to assist in supporting and stimulating the implementation of community-based management activities at all project sites. The total seed funds provided Rp. 20 million (US\$2,500) per village. These funds were used for several activities:

- (1) Community Trust Fund for buying or making items that addressed the common needs of the community, e.g. garbage boxes, repair of the mosque, church, community hall, etc. The aim of this activity was to encourage the local community to participate in environmental programs and to build community trust in the COREMAP program;
- (2) Funding environmental improvement activities, such as water supply, solid waste management, and mangrove reforestation; and
- (3) Funding the promotion of alternative income generation activities.

Village grants were used to support such activities as the development of community social structures (supply of electricity, water storage, and sanitation

facilities) the establishment of marine sanctuaries (including signboards for sanctuaries, installing mooring buoys), the creation of information centres and village libraries, and the alternative income generating activities. COREMAP provided Rp. 100 million (US\$12,500) as a grant per village. However, the payment of village grants is tied with some project requirements that should be compiled by the community, such as the establishment of marine community sanctuary. This should be proofed by the draft of Village Coral Reef Management Plans (CRMPs) and Village Ordinance.

The tying of village grant funds to conservation outputs has been criticized. According to Hunnam (2000) the tying of village grants to designation of a sanctuary could be interpreted as payment for reef protection measures. Contrary to Hunnam's point of view, the community appreciated the close link between reef conservation and their own livelihood, in particular the importance of the reef in the living fish trade (Hunnam, 2000). This is further supported by the demonstration of the community appreciations for the close link between reef conservation and their own livelihood, in particular the importance of the reef for the living fish trade. The community-based management groups in Penaah gave 10% of their AIG's profit to finance the reef watcher program.

It is worth noting that the seven target communities at Senayang and Lingga Islands established revolving fund schemes from their seed funds and village grants. As mentioned earlier, it was agreed that some of the COREMAP grants could be used for funding economic activities. The economic activities were usually carried out by the community production and gender groups. Communities agreed that all the COREMAP grants used for economic activities would be done on a credit system. The community groups decided the interest and payment

procedure of the credit system. The collected funds from re-payment were then revolved and used for other economic activities proposed by other community members. The benefits of this scheme for the delivery of micro-credit were well demonstrated in Senayang and Lingga Islands. Credit was provided to support kiosks, and other village-based activities. Although some borrowers were in default, in general this was tolerated as there were only a few members, and it was a new system for them.

## **2.5. Implementation of Alternative Income Generation (AIG)**

COREMAP alternative income generation activities included the establishment of a small-scale grouper fattening project, coconut oil production, tailoring, food processing, fish retail kiosks, credit scheme, bakeries and handicrafts. To ensure the successful implementation of AIG activities COREMAP held several training courses, such as mariculture of estuarine grouper, the establishment of reserve areas for natural restocking of grouper, and tailoring for women.

As in the Pacific Islands countries and other COREMAP sites, the implementation of AIG activities in Senayang and Lingga Islands showed some initial, but modest success. A number of problems were identified as affecting COREMAP's alternative income generation strategy (IUCN, 2002). These included:

- (1) Un-willingness by fishers to accept a change from their former livelihood to land-based activities;
- (2) Only a narrow scope of AIGs permitted by COREMAP with no alternative activities which met with their intended desires and also their capabilities; and

- (3) Due to the lack of markets, some AIGs products could not be sold in the local market.

To address the complexities of AIGs, a comprehensive feasibility study is necessary before planning or conducting activities. The feasibility study can provide communities with accurate market analyses for demand of AIG products and present other alternatives to the community to generate income. However, this technical assistance is complementary to the AIG selection process. The community still has the right to decide on the type of AIG activities. The success of AIG activities is mainly determined by proper training; therefore, it is necessary to conduct appropriate and suitable AIG training before implementing this program.

## **2.6. Integrated Coastal Management Plans at Local Level**

The main objective of community-based reef management or co-management in COREMAP program is to develop community capability for managing their coral reefs and its ecosystems. Communities were encouraged to develop a Community Coral Reef Management Plan (CCRMP). This is an integrated plan for coral reef management, which consists of key village programs required to improve reef management practices. The plan should address the problems of destructive fishing (use of cyanide and poisons), illegal trawling, over-fishing, the impact of sand mining and pollution. Steps in the plan can include:

- (1) Development of village reef management strategies and programs;
- (2) Establishment of community reef and mangrove sanctuaries;
- (3) Development and implementation of village ordinances to support the plan;

- (4) Development of a village institutional capacity for reef management;
- (5) Conflict resolution mechanisms for fishing gear; and
- (6) Gender issues to enhance the capacity of both genders in community development.

The development of the CCRMP is similar to the establishment of a local marine sanctuary; this takes time and needs intensive socialisation to get agreement among the community groups (Sudiarno, 2003). At the end of 2002, there were six draft of CCRMPs completed and endorsed by the leaders of the six villages in Senayang and Lingga Islands. Senayang village was one of the seven villages that were faced with a conflict between its villagers and another village as resource users. However, in early 2003 this conflict was resolved through local government intervention, and then the seventh draft of CCRMP to cover all selected villages in Senayang and Lingga Islands was completed. Unfortunately, the CCRMPs have not yet been adopted as District Regulation, although they have received approval of the Riau Regency Administrator (*Bupati*).

Village ordinances have been prepared as part of the CCRMPs to regulate protection activities, ensure the enforcement of the CCRMP management decisions, and provide legal support for the plan. Village ordinances are developed through a series of formal and informal meetings and small group discussions amongst all stakeholders of the village. The ordinances contain specific rules for issues that relate to reef management, patrolling, monitoring and development of AIGs. The village ordinances also include (COREMAP PMO, 2000):

- (1) Rules and sanctions on the protection and use of sanctuary zones;

- (2) Description and terms of reference for village institutions for implementation of the CCRMP, in particular the control and monitoring functions; and
- (3) Selection of criteria and mechanisms for alternative income generation activities and basic infrastructure for reef protection.

Besides these accomplishments of communities, there were also valuable points that can be noted from these experiences. These points come from the evaluation carried out by the Riau NGO consortium one month before terminating their assistance to the seven villages after 14 months from the establishment of coral reef and mangrove sanctuaries in six villages. These results were (Sudiarno, 2003):

- (1) The management of reef sanctuary areas (no take zone area) has been well implemented in five villages, although there were still a few minor violations;
- (2) There were no violations in the mangrove conservation areas in six villages; and
- (3) Communities having implemented and enforced the village ordinance well. Offenders had been penalized according to the village ordinance.

The approved coral reef management plan and village ordinance are submitted to district and regency officials for their agreement, and to seek additional strength and support for implementation and enforcement. With regional government approval, the responsibility to manage marine and coastal resources is thus delegated to the community. Such approval also indicates a change of the property management regime from state property rights to communal or community property rights.



## 2.7. Community Reef Watcher Program

Senayang and Lingga adopted a different model of MCS in which the MCS activities were merged with CBM activities. The MCS activities were carried out by reef watchers selected by villagers. They had the duty to monitor, control and report the fisheries activities in their own marine sanctuary. The reef watchers used simple equipment such as radios (short distance) and binoculars provided by COREMAP to monitor activities in their areas. The reef watchers also sought support from the military and police to enforce the rules against non-residents, with varying degrees of success in the support received. Reef watchers routinely carried out about 8-12 patrol trips per month. The operational costs of the reef watcher programme were supported by COREMAP and the local government. The community managed the MCS operational funds and fees.

This enforcement strategy worked very well to control destructive fishing as long as funding was available and integrated into community budgets. The strategy had advantages over other reef MCS models as it addresses only the community side of reef conservation and protection and relies on the law enforcement agencies for the back-up support for deterrent law enforcement. This strategy works very well if the cooperation and commitment of law enforcement agencies are secured and maintained. Unlike with Senayang and Lingga, the implementation of MCS activities in Takabonerate, South Sulawesi and Biak, Papua required a full community based enforcement scenario. This therefore required expensive and sophisticated monitoring and surveillance equipment such as radar, radio telecommunications, and high-speed boats. This system requires full passive and deterrent enforcement capability, which is complex in its management and expensive in cost for

maintenance and repair of equipment as it assumes that there may not be the required support from mandate law enforcement agencies. The implementation of MCS activities in Takabonerate and Biak has not been embedded in a core CBM program. This is carried out by specific organization or task force under the local government coordination. However, the problem of training, sustainability and self-sufficiency of funds resulted in the ineffective performance of MCS component in Takabonerate and Biak. The strategy adopted in Senayang and Lingga Islands maximizes the self-reliance and commitment of the villagers, minimizes costs and provides the best foundation for long-term organizational and financial sustainability (IUCN, 2002).

## CONCLUSION

COREMAP is the first program that provided a major opportunity in Indonesia to overcome the problem of coral reef management. It recognized the need for an approach that combines bottom-up community-based management and top-down support (IUCN, 2000). However, there are two major external factors that affected the performance of COREMAP Phase I. The first was political instability in Indonesia from 1998 to 2000 that resulted in several changes to the pilot sites and delays in implementation of field programs. Due to the security problems caused by this instability, the government of Indonesia and the donors to relocated their project team from Mollucas and Kupang Bay, to Biak for the World Bank's site and Maumere for the AusAID's site.

The second factor was the enactment of the Autonomy Laws in 2001, which gave more authority to regency governments to manage their resources. The enactment of this law required the re-

alignment of the COREMAP program to merge with the autonomy law. Some central government responsibilities of managing the COREMAP program needed to be transferred to regional governments. The COREMAP program was designed during the centralised administration era, where most management activities and funding were controlled by the more affluent central government. Even though some of the management activities were planned to be implemented by regional governments and local communities, the involvement of regional governments and local communities in the decision-making process was still very limited. For instance, all the decisions for infrastructure procurement activities were carried out directly by the central government. This practice had to be changed as a result of the autonomy law, although it is not easy for regional governments to manage the COREMAP program as their experience in such affairs was very limited.

COREMAP involved international agencies and foundations such as the WB and the ADB that have specific mechanisms and procedures for each management activity. Today, almost all regional governments in Indonesia face problems of lack of capacity and training to meet the complex and bureaucratic donor agency operational and reporting requirements. The success of the next phases of the COREMAP will depend largely on the capacity of regional governments to improve their staff to be able to handle the complexity of the COREMAP program.

Despite the challenges outlined above, COREMAP Phase I achieved remarkable results. IUCN, in its independent evaluation noted several achievements of COREMAP Phase I. These included: (i) increase in community awareness and commitment to sustainable fishing practices at all COREMAP sites; and (ii) reduction in illegal and destructive

fishing practices, such as dynamiting and poisoning in most coastal communities of COREMAP project sites (IUCN, 2000). Therefore, the IUCN independent evaluator strongly recommended that international donors and GOI proceed to fund the second phase of the project.

The IUCN evaluation team also noted that Senayang and Lingga Islands (in Riau) had the most advanced community-based management programs in comparison to other COREMAP sites (IUCN, 2000). According to the IUCN, the implementation of community-based management in Senayang and Lingga Islands has contributed significantly to the success of COREMAP Phase I in Riau. This success included: (i) a high level of awareness and motivation of community groups had been developed in both islands; (ii) the community in both islands had developed Coral Reef Management Plans (CRMPs). CRMPs were established in seven villages of Senayang and Lingga Islands and no-take zones were created; and (iii) the community in both islands developed and supported the reef watcher program. However, the implementation of Alternative Income Generation (AIG) activities was perceived as modest in the islands.

In summary, the implementation of community-based management activities in Senayang and Lingga Islands has shown that the effective coastal resource management requires a multi-disciplined approach. It is more than a problem of simple conservation education or law enforcement. The complex problem on community-based management also requires intervention and support from government, universities and NGOs for socio-economic, legislation and policy aspects. It is also necessary to ensure the widest participation of all the people who depend on the reef resources to gain the success of the community-based management approach. The integration of

community participation, environmental education, economic incentives, and the legal mandate, with a commitment for compliance is an appropriate management system of reef and resources management in Senayang and Lingga Islands. However, the long-term success of this system depends very much on the long-term institutional support from the participating government, university, and NGO.

This experience confirms the economic benefits to management from the establishment of strong links to education, community and government participation, and co-operation of all involved organizations for successful resource management. Nevertheless, the community involvement in all management processes is the key aspect for success. Thus, there is wisdom in placing the community at the centre of coral reef management.

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