

THE NATURE AND ROLE OF LOCAL BENEFITS IN GEF PROGRAMME AREAS

CASE STUDY

*Indonesia:
Coral Reef Rehabilitation and Management
Project (phase 1)*



GEF

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Currency Equivalent

Currency Unit = Indonesian Rupiah

US\$1 = Rp. 8,000
Rp. 1 = US \$0.0002

Abbreviations and Acronyms

ADB	Asian Development Bank
APL	Adaptable Program Loan
ANDAL	Environmental Impact Assessment (<i>Analisa Dampak Lingkungan</i>)
AusAID	Australian Agency for International Development
BAPPENAS	National Development Planning Agency (<i>Badan Perencanaan Pembangunan Nasional</i>)
CAS	Country Assistance Strategy
CBM	Community-Based Management
COREMAP	Coral Reef Management Program
CRMP	Coral Reef Management Plan
CRITC	Coral Reef Information and Training Center
DKP	Department of Marine Affairs and Fisheries (<i>Department Kelautan dan Perikanan</i>)
DPR	National Legislature (<i>Dewan Perwakilan Rakyat</i>)
DPRD	District Legislature (<i>Dewan Perwakilan Rakyat Daerah</i>)
ERR	Economic Rate of Return
GEF	Global Environment Facility
GOI	Government of Indonesia
IBRD	International Bank for Reconstruction and Development
ICR	Implementation Completion Report
LIPI	Indonesian Institute of Sciences (<i>Lembaga Ilmu Ilmu Pengetahuan Indonesia</i>)
MCS	Monitoring, Control and Surveillance
NGO	Non-Governmental Organization
OED	Operations Evaluation Department
O&M	Operations and Maintenance
PAD	Project Appraisal Document
PMO	Project Management Office
Pokja	Working Group (<i>Kelompok Kerja</i>)
PPAR	Project Performance Assessment Report
SekNeg	Secretariat of State (<i>Sekretariat Negara</i>)

Preface

This report is a Case Study of the Indonesia: Coral Reef Rehabilitation and Management Phase I (COREMAP-I). It is one of several case studies being prepared for a review of *The Nature and Role of Local Benefits in GEF Program Areas* undertaken by the Monitoring and Evaluation Unit of the GEF. Its purpose is to assist in maximizing the level of local benefits included in future GEF policy, strategies, programs, project design and implementation, within the context of GEF's mandated focus on global environmental benefits.

The scope of investigation of the Case Study is to report on progress in achieving results relating to project objectives, outputs and outcomes, within the specific context of:

- (a) Assessment and description of the types and scale of local benefits and negative impacts, intended or unintended, which have resulted from the GEF project, including local perceptions of the benefits and impacts.
- (b) Examination and description of the nature of the links between local benefits and the attainment of global environmental benefits. This is based on an analysis of linkages in terms of how global environmental benefits can affect local benefit / negative impacts and how the generation of local benefits / negative impacts can affect global environmental benefits.
- (c) Evaluation and description of the extent to which the strategy and environmental management options in the project design and implementation properly incorporated the opportunities to generate greater levels of local benefits: essentially looking at what the projects did not do, as well as what they did do.

This report is based on the draft COREMAP Phase I Final Report, prepared by the Borrower, the Project Appraisal Document (PAD), loan documents, project status reports, project financed reports, and discussions with Bank staff, Borrower staff, project consultants, and representatives of civil society organizations and local communities involved in the project. In September 2003, an evaluation mission conducted by Andres Liebenthal visited the project sites in Padaido and Taka Bone Rate in parallel with the final supervision and implementation completion report preparation mission undertaken by the Bank. The collaboration and warm hospitality of Bank operational staff, government officials, civil society and community representatives who assisted the mission are gratefully acknowledged.

OVERVIEW OF THE PROJECT

1. The Government of Indonesia (GOI) launched the Coral Reef Management Program (COREMAP) in 1998 as a 15-year program with the objective “to protect, rehabilitate and achieve sustainable use of coral reefs and associated ecosystems in Indonesia which will, in turn, enhance the welfare of coastal communities”. The program was divided in three phases: (i) a 3 year “Initiation” Phase designed to test and develop viable CBM systems in selected pilot areas; (ii) a 6 year “Acceleration” Phase to build upon and expand CBM systems to other sites; and (iii) a 6 year “Institutionalization” Phase for ensuring institutional (administrative, economic and financial) sustainability of program activities. In support, the Bank/GEF COREMAP project was designed as an adaptable program loan (APL) in three phases that parallel those of the GOI’s program.¹ This case study covers the first phase of the APL, the COREMAP I project, which is scheduled for completion in June, 2004.

COUNTRY CONTEXT

2. Indonesia is the world’s largest archipelago, with more than 17,000 islands and an 81,000 km coastline rich in coral reefs, seagrasses and mangroves. Its marine environment is one of the richest of the world, with about than 2,500 species of mollusks, 2,000 species of crustaceans, 6 species of sea turtles, 30 of marine mammals, and over 2,000 species of fish. It has approximately 42,000 km² of coral reefs, or 16 percent of the world’s total. With over 70 genera and 450 species recorded, Indonesia lies at the center of the world’s coral reef diversity.

3. Coral reefs are a major productive and aesthetic asset, playing a key role in fisheries, marine tourism and coastal protection. Healthy reefs are an important source of food and economic opportunities for some 67,500 coastal villages. Coral reefs also play an important role in marine-based tourism, attracting divers and providing the source of white sand for Indonesia’s beaches. In addition, fringing coral reefs help dissipate wave energy, thereby protecting coastal lands from storms and wave erosion.

4. Despite their importance, Indonesia’s coral reefs are under serious threat from poison and blast fishing, overfishing, and sedimentation and pollution. In a 1994 survey, the Indonesian Institute of Sciences (LIPI) found 70 percent of the sites to be in poor to fair condition. The only known study of coral reef degradation over time, in Pulau Seribu off Jakarta Bay, shows a steady decline of 3-6 percent a year in live coral reef cover since 1969. Urgent management interventions were therefore needed to protect Indonesia’s reefs.

5. The key issues for coral reef management were identified as: (i) poor management of existing threats; (ii) unclear institutional mandates and inadequate institutional capacity; (iii) a weak policy and legal framework; and (iv) insufficient information. The major threats, overfishing and destructive practices (blast and

¹ COREMAP has also been funded by loans from the ADB and grants from AusAID.

poison fishing), are exacerbated by a high demand for marine products, opportunities for substantial private gains, weak enforcement of existing laws, and an open access regime that discourages community action. Responsibility for managing Indonesia's marine areas were dispersed through numerous government agencies. Policies and regulations followed sectoral priorities, and failed to properly address coastal issues. Legal loopholes such a prohibiting poison fishing but allowing its use to tranquilize fish made it extremely difficult to enforce existing laws. Finally, information required for marine management was fragmented and difficult to access.

SECTOR STRATEGY

6. The community-based management (CBM) approach was chosen based on the realization that Government agencies cannot effectively manage the extensive coral reef areas without the close involvement of coastal villages. The CBM approach is based on the following lessons gained from similar programs in the region: (i) habitat management in the form of reef sanctuaries (no-take zones) is generally more effective than management aimed at specific stocks; (ii) reef management has been most successful where communities have been organized and empowered to manage local reef resources; (iii) reef management systems need to be flexible and adaptable, building upon local ecological knowledge and traditional management systems; (iv) external threats need to be addressed through effective enforcement; (v) reef management has been most successful when local stakeholders derive quick and direct economic benefits from reef management; and (vi) local support should be established first for a limited set of clear and achievable goals of direct interest to local people.

It was also realized that the CBM approach could not be successful without a supporting framework to contain external threats. This framework needed 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) increased awareness amongst decision makers of the threats facing the reefs; and (v) strengthened management capacity.

PROJECT OBJECTIVES

7. The development objective of Phase I of the COREMAP program was “to establish a viable framework for a national coral reef management system in Indonesia”. In support, the specific objectives of the Bank/GEF COREMAP I project were to:

- (a) Strengthen the national policy, strategic planning and legal framework for coral reef management;
- (b) Strengthen the institutional capacity for coral reef management sufficiently to enable expansion of the COREMAP program;

(c) Design and test pilot CBM in two sites (Taka Bone Rate National Park in South Sulawesi and Lease Islands in Maluku);

(d) Test and evaluate models of coral reef monitoring, control and surveillance (MCS) systems at the national level and in target provinces; and

(e) Design and launch national and local public awareness campaigns for coral reef management.

8. The Bank/GEF project was coordinated with parallel projects by other donors:²

(a) A national coral reef information, research and monitoring system and Coral Reef Information and Training Centers (CRITCs, funded by ADB);

(b) National capacity building and training (funded by AusAID);

(c) Pilot CBM and enforcement in Senayang Islands, Riau (funded by ADB), and Kupang Bay, East Nusa Tenggara (funded by AusAID); and

(d) Initial CBM activities in six provinces (funded by GOI).

9. The project objectives are consistent with Indonesia's Biodiversity Action Plan, Agenda 21, the Convention on Biological Diversity, GEF's Operational Strategy, in particular the Operational Program (OP2) on Marine, Coastal and Freshwater Ecosystems, and guidance from the Conferences of Parties. It specifically responds to the Jakarta Mandate stressing conservation and sustainable use of marine ecosystems. By focusing on Eastern Indonesia, the project was designed to help conserve an area which is believed to contain the richest coral reef, fish, and marine invertebrate biodiversity in the world.

10. These objectives were not changed. However, political turmoil and poor security conditions led to the termination of initial CBM activities in Maluku and Kupang, and their substitution by new pilot CBM sites in the Padaido Islands and East Biak in Papua (funded by the Bank), and Maumere Bay in East Nusa Tenggara (funded by AusAid).

PROJECT COMPONENTS

11. The Bank/GEF COREMAP I project was supported by IBRD Loan No. 43050 in the amount of \$6.9 million and a Global Environmental Facility (GEF) Trust Fund Grant No. 28373 in the amount of SDR 3.1 million (US\$4.1 million equivalent), which funded the following components:

(a) Program Strategy, Legal Framework, Project Management, and Phase II Preparation. (total cost: \$2.9 million, of which \$1.0 from Bank and \$0.8 from GEF);

² These activities are mentioned for context only and are not evaluated in this report.

- (b) Community-Based Management (total cost: \$2.0 million, of which \$0.8 million from Bank and \$1.2 million from GEF);
- (c) Surveillance and Enforcement (total cost: \$4.0 million, of which \$2.5 million from Bank and \$0.9 million from GEF); and
- (d) Public Awareness (total cost: \$3.9 million, of which \$2.5 million from Bank and \$1.2 million from GEF).

LOCAL IMPACTS OF THE PROJECT

12. Overall, the project has been modestly effective in establishing a viable framework for coral reef management in Indonesia.³ The CBM approach and the MCS components have been implemented in the two pilot sites, but the design needs to be substantially revised to ensure their sustainability for the long term and document its local and global benefits.⁴ The project also created the institutional framework needed to implement the COREMAP program, including the national PMO, the district Pokjas, and the village community groups. This framework is consistent with the institutional decentralization strategy of the GOI, replicable as COREMAP expands, and adaptable to local customs and circumstances.

13. In terms of the livelihoods approach, the major impacts of the project include those on institutional, social, physical and natural capital.

Institutional Capital

14. The greatest impact of the project was on the institutional capital for coral reef management at the national, district and community levels. The specific objective was to develop an sufficient institutional capacity for coral reef management to enable the expansion of the program in Phase II at the national and local levels, and its eventual mainstreaming into line agencies. The approach taken was to establish a national Program Management Office (PMO) at the Indonesian National Institute of Sciences (LIPI) in Jakarta, and provincial and district level working groups (*Pokjas*) made up of relevant agency representatives coordinated by the provincial and district planning bureaus (BAPPEDAs), supplemented by staff from local NGOs and universities. In 1999, a decision was made to transfer responsibility for COREMAP Phase II to the newly created DKP, but leave LIPI in charge of Phase I until its conclusion.

15. By the end of the project, the PMO included a full-time Director, part-time Assistant Directors to manage to the technical teams for monitoring, control and surveillance (MCS), public communications, the Coral Reef Information and Training Centers (CRTICs), and CBM, and part-time staff seconded from LIPI and DKP for

³ In line with OED practice, “modestly” is used to connote that “major objectives were met, or expected to be met, but with significant shortcomings, i.e. it is the third step in a four-point scale.

⁴ The revisions needed are discussed below in para. 46 ff.

the technical teams. At the local level, working groups (*Pokjas*) had been established within the district government organizations that incorporated staff from relevant agencies, local NGOs involved in the project. The two pilot districts of Selayar (for Taka Bone Rate) and Biak (for Padaido) had active *Pokjas* with a track record of regular meetings, effective inter-agency coordination, project management, progress reports, support from the District Chiefs (*bupatis*) and positive engagement with the District Legislatures (DPRD).

Social Capital

16. At the local level, the implementation of the CBM approach required a complex series of steps to develop the social capital for coral reef management at each participating village in the two pilot sites: (i) the participatory formation of community groups and selection of community-based oversight teams and motivators; (ii) the participatory development of a coral resources management plan (CRMP) and proposals for the utilization of village grants (e.g. for village infrastructure and establishment of seed funds); and (iii) the approval, implementation and management of the CRMPs, village proposals for infrastructure, and seed funds.⁵

17. By September 2003, the CBM approach had been nearly fully implemented at the five villages in Taka Bone Rate and, due to a delayed start, only partly implemented at six villages in Padaido. Each participating village had elected a program oversight team (*tim pengawas local*) and three motivators, formed three community groups (for reef conservation, production activities, and women), formulated a CRMP with an identified sanctuary (no-take zone) and community-based “reef watchers” to monitor fishing activities in village waters and report on violations of the sanctuary or illegal activities (blasting and poisoning). In Taka Bone Rate, the villages had also largely implemented their block grant proposals. In Padaido, they were still at the preparation and review stage, and the block grants had not yet been disbursed.

18. The use of seed funds for the establishment of community revolving credit schemes has been particularly favorable for the development of social capital. The repayment rate has reached 63%, with most of the shortfall due to the failure of three seaweed culture projects⁶ (in one village) and lack of realization that the funds were to be repaid (in one village). In addition, simple and sound record keeping systems have been established in every village, with the individual loans and repayments displayed in village community centers to provide transparency and accountability. In most of the villages, a portion of the interest income has been set aside as a contribution to support coral reef conservation and monitoring activities (I.e., pay for the reef-watchers).

⁵ Participating villages would be eligible for block grants (up to a total of Rp. 150 million per village), with 30 percent payable upon approval of the CRMP, 30 percent upon approval of the village grant utilization proposal, and the remainder upon implementation of the CRMP.

⁶ Due to poor choice of sites and husbandry techniques.

19. The monitoring, control and surveillance (MCS) component of the project also contributed to the development of social capital through the organization and empowerment of community-based “reef watchers” to patrol the reefs and act as the eyes and ears of the system, backed up by law enforcement agencies to capture and prosecute the violators. Its implementation required coordination with the CBM component, which underpinned the community’s support of the reef watcher program, and the relevant enforcement agencies, including DKP, the coastal police, the navy,⁷ and , the park guards (in the Taka Bone Rate National Park. By the end of the project, this model appeared to be functioning reasonably well, with successful arrests, prosecution and jailing of illegal fishers at both Taka Bone Rate and Padaido, and a reported reduction in illegal bombing and cyanide fishing.

20. At the national level, the social support for sustainable coral reef management was enhanced through a public awareness campaign. This involved numerous activities including two live national television shows, pamphlets, mobile displays at six national exhibitions, production of popular songs, radio and TV spots, teacher kits and training, on the job training and thesis support for university students, and contests and games for elementary school students. The quality of the campaign was recognized by its receipt of a Golden Quill Award from the International Association of Business Communicators in 2002, and its effectiveness was documented by before-and-after surveys in target areas. The high level of activities that continued following the completion of the consultant contract (in November 2002), a good indication of the sustainability of the campaign.

Physical Capital

21. The village grants associated with the CBM approach were mainly intended to provide community facilities, particularly physical infrastructure and productive equipment, in exchange for the communities’ participation in COREMAP and implementation of the CRMP. Thus, in Taka Bone Rate, twelve of the block grants were invested in village infrastructures such as community meeting places, clean water reservoirs and diesel-based electrification schemes.

22. The use of seed funds for the establishment of community revolving credit schemes also contributed to the creation of physical capital. The funds have been used by groups and individuals for a variety of purposes, including the purchase of nets and other fishing tools, establishment of small shops, seaweed culture, and fish transport and storage. The communities also agreed to use a portion of the proceeds (interest) from the seed funds to provide a modest fee for the reef watchers.

23. The MCS component also increased the physical capital available to the participating communities. For the two pilot sites, the project provided the MCS units equipment including speedboats, transport vessels, radar, radios, Global Positioning Systems (GPS), and cameras, as well as operational manuals, guidelines

⁷ In general, the coastal police have jurisdiction within 4 nautical miles (nm) of the coast, the DKP between 4 and 12 nm, and the navy beyond 12 nm.

and training. While most of this equipment is in the possession of the enforcement agencies, they have significantly added to the communications and transport options of the villages, which have no phone, radio or regular transport services.

Natural Capital

24. The impact of the project on natural capital is likely to be positive, but its scale is impossible to establish due to lack of coordination between the CBM and MCS activities funded by the Bank/GEF project, and the baseline surveys and impact monitoring arrangements. Basically, the mission found that:
- (a) *Lack of Integration Between Project Activities and Baseline Data:* The mission found that there was no correlation between the sanctuaries identified in the village CRMPs and the stations (line intercept transects) used for the reef health status baseline surveys. Without coordination between baseline observation stations, reef sanctuary locations, and control sites, it will not be possible to determine the impact of the COREMAP, even in the long term.
 - (b) *Incomplete Program Baselines:* A review of the baseline socioeconomic and biophysical surveys⁸ indicates that they did not include information about the fishing pressure being exerted in the waters surrounding the pilot sites,⁹ and about the quality of the coral reefs as a whole, rather than just at specific stations.¹⁰ Without such baseline data, the critical mass of scientific information needed to establish whether COREMAP will be achieving its expected benefits over time does not exist.
 - (c) *Inadequate Quality Control of Sanctuaries:* One of three sanctuaries inspected by the mission covered an area where the coral had already been destroyed. That is, it had no biodiversity value.¹¹ This again (see para. 27) points to weaknesses in the technical guidance provided by the local NGO, and in the technical review process of the PMOs.

8. The baseline socioeconomic and biophysical surveys were undertaken under a complementary project funded by the ADB and managed by the COREMAP PMO through the establishment of district and national-level Coral Reef Information and Training Centers, as noted in para 9.

9. E.g., such information as fish stocks, number of active fishermen; number, size and type of fishing vessels; type size and number of fishing gear used; fish species sought and caught, and market prices for different types of fish.

10. E.g., such information as species diversity, species distribution, identification of habitat types, and overall quality of the reef. There is also the issue that most of the line intercept transect stations were located at the reef edge, which tends to be the area richest in biodiversity, but do not constitute a representative sample of the coral reef as a whole.

11. In principle, a degraded site is not necessarily a bad choice for a sanctuary, as it can serve as a demonstration site for how quickly corals and fisheries recover following their closure. But given the absence of baseline data on the sanctuary such a rationale is not supported by the evidence. Rather, in the absence of technical guidance, it is quite possible that the community simply chose the site so they could benefit from COREMAP funds with minimum loss of fishing revenue.

25. This unsatisfactory state of affairs appears to be largely due to the PMO's having been managed by a part-time director for the first three years of the project, and it being organized along thematic lines, with assistant directors and technical teams responsible for MCS, CRTICs, CBM, and public communications for the entire COREMAP program, without geographical responsibilities. As a result, there has been a serious lack of integration between the CBM and MCS activities funded by the Bank/GEF, and the baseline surveys of reef and socioeconomic conditions funded by ADB.

Impacts on Wider Processes

26. The impact of the project on wider institutional, environmental and social processes has been substantial. The project supported the GOI's decision to designate the newly created DKP as the agency responsible for the equitable and sustainable management of coral reef resources, where there had been none before. The project also created the entire institutional framework needed to implement the program, including the national PMO, the district Pokjas, and the village community groups. While there are still areas for improvement, and there is a risk that some of the capacity will be lost in the transition from LIPI to DKP, and from Phase I to Phase II, this architecture is consistent with the institutional decentralization strategy of the GOI, replicable as COREMAP expands, and adaptable to local customs and circumstances.

27. The project also supported the strengthening of the legal framework for coral reef management through the preparation of seven drafts of legislation and twelve legal papers. The most important were inputs provided to DKP for the drafting of the revised Fisheries Act and the Coastal Zone Management and Small Islands Act. A major focus was the strengthening of provisions to curb illegal and destructive fishing practices (such as blasting and poisoning), and the clarification and coordination (cross-authorization) of enforcement jurisdictions in coastal areas. At the district level, the proposed legal reforms focused on the coordination of the enforcement of fisheries and coastal zone regulations and on securing user rights for coastal communities.

28. The full impact of the strengthened legal and policy framework for coral reef management is not evaluable at this time, since it has not yet been officially enacted, and the baselines and monitoring arrangements are incomplete. For the MCS component, indications are that enforcement pressure has increased. In 2003, the MCS program has been successful in apprehending and prosecuting ten violators in Taka Bone Rate and nine in Padaido. Other apprehensions have been made, but turned over to village authorities in the belief that the application of customary (*adat*) sanctions would be more effective than a jail term. For the CBM component, there is some evidence that the participatory CRMPs, village grant proposals and implementation and revolving fund credit schemes have strengthened community-based decision-making processes, and involved them in lobbying for community user rights with the district legislature.

29. The impact of the project is also reflected in the abandonment of plans for an oil refinery on Selayar, about 50 miles from Taka Bone Rate National Park. When a proposal to establish a 150,000 barrels per day refinery were announced in 1999, the Chairman of LIPI, on behalf of the COREMAP program, wrote to the President of Indonesia to inform him of the legal requirement for a prior environmental assessment (ANDAL), and of the need to involve COREMAP as a stakeholder. The COREMAP team invited the Bank to comment on the ANDAL, which it found to be seriously deficient. A year later, the refinery was reported to have been redesigned to comply with international standards for pollution control. Shortly afterwards, the proposed site for the refinery was moved to another part of Sulawesi.

LINKS BETWEEN LOCAL AND GLOBAL BENEFITS

30. The rationale for the project's support for the CBM approach is that the achievement of the global benefits, in terms of the protection of some of the most biologically diverse coral reefs in the world, is fully consistent with the pursuit of local benefits, in terms of enhancing the welfare of coastal communities. Nevertheless, it is useful to evaluate the robustness of the linkage by examining to extent to which the pursuit of global benefits may have affected the generation of local benefits and viceversa. This examination will focus on three areas of potential tension between the two: (i) development of COREMAP villages vs. alternative projects, (ii) environmental restrictions on village activities, and (iii) global benefits's dependence on sustainability of local benefits.

Development of COREMAP Villages vs. Alternative Projects

31. The choice of villages for development in line with the coral reef management strategy has to be justified in comparison with the local (and also global, where appropriate) benefits of alternative development projects. At the time of appraisal, this justification was underpinned with an unusually thorough and detailed economic analysis¹², which was updated for the (draft) appraisal of the phase II project (See Annex A). The benefits of conserving healthy coral reefs, in the form of sustainable fisheries, coastal protection (erosion control), tourism and recreation, were compared with those of reef-damaging activities, including poison and blast fishing, coral mining, sedimentation (from logging and mining), and overfishing that would be discontinued as a result of the COREMAP strategy.

32. The analysis also considered the cost of the project and the sensitivity of net benefit estimates to assumptions about fish yields over time, with will depend on the effective enforcement of the strategy. On this basis, the economic rate of return (ERR) for the Taka Bone Rate site is estimated as 19%, with a 'high' estimate of 49% and a 'low' one of 1%. The ERR for the Padaido site is 12%, with a 'high' of 23% and a 'low' of 1%. The ERRs were also estimated for four additional districts

¹² See Cesar, H. S. J., (1996): *Economic Analysis of Indonesian Coral Reefs*. Working Paper Series "Work in Progress", World Bank, Washington DC.

relevant for the COREMAP program, all of which, with one exception, yielded results greater than 10%.

33. In the view of the mission, the ERR methodology is exemplary and represents a model for other biodiversity projects, for which economic analyses have been sparse mainly due to the difficulty of obtaining adequate data. In face of the same difficulty, the project team searched the literature for applicable data and identified necessary and defensible assumptions. While some of the data and assumptions can be questioned, their strengths and weaknesses are transparently discussed in the PAD, and partially taken into account for the sensitivity analyses. Finally, since the ERR is based on local benefits, not including global benefits which by some estimates are an order of magnitude greater,¹³ it is concluded that the ERRs are conservative.¹⁴

34. Overall, the COREMAP strategy is economically justified and does not displace financial resources from alternative development projects, since, by and large, all of the ERRs for the sample of relevant districts were higher than the opportunity cost of capital of 10%. Thus, the pursuit of global benefits through the coral reef management strategy is fully consistent with the national economic development objective. In fact, COREMAP's focus on the conservation and sustainable development of coral reefs has the potential to yield returns substantially above those observed for other rural community development projects.

Environmental Restrictions on Community Activities

35. The CBM approach is also designed to provide for additional benefits from the implementation of village grant proposals for infrastructure and seed funds, which were reviewed to ensure compatibility with the CRMPs. Given the environmental screening of all proposals, there should be no conflict between the pursuit of global and local benefits.

36. The implementation of the COREMAP strategy was not, however, without costs at the community and individual level. Thus, the mission learned of some dissatisfaction from owners of equipment used for bomb and poison fishing (mainly air pumps) that could no longer be used. There is also some dissatisfaction from the resettlement of 12 families from Latondu Kecil island in Taka Bone Rate, following its designation as a reef sanctuary by the National Parks Department in 1998. These families still complain of being at a disadvantage as newcomers in the host community, of their traditional fishing grounds being no longer accessible, and of their (women) having to walk longer to their gleaning grounds. In the mission's view, these individual costs are amenable to compensation through the implementation of

¹³ See Ruitenbeek, J. (1999): *Blue Pricing of Undersea Treasures – Needs and Opportunities for Environmental Economics Research on Coral Reef Management in South East Asia*. Paper presented to the 12th Biannual Workshop of the Environmental Economics Program for South East Asia, Singapore, 11-14 May, IDRC, Singapore..

¹⁴ Regrettably, due to the inadequacies in baseline surveys and monitoring arrangements discussed in para 24, the Phase I project did not contribute any additional information to underpin the ERR estimates.

alternative income opportunities, as provided for in the CBM approach.¹⁵ However, it will be important to monitor and document the effectiveness of this solution, since such situations are likely to recur when the program expands.

Global Benefits' Dependence on Sustainability of Local Benefits

37. The success of the COREMAP strategy depends on the coastal communities' expectation of greater direct benefits from reef management than from the continuation of destructive activities. While the conceptual basis for this expectation has been presented in the economic analysis, its realization puts a high premium on the sustainability of benefits from CBM, which has yet to be demonstrated. This is not surprising, considering that the project was only designed to support the first ('Initiation') phase of a long term program, but points to a number of areas where urgent action is needed.

38. The fiscal and financial sustainability of the program cannot be evaluated at this time, since COREMAP's transfer to DKP and the district and village entities is still under way. While each of these entities has expressed an interest in the continuation of the program and a willingness to share in its costs, the adequacy of the budgetary provisions, particularly for the MCS component of the program, has not been established. At the community level, the continued operation of the revolving credit schemes appears to be consistent with local customs and capacities, but the electrification schemes are unviable and need to be replaced with more appropriate approaches.

39. The technical, environmental and economic sustainability of CBM cannot be evaluated in the absence of adequate baseline surveys and monitoring arrangements. Given the long time frame required for the expected benefits (in terms of reef health, village incomes, etc.) to materialize, these baselines need to be established as soon as possible.

INCORPORATION OF OPPORTUNITIES FOR GREATER GLOBAL AND LOCAL BENEFITS

40. The COREMAP strategy and the design of the project were unusually complex, as they needed to organize and empower widely dispersed and remote island communities in the absence of supportive legal, policy and institutional frameworks. The appraisal of the technical and economic aspects of the project was as thorough as could be expected, given the limitations of the scientific understanding of coral reefs, their interaction with local fisheries, and the nature of destructive threats. Nevertheless, based on the project's experience, it is possible to identify additional opportunities to enhance the incorporation of local and global benefits, which should be considered for future phases and projects.

¹⁵ These complaints came up towards the end of project implementation. In response, the project team has followed up to ensure that the GOI had taken the necessary actions to restore their living conditions at least to pre-resettlement levels, and to facilitate their benefiting from COREMAP's community development aspects.

Potential for Local Fisheries Development

41. The commercial and artisanal fisheries in the project areas appear to be far from being fully and efficiently developed, but the project has done little to examine how the local communities could extract additional benefits from the fishery resources around them. While the communities have been given full authority over village grant and seed funds, their decisions often have not been informed by adequate expertise on technical and commercial aspects. In light of the ample fishery resources in the project areas, the provision of additional expertise on technical and market issues to aid their sustainable development by the local communities would seem to be an area worth considering to enhance the local benefits of the program.

Potential for Renewable Energies Development

42. Three of the five Taka Bone Rate villages where CBM has been fully implemented chose to invest one of their three village grants in a diesel-based electricity supply system. While this choice reflects village priorities, it was clear to the mission that the electrification schemes have not been designed to adequate technical standards, and are not being managed in a financially sustainable way.¹⁶ The installations are precarious, unsafe, and certain to fail, and should not have passed the technical review process of the NGOs and PMOs. In light of the limited capacity of the villages to manage and maintain an electrification scheme, it would appear that simpler, more decentralized approaches, including solar photovoltaic home systems, should also be considered.¹⁷

Potential for Greater Empowerment of Participating Villages

43. Based on the experience of the project, there seem to be additional opportunities to pursue the COREMAP objective empowering the coastal communities as owners and managers of local reef resources. The potential to transfer further project responsibilities to the community level, and the need to supplement the village entities' sources of revenue present two directions that deserve to be pursued.

44. While the project has already engineered a major transfer of budgetary, development and enforcement responsibilities from the national to the district levels, the financial management aspects remains centralized, with extensive delays between community level decisions, district-level reviews, and central level approvals. This was the most important source of complaints noted by the mission. The need to address this issue would seem to offer the opportunity to transfer greater authority and responsibility for project implementation to the villages.

16. E.g., tariffs do not cover operating costs, and there is no provision for equipment maintenance, repair and replacement.

17. Some lessons may be learned from the experience with similar systems in remote Pacific island countries. See: *Solar Energy: Lessons from the Pacific Island Experience*, by A. Liebenthal, S. Mathur and H. Wade, World Bank Technical Paper 244 – Energy Series, Washington, 1994.

45. The sustainability of village support for the CBM and MCS components of the strategy will require greater attention to enhancing the communities' sources of revenue. The development of a user charge system that would enable the villages to collect and retain license fees from fishing boats, divers and tour operators would seem to be appropriate. Some such user charges already exist, but they are far from reflecting the economic value of the resource, and the revenues are sent to the central government.

KEY LESSONS

46. The main lessons that emerge from the experience of the project point to the need to proceed with caution with the expansion of the program in Phase II in order to allow workable and sustainable arrangements to be established for the implementation of the strategy, the integration of project activities with impact data gathering and monitoring, and the provision of technical guidance for community-based decision making.

Importance of Flexibility and Caution for Pilot Projects

47. As the pilot for a three-phase APL, the subject project was designed with ample allowances for flexibility and learning. Even so, the project required three extensions from its original completion date, and several key requirements for the success of COREMAP, such as the internal organization and implementation arrangements within DKP, the integration of project activities with data gathering and impact monitoring, and the provision of technical guidance to local communities, remain incomplete and untested. In addition, the sustainability of the CBM-centered strategy has not been demonstrated. This points to the need for flexibility and caution in regard to the expansion of the COREMAP program in Phase II, until the viability of the approach has been established.

Need to Integrate Project Activities with Impact Data Gathering and Monitoring

48. A major flaw in project implementation was the lack of coordination between the CBM and MCS activities and the baseline surveys and monitoring provisions carried out under a complementary project funded by the ADB. Without close integration between baseline surveys, sanctuary creation, and surveillance activities, it will not be possible to determine the impact and validate the rationale for the COREMAP strategy, even in the long term. This unsatisfactory state of affairs appears to be largely due to the PMO's having been managed by a part-time director for the first three years of the project, and it being organized along thematic lines, with assistant directors and technical teams responsible for MCS, CRTICs, CBM, and public communications for the entire COREMAP program, without geographical responsibilities. The ensuing lack of integration could have been avoided with the

assignment of managers with geographical responsibilities and the duty to ensure that the different components are effectively integrated at all locations.¹⁸

Need to Assign Full Time Staff for Project Implementation

49. The PMO's extensive reliance on part-time staff significantly reduced the ability of managers and staff to maintain control and direction over the technical aspects of the project, and encouraged a situation where most of the work was done by consultants and contractors with little integration with PMO technical staff. This contributed to significant delays in project implementation, inadequate integration between different project components and limited transfer of knowledge from consultants to national staff. These problems could have been reduced or avoided with the appointment of full-time staff for the implementation of the project.

Need to Provide Technical Guidance to Community-based Decisions

50. While community empowerment was a vital element of the COREMAP strategy, it can lead to poor decisions, as indicated by the findings about the quality of biodiversity in one of the chosen sanctuaries, the poor choice of sites and husbandry techniques for seaweed culture projects, and investments in unviable electrification schemes. The failure of the seaweed culture projects was particularly unfortunate, given LIPI's extensive in-house expertise in this area. This points to the need to ensure that community-based decision-making processes be informed by sound technical guidance to ensure that mistakes are avoided.

18. Another approach would be to have critical parts of the program funded by pooled funds, which would require close coordination between donors.

Annex A : Economic Analysis of COREMAP Program¹⁹

Coral reefs form the core of the livelihood for hundreds of thousands of Indonesian subsistence fishers, and a source of food security in times of agricultural hardship. They also provide a natural barrier against wave erosion, thereby protecting coastal dwellings, agricultural land, and tourism beaches. They are a potential source of foreign exchange from divers and other marine tourists. In addition, because of their unique biodiversity, they are of great interest to scientists, students, pharmaceutical companies, and others. These and many other functions give coral reefs an important and growing value. A recent World Resources Institute paper²⁰ estimated the potential sustainable annual economic net benefits of healthy reefs in Southeast Asia. The results per square kilometer of reef are given in Table B-1.

Table B-1: Potential Sustainable Annual Economic Net Benefits per km² of Healthy Coral Reef in Southeast Asia

<i>RESOURCE USE (DIRECT AND INDIRECT)</i>	<i>PRODUCTION RANGE</i>	<i>POTENTIAL ANNUAL NET BENEFITS (US\$) (RANGE)</i>
Sustainable fisheries (local consumption)	10 – 30 t	\$12,000 – 36,000
Sustainable fisheries (live fish export)	0.5 – 1 t	\$2,500 – 5,000
Coastal protection (erosion prevention)		\$5,500 – 110,000
Tourism and recreation	100 – 1000 persons	\$700 – 111,000
Aesthetic/biodiversity value (WTP)	600 – 2000 persons	\$2,400 – 8,000
Total (fisheries & coastal protection only)		\$20,000 – 151,000
Total (including tourism potential)		\$23,100 – 270,000

Source: Reefs at Risk in Southeast Asia (Burke et al. 2002)

Yet, despite their high potential values, the quality of coral reefs in Indonesia is declining rapidly. Even remote reefs in unpopulated areas are not free from man-induced deterioration. At the moment, only 29 percent of Indonesian reefs are in good condition (that is, with more than 50 percent live coral cover). In most areas, a variety of human-induced threats are responsible for the degradation of reefs. The relative importance and the type of threats vary tremendously by location. Powerful economic forces are driving the observed destructive patterns of coral reef use, often rendering short-term economic profits, sometimes very large, to selected individuals.

Measures for coral reef protection are often presumed to conflict with economic development, and are said to require a sacrifice of economic growth. However, this

19. This analysis has been prepared by Herman Cesar as Annex 12 of the PAD for the COREMAP Phase II project.

20. Burke, L., E. Selig and M. Spalding. 2002. Reefs at risk in Southeast Asia. World Resources Institute. 72 pp.

perception stems mainly from a failure to recognize the magnitude of costs to the present and future economy resulting from reef degradation. Table B-2 adapted from Cesar et al. (1997) shows the benefits to individuals and losses to society from each square kilometer of coral reef destruction, providing an economic rationale for preventive or remedial efforts. For coastal protection and tourism losses, both “high” and “low” scenario estimates are presented, depending on the types of coastal construction and tourism potential. “High” cost scenarios are indicative of sites with high tourism potential and coastal protection value. “Low” cost scenarios are indicative of sites with low tourism and coastal protection value.

Some of the most important values of coral reefs, such as those to future generations and intrinsic values, cannot be quantified. However, since the economic benefits from reef destruction often are used to justify continuation of these destructive practices, quantifying the costs associated with coral reef degradation is important to make a balanced assessment of the benefits and costs of various threats.

The analysis is mainly based on observable data, such as the value of the decline of fish catch or expenditures by hotels on infrastructure to temporarily prevent beach erosion. Total costs should thus be interpreted as rough estimates of the lower range of true costs associated with reef destruction. The numbers in Table B-1 are generated on the basis of available data, using hypothetical examples of sites subject to one individual threat.

Table B-2: Total Net Benefits and Losses due to Threats of Coral Reefs in SE Asia (Net Present Value²¹ in US\$ 000 per km²)

Threats	Net benefits	=====Net losses to society =====				
	Total net benefits to individuals	Fishery	Coastal protection	Sustainable tourism	Others (e.g. biodiversity)	Total net losses (quantifiable)
Poison Fishing	33	37	n.q.	3-409	n.q.	40-446
Blast Fishing	15	80	8-170	3-450	n.q.	91-700
Coral Mining	121	87	10-226	3-450	> 67	167-830
Sediment (logging)	98	81	n.q.	192	n.q.	273
Overfishing	39	102	n.q.	n.q.	n.q.	102

Source: Adapted from H. Cesar et al., “Indonesian Coral Reefs -- An Economic Analysis of a Precious but Threatened Resource,” *AMBIO* 26, 1(1997): 345-358.

Notes: -- n.q. = not quantified.

The data presented above are for Southeast Asia (Table B-1) and for Indonesia (Table B-2) as a whole. For the program, a cost-benefit analysis (CBA) was carried out for

21. The Net Present Value (NPV) provides a summary of the value of the resource, by aggregating annual benefits over a 20 year time period, but gives greater weight to the near future by using a “discount rate” of 10% per year, which means the current benefits of a future good is reduced by 10% for each year into the future.

the 6 target districts. The advantage of an analysis at a district level is the actual use of real site data, rather than having to rely on country averages.

The CBA at the district level captures the three main quantifiable benefits: fisheries, other local products derived from coral reefs and recreation/tourism. Program benefits are carried forward 25 years, which is the evaluation time horizon for the analysis. Below, the main assumptions behind the three main quantifiable benefits are presented and data are given for each of these benefits for each of the districts. Data on the category “other local products” were not collected locally, but instead come from benefit transfers from Ruitenbeek.²²

Main benefits are expected to come from the fisheries sector: the closure of reef areas is expected to stabilize yields compared to the “without program” scenario where yields are expected to gradually decline over time (see Figure B-1). The graph gives both a central case as well as a more optimistic and a more pessimistic case, to mimic the uncertainties regarding the benefits of no-take zones.

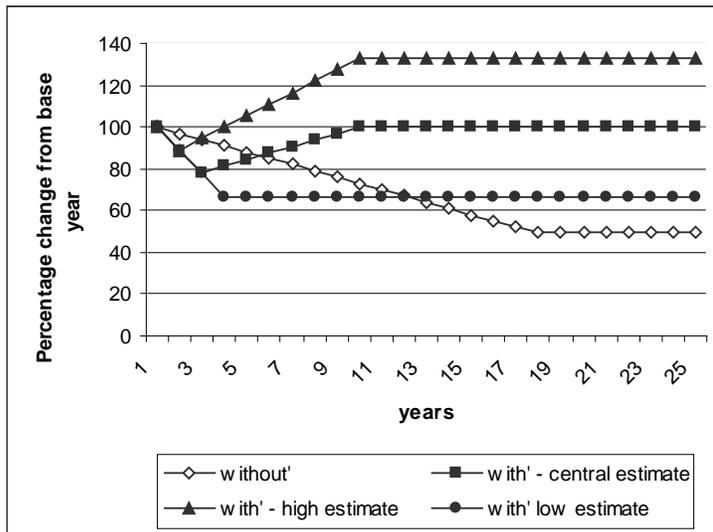


Figure B-1: Fisheries benefits assumed in economic analysis

The central estimate (Figure B-1) is in line with the recent literature on the economics of no-take zones, as summarized in Roberts et al. (2001). Village grants and associated alternative income generating activities are assumed to ensure that fishing pressure in the areas outside the no-take zones is not increasing with the closure of specific areas.

We have conservatively hypothesized that in the “central” estimate, the current yields will be maintained over time, after an initial drop due to the introduction of no-take zones. In the “without” program scenario, the fisheries benefits are supposed to

22. Ruitenbeek (2002) is basically Ruitenbeek's annex to the ADB COREMAP Project. There is no official quotation for it.

decline gradually over time to 50 percent of current levels. Due to lack of reef fisheries yield data, these data were calculated based on total reef area per district, local reef quality and assumed yields per level of reef quality. The latter ranged from 1 to 4. Levels were obtained per *kecamatan* based on expert judgment by consultant team members. It was assumed that a low level of 1 corresponded with a catch of 5 mt/km²/yr, while a levels 2, 3, and 4 corresponded with catches of 15, 25, and 35 mt/km²/yr, respectively. This was partly based on the literature ²³ and on expert judgment from the fisheries consultant in the team.

Table B-3: Cost and Benefit Estimates for the 6 program Districts

	Pangkep	Selayar	Buton	Raja Ampat	Biak	Sikka
District Program costs ^a	7.5	7.9	13.3	8.5	9.0	7.6
Fisheries Value (2003)	2.4	8.1	7.3	17.2	3.6	0.8
Local Products (2003)	1.5	4.4	5.6	5.2	1.7	0.5
Tourism Value (2003)	0.1	0.4	1.6	0.2	0.1	0.2
Reef Area (km ²)	374	1098	1402	1300	424	128
Reef quality index	1.8	2.0	1.6	3.2	2.3	1.7
Number of fishers	35,000	18,100	60,700	10,700	unknown	4,300

^aexcluding district Coral Reef Information and Training Centers.

Tourism levels were estimated for each of the districts. Tourism was assumed to increase at 5 percent per year in the “central” estimate based on the enhanced attraction of the area due to the marine parks and marine tourism parks in the districts. Benefit transfer was used to estimate “other local products” (Ruitenbeek, COREMAP-ADB, 2002). In order to arrive at actual value-added figures per year from tourism and fisheries, it was assumed that the average price of fish is 2750 Rp./kg and that value added in local fisheries is 80 percent of gross value (Cesar, 1996). For tourism, current expenditures on hotels and diving/snorkeling trips were collected for the six districts. Additionally, 50 percent was added for “other” expenditures of these tourists during their stay. It was assumed that net value of tourism is 40 percent of gross value. For fisheries and tourism, a multiplier effect of 2 (i.e., 100 percent) was assumed, given the large underemployment situation in each of the sites. The results are summarized in Table B-3.

The COREMAP program involves nearly 5,000 square kilometers of some of the most pristine reefs in Indonesia. Hence, apart from quantifiable benefits, there are a host of other benefits, such as global biodiversity. These have not been used in the estimates. However, an estimate by Ruitenbeek puts this level at US\$ 8.5 thousand per hectare, far more than the use values given in Table B-3 above.

23. McAllister, D. E., (1988) "Environmental, Economic and Social Costs of Coral Reef Destruction in the Philippines". *Galaxea*, Vol. 7, pp. 161-178.

The detailed BCA results for the base case are given in Table B.4 for the case of Buton. This indicates the annual benefit and cost streams associated with the program for the case of Buton. The resulting NPV at a 10 percent discount rate is US\$ 15.6 million while the economic internal rate of return (EIRR) is estimated at 18 percent in the base case. Other districts have similar patterns of annual costs and benefits.

Table B-4: Summary Table of Economic Analysis for Buton District (million US\$)

year:	1	2	3	4	5	6	7	8	9	10	25	NPV (10%)
Quantifiable benefits 'with'												
Fisheries	7.3	6.5	5.7	5.9	6.1	6.3	6.6	6.8	7.0	7.3	7.3	61.2
Local Products	5.6	5.0	4.4	4.6	4.7	4.9	5.1	5.3	5.4	5.6	5.6	47.3
Tourism	1.6	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	5.0	21.4
Net benefits AIG*	0.0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1.8
Total quantifiable benefits	14	13	12	12	13	13	14	14	15	15	18	132
Quantifiable benefits 'without'												
Fisheries	7.3	7.0	6.8	6.6	6.4	6.2	5.9	5.7	5.5	5.3	3.6	51.9
Local Products	5.6	5.4	5.3	5.1	4.9	4.8	4.6	4.4	4.3	4.1	2.8	40.1
Tourism	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	14.2
Total quantifiable benefits	14	14	14	13	13	13	12	12	11	11	8	106
Incremental benefits (25 yrs.)	0	-1	-2	-1	0	1	2	3	4	5	10	26
Intervention Costs (COREMAP Phase II)												
Buton COREMAP Phase II Costs	3.4	2.0	2.0	2.0	2.0	2.0	0.0	0.0	0.0	0.0	0.0	9.9
Net Benefits	-3.2	-2.8	-3.7	-2.8	-1.9	-1.1	1.8	2.7	3.6	4.5	10.1	15.6
EIRR	18%											

*AIG are Alternative Income Generating Activities.

The results from the cost-benefit analysis for the other districts is given in Table B-5. As is clear from the table, quantifiable economic internal rates of return range from 6 percent in Sikka to 21 percent in Raja Ampat. The differences can largely be explained from the relative size and health of the reefs in the different districts. As the benefits vary much more than the costs of addressing the problems, program management of the relatively smaller, less intact reefs has a much lower rate of return than larger, more pristine areas.

Table B-5: Economic Rates of Return for the 6 Program Districts ('central' estimate)

	Pangkep	Selayar	Buton	Raja Ampat	Biak	Sikka
EIRR 'central' (%)	11	19	18	21	12	6

The estimates are rather sensitive to the assumptions, especially those related to trends in fish yields over time. If the no-take zones are less effective, for example, because of illegal fishing in these areas, the rates of return drop significantly. This also highlights the importance of credible enforcement of the no-take zone regulations. See also the sensitivity analysis discussed below.

Program Beneficiaries: Over 100,000 fishers in the area are involved in reef-related fishing. These fishers will directly benefit from the activities under the program. Their incomes will be stabilized compared to the “without program” case where these would decrease with 50 percent or more over the coming 25 years.

Financial Analysis Results: Under program preparation, no separate financial analysis was carried out. However, under the ADB part of COREMAP Phase II, a detailed financial analysis was carried out and a financial internal rate of return (FIRR) of 16.7 percent was calculated for the alternative income generating activities among others.

Sensitivity Analysis: The estimates are necessarily rather sensitive to the assumptions, especially those related to trends in fish yields over time. If the no-take zones are less effective (for example, because of illegal fishing in these areas), the rates of return drop significantly. This also highlights the importance of credible enforcement of the no-take zone regulations. This is shown in Table B.6.

Table B.6: Economic Rates of Return for the 6 Program Districts ('central' estimate and sensitivity)

	Pangkep	Selayar	Buton	Raja Ampat	Biak	Sikka
EIRR 'central' (%)	11	19	18	21	12	6
EIRR high (%)	22	40	37	49	23	14
EIRR low (%)	Undefined	1	3	Undefined	1	Undefined

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