

**LINKING INTEGRATED COASTAL MANAGEMENT AND MARINE  
PROTECTED AREA DEVELOPMENT IN BERAU ISLANDS, EAST  
KALIMANTAN, INDONESIA**

**Keterkaitan Pengelolaan Pesisir Secara Terpadu dan Pengembangan Kawasan  
Perlindungan Laut di Kepulauan Berau, Kalimantan Timur, Indonesia**

Oleh:

Budy Wiryawan<sup>1</sup>

Diterima: 19 Januari 2008; Disetujui: 27 Juli 2008

**ABSTRAK**

Kawasan Konservasi Laut (KKL) sudah dikenal luas sebagai alat pengelolaan perikanan untuk mencapai pemanfaatan perikanan berkelanjutan. Paper ini akan menjelaskan proses pengembangan program ko-manajemen KKL di Kabupaten Berau, Indonesia. Kepulauan Berau terdiri dari 31 pulau-pulau yang sangat kecil, luas area 14000 ha dan memiliki keragaman hayati yang tinggi termasuk bakau, terumbu karang, dan lamun. Area ini merupakan rumah yang sangat penting bagi penyu hijau dan tempat berkumpulnya pari manta di Indonesia. Kajian cepat ekologi mengindikasikan bahwa terumbu karang di Kepulauan Berau membentuk sebagian dari "Coral Triangle" dalam mega keragaman hayati dunia. Ditemukan 872 spesies dari 287 genus dan 77 kerabatan ikan-ikan karang di area ini yang diamati atau dikumpulkan (Allen, 2003). Selain itu, ditemukan sekitar 460 hingga 470 spesies karang scleractinian hermatypic, 8 spesies lamun, 8 spesies cetacean, dan 26 tempat potensial bagi ikan memijah (Wiryawan et al., 2004).

Akhir-akhir ini banyak kegiatan yang berkaitan dengan pengelolaan pesisir telah diimplementasikan oleh beragam lembaga, baik pemerintah maupun LSM untuk melindungi dan mengelola sumberdaya laut dan pantai di kawasan ini. Akan tetapi, belum ada tindakan pengelolaan yang resmi sebagai tuntunan untuk integrasi program, mengelola sumberdaya pantai, dan untuk memecahkan permasalahan degradasi lingkungan. Kemitraan antar pemangku kepentingan diperlukan untuk mencapai upaya maksimal menuju ko-manajemen KKL yang diimplementasikan dengan baik di kawasan ini pada tahun 2009.

**Kata kunci:** Ko-manajemen, KKL, kajian cepat ekologi

**ABSTRACT**

*It was recognized widely that Marine Protected Area is a tool for fisheries management to achieve sustainable fisheries utilization. This paper will explain process of development of Co-management MPA program in Berau Islands, Indonesia. Berau islands consist of 31 very small islands that made of 14,000 Hectares and have high marine biodiversity including mangrove, coral reefs, seagrass. This area is an important home for green turtles and manta ray aggregation sites in Indonesia. Rapid Ecological Assessment indicated that the coral reef of the Berau islands forms an integral part of 'Coral Triangle' within Mega biodiversity of coral reefs of the world. It was found that a total of 872 species belonging to 287 genera and 77 families of reef fishes were observed or collected (Allen, 2003). In addition, total of around 460 to 470 species of scleractinian hermatypic coral species were recorded (Turak, 2003), 8 species of sea grass, 8 species of cetacean (Khan, 2003), and 26 potential fish spawning aggregation sites (Wiryawan et al, 2004).*

*Currently many activities related to coastal management have been implemented by various agencies, either government or NGOs to conserve and manage coastal and marine resources of this area. However, there is no formal management in action as a guideline for program integration, to manage the coastal resources and to solve environmental degradation problems. Partnership*

<sup>1</sup> Dept. Pemanfaatan Sumberdaya Perikanan, FPIK, IPB. Email: b.wiryawan@cbn.net.id

among key stakeholders is required to achieve maximum effort towards well implemented co-management MPA in this area by 2009.

**Key words:** co-management, MPA, Rapid Ecological Assessment.

## 1. INTRODUCTION

The Berau Islands is situated in East Kalimantan (Borneo) on the western side of Macassar Strait and at the nexus of two Indonesian Seas; the Sulawesi (or Celebes) Sea and the Java Sea. It stretches approximately 150 km along the edge of the continental shelf with the Berau Delta to the west and deep trench of the Straits of Macassar to the east.

The Berau Islands has a diverse and dynamic marine environment with numerous riverine, coastal and oceanic cetacean habitats in close proximity-including river deltas, mangroves, shelf and oceanic coral reefs, pelagic waters and seamounts as well as migratory corridors of ecoregional importance. The diversity of coral reef in the area is the second highest in the world. The largest population of green and hawksbill turtles and resident manta rays as well as the presence of the unique Kakaban Lake with stingless jelly fish are found in this unique area which also includes extensive seagrass beds (Tomascik et al, 1997). The delta of Berau River has one of the largest remaining mangrove systems in Borneo and harbours a large population of the endangered Proboscis monkey.

There are around 31 small islands, and only two of the islands are permanently inhabited. Berau and Maratua are the only islands with fresh groundwater and have populations of approximately 1.350 and 2.687 individuals respectively. These are predominantly ethnic Bajau who earn their living from fishing.

## 2. METHODOLOGY

### 2.1 Rapid Ecological Survey (REA)

Field surveys to the reef system consisted of six main islands (Panjang, Berau, Semama, Sangalaki, Kakaban and Maratua), a unique delta-front patch reef complex, fringing reefs and three atolls, have been conducted. The delta has one of the largest remaining mangrove systems in Borneo and home for endangered Proboscis monkeys. The area also includes extensive seagrass beds. Its high levels of biodiversity, large size and relatively good condition of the reefs and mangroves, the

large numbers of breeding turtles and resident Manta rays as well as the presence of the unique Kakaban Lake make the seas as one of the most important marine ecosystems in South East Asia.

The field surveys using REA is a system employed by TNC scientists to assess biodiversity in some of the most ecologically diverse regions on earth. Through the collection of data, scientists are able to determine areas of ecological importance and initiate conservation action. The main objectives of the REA are:

- 1) To produce data, maps, classifications, descriptions, and threats identification for management;
- 2) Generate baseline study for Marine Protected Area (MPA) development, baseline data for monitoring activities and contribute to the National inventory;
- 3) Characterize natural communities, provide descriptions listing key species, and assess their importance for conservation; and
- 4) Compare diversity among different subregions of the site.

The biodiversity of corals includes their habitats, communities, species and genetic composition. Reefs at 36 locations in the Berau area, East Kalimantan were characterized. Survey stations were selected to cover the fullest possible range of habitats and sufficient replication of possible habitat types. The area includes all reef habitats from Balikpapan reefs in the north and beyond which the Kayan delta restricts reef growth to the Bay of Seliman and the Kaniungan Reefs, the most southern reefs before Tanjung Mangkalihat, the most eastern tip of Kalimantan. As well as coastal and shelf reefs the three atolls, Kakaban, Maratua and Muaras were also included in the study. Employing participatory process, such as workshops of Participatory Conservation Planning (PCP) and Site Conservation Planning (SCP) of TNC, series of public consultations within almost of the 32 coastal villages have been conducted during 2003-2005 to identify community interest and to engage their participation in MPA development process.

## 2.2 Stakeholder Analysis

The profiling activity has been started by stakeholder analysis in mid 2003. The stakeholder analysis found that there are some institutions that are working in Berau islands with the same or different specific objectives. They have similar general objective that is increasing quality of live of coastal community through community development, economic development, institutional development, environmental recovery, or endangered species protection. These institutions have been doing the program for several years before The Nature Conservancy in East Kalimantan is started (Susanto and Wiryawan, 2003).

After information has been collected trough surveys and deskstop study, the Berau Islands profile is published as foundation for developing an MPA, which are containing

comprehensive 70 pages of information texts and 20 pages of biophysical and socio-economic thematic maps. Although, the profile is an imperfect document, while it is only accurate for the moment the information accepted as correct by all partners, however it has involved through a learning by doing approach more stakeholders in local level (Wiryawan et al, 2004). How these relationships develop in the remaining years of MPA program work in Berau is still unclear, there needs to be a continuing commitment to support from all parties already involved and the involvement of other important stakeholders in the search for a common vision for the establishment of large-scale marine protected area in this area, the zonation planning and management plan of MPA exercise scheduled for 2004-2008.

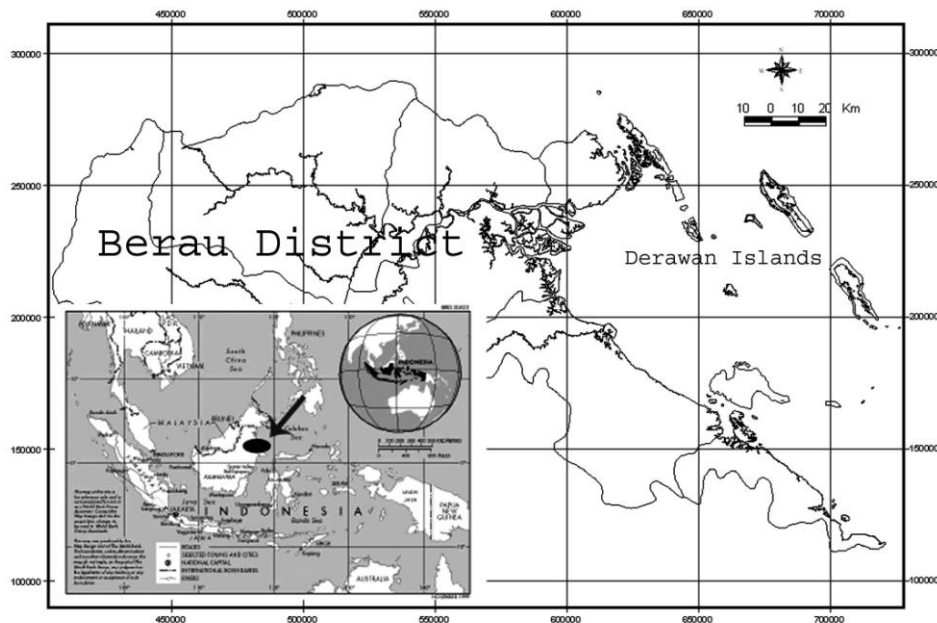


Figure 1 Berau district.

## 3. RESULT AND DISCUSSION

### 3.1 Marine Ecosystem

#### 3.1.1 Coral reef

A total of 413 confirmed scleractinian hermatypic coral species were recorded. An additional 61 possible other species will need confirmation following consultation with reference collections. With the confirmation of the additional species a final total of around 460 to 470 species from this study alone will put Berau Islands in second position, after Raja Ampat, in terms of highest hard coral species diversity in

the world. Highest species diversity was found on Muaras and Malalungun Reefs. Panjang Reef as a whole, including patches and reef complex to the west of the island, had the greatest habitat diversity. Although only two stations were sampled on it, Karang Besar reef complex possibly has a high diversity of reef habitat types (Turak, 2003).

#### 3.1.2 Reef fishes

The corals reefs of the Berau district forms an integral part of the Coral Triangle. During the present survey a total of 832 species

in 272 genera and 71 families were observed or collected. An additional 40 species, 16 genera, and 6 families were recorded from Sangalaki-Kakaban islands in 1994, bringing the overall species total of the area to 872. A formula for predicting the total reef fish fauna based on the number of species in six key indicator families indicates that at least 1,051 species can be expected to occur in the Berau region. Gobies (Gobiidae), wrasses (Labridae), and damselfishes (Pomacentridae), and wrasses (Labridae) are the dominant groups in the Berau region in both number of species (116, 104, and 101 respectively) and number of individuals.

### 3.1.3 Cetacean

There are 10 cetacean species (including 5 whale species) were identified in 27 sightings during 81.75 active visual survey hours (excluding time spend 'off-effort' while collecting data during sightings or time spend on training activities) over 10 field days. The survey distance covered an estimated 543.0 nautical miles. An estimated total of 856 individual cetaceans were counted during the species sightings. All cetacean sightings were odontocetes (toothed whales and dolphins-Suborder Odontoceti). Sightings included coastal as well as oceanic cetacean species. No baleen whales (Suborder Mysticeti) were observed, nor any beaked whale species (Fam. Ziphiidae). The cetacean species positively identified during the survey include (as ranked by decreasing sighting frequency): Spinner dolphin (*Stenella longirostris*), Bottlenose dolphin (*Tursiops truncatus*), Pan-tropical spotted dolphin (*Stenella attenuata*), Short-finned pilot whale (*Globicephala macrorhynchus*), Sperm whale (*Physeter macrocephalus*), Melon-headed whale (*Peponocephala electra*), Dwarf sperm whale (*Kogia sima*), Indo-Pacific bottlenose dolphin (*Tursiops aduncus*) (Kahn, 2004). In addition, survey on April-May 2004 found schooling of False Killer Whale (*Pseudorca crassidens*) and Fresh Water Dolphin (*Orcaella brevirostris*) (Wiryawan et al, 2005).

### 3.1.4 Sea Grasses

Seagrass ecosystem of Berau Islands growth optimally in fine-mud substrate, with water depth not exceeding 10 meters, a temperature around 28°-30 °C, salinity around 35 psu and an optimum current speed of 0.5 m/s. Seagrass meadows have an important role in coastal area dynamics. The important role of sea grasses in this areas are : (1) to provide primary production material and (2) nutrition

material for the green turtle, (3) to stabilize sea beds, (4) to provide protection for marine biota, (5) to act as a nursery ground for juveniles and (6) to serve as protection buffer for coastal areas. Seagrass survey in July 2003 found 8 species of Berau Islands seagrass, which are: *Halodule pinifolia*, *Cyamodocea rotundata*, *Syringodium isoetifolium*, *Enhalus acoroides*, *Thalassia hemprichii*, *Halophila ovata* and *Halophila ovalis* (Wiryawan et al, 2004).

### 3.1.5 Mangrove

Mangrove ecosystems in the Berau delta area have been traditionally and sustainably utilized by the local communities, especially for fishing. During the past 10 year however, mangrove forests has been converted to shrimp or fish pond. *Nypa fruticans* is the dominant vegetation that mostly converted to ponds, however mangrove species namely, *Bruguiera* spp, *Rhizophora* spp. and *Sonneratia* spp. have also been impacted from exploitation. Mangrove forest covered 53.500 Ha of the Berau delta in 1997, with aquaculture activities in mangrove ecosystems covering 450 Ha. In 1999 the area of mangrove ecosystems covered only 49.000 Ha. The average conversion rate during that time was 50 Ha per day.

### 3.1.6 Resources Uses

Fishing activities are the main livelihood for communities residing within the Berau MPA. Maps of fishing grounds indicate that fishing activities occur directly within the coral reef and mangrove ecosystems. Inventory of different types of fishing gear used within the propose MPA sites has been conducted by Joint Program. Many types of fishing gear operated within the area has been recorded, which are: a. Mini trawl, b. Trammel net (jaring gondrong), c. Danish seine (dogol), d. Hand line (pancing), e. Bottom long line (rawai dasar), f. Stationary lift net (bagan tancap), g. Boat operated lift net (bagan perahu), h. Reef gleaning (bekarang dan menanjuk), i. Nets/seine (jaring/pukat), j. Crab seine (jaring kepiting), k. Crab trap (ambo kepiting), l. Circular push net (mendaring/suit), m. Bottom pot (bubu), n. Barrier, fence, weir (belat/kelong/togo), o. Compressor hookah (menyelam), Blasting (penangkapan dengan bahan peledak). Within the Berau Subdistrict (kecamatan) located in the northern part of the Berau MPA, in the last two years there has been a rapid growth of bagan nets (stationary lift nets for harvesting anchovies) recorded by the District fisheries department. A recent count indicated that there were 334 bagan nets in the waters near the Berau Delta.

Aquaculture for shrimp and milk fish (*Chanos chanos*) has been practiced in the coastal area of Berau, with a significant number of shrimp ponds (tambak) in Batumbuk Village. The productivity of shrimp ponds in the Berau Archipelago is relatively low, with only 100 kilograms/hectare being produced.

Tourism is increasing as the Berau Archipelago becomes better known for its excellent diving. In 2003, there were about 1,000 to 1,300 foreign visitors to the region. The main islands for tourism are Sangalaki, Berau, Maratua and Kakaban. While infrastructure for tourism is currently poor, the potential for increased economic benefits as a result of tourism is very high.

### 3.1.7 Coastal Management Issues

In recent years, there has been growing research and political support to protect the resources of the Berau Archipelago. Early efforts date to 1982, and accelerating in 1998, with continuing research activities and workshops through the present. Both the central and regional governments have enacted a series of decrees to address conservation issues in the Berau Archipelago. Sangalaki Island is protected as a marine tourism park, and Semama Island is protected as a nature reserve, both established through the Decree of Ministry of Agriculture No. 604/Kpts/Um/1982. Also, Berau District recently developed a new spatial plan, codified as a perda in 2004, that uses three types of zonation for coastal and marine areas: conservation areas (*kawasan lindung*<sup>2</sup>), extractive zones, and non-extractive zones. All of the Berau islands are classified as conservation areas under the District's spatial plan. In addition, there is a newly issued decree by the District head, District Decree No. 70/2003, that establishes Kakaban Island as a regional marine protected area (*Kawasan Konservasi Laut Daerah* (KKLD)). The District head has also issued two decrees on sea turtle conservation. In 2001, the District head issued a decree calling for monitoring and surveillance of turtles, and in 2002, the District head issued a decree for protecting sea turtles and nesting sites on Berau and Sangalaki Islands, reversing a longstanding practice of turtle egg collection on

---

<sup>2</sup> Note that '*kawasan lindung*' is more properly translated as '*protected area*', but common usage provides for '*conservation area*.' The distinction is that the terminology under spatial planning does not provide for specific, defined protections, as compared with '*protected areas*' under other laws.

those islands. In 2004, District Advisory Committee for coastal management comprises representatives from government and non-government institutions has been formalized. This Committee promotes the establishment of Berau MPA and gives advices to the District Head related to the coastal management issues.

In addition to these laws and regulations, the national parliament enacted two major statutes in 2004, Law No. 32/2004 revising the original law on regional government and providing for authorities for regional governments to manage and conserve their marine jurisdictions, and Law No. 31/2004 revising the original law on fisheries, and providing strong mandates for conserving fisheries resources.

The concept of marine conservation has grown steadily in the consciousness of government decision-makers and non-government stakeholders. However, conservation efforts were constrained by resource limitations and the large geographic area of concern. In order to coordinate conservation efforts among several NGOs, and to promote efficiencies of scale by working together as a joint program, the Joint Secretariat was established through an Memorandum of Understanding (MoU) among government and non-government institutions.

The goal of the MoU is to promote partnerships among multiple stakeholders to protect biodiversity, while also ensuring sustainable marine resource use for the benefit of local communities. The specific objective was the establishment of a large, co-managed Marine Protected Area that includes extractive use zones, non-extractive use zones and fully protected (no-take) zones. The MPA is intended to accommodate multiple stakeholders and resource users.

In developing the concept for the MPA, the Joint Secretariat sponsored a series of workshops and meetings. Relying on similar workshops held in previous years, the Secretariat and stakeholders defined conservation priority areas, their threats and opportunities for conservation and restoration. Conservation priorities included protection of various ecosystems, including coral reefs, mangroves, seagrasses, marine lakes. Economic and special sites were also identified such as spawning aggregation sites, Pea Bay Ecosystem in Maratua Island, and Muaras sandbank. In addition, particular species were also identified, including reef fishes generally, turtles, mantas, cetaceans, Stingless Jelly Fish

(Cassiopea), hammerhead sharks, groupers, Napoleon fishes, and Coconut crab.

Based on the work of the Joint Secretariat, as well as the surveys and outreach efforts prior to the formation of the Secretariat, in July 2005, the Head of Berau District endorsed the concept of forming a large-scale, multi-use and multi-stakeholder MPA throughout the marine waters of the district, stretching across the Berau Archipelago. This concept was memorialized in the form of a decree signed by the District Head, which is just reviewed and approved by the regional parliament of Berau (Daerah Perwakilan Rakyat Daerah Berau) at the end of November 2005.

Vision The vision of the MPA is to protect marine biodiversity and to sustain coastal livelihoods in the Berau Archipelago. While, the overall strategy is to promote partnerships in order to improve the processes for decision-making among stakeholders, in the establishment and management of the Berau MPA.

### 3.2 Declaration of MPA and Joint Project

Expert Workshop on Delineating Coral Triangle in 2003 indicated that the Berau Archipelago lies within the functional seascape of Northeast Borneo, alongside ten other functional seascapes comprising the Coral Triangle. The marine waters of the Berau Archipelago are strongly influenced by the Indonesian Throughflow (the major tropical oceanic exchange current between the Pacific and Indian Oceans), as well as periodic deep-sea upwellings from the Sulawesi Sea, and major river outflows from East Borneo. The inter island passages between the major reef complexes and islands are governed by substantial tidal and ocean exchange currents ranging from 2-4 knots. This makes the KKL Berau a diverse and dynamic marine environment with numerous riverine, coastal and oceanic cetacean habitats in close proximity. These habitats including river deltas, mangroves, shelf and oceanic coral reefs, pelagic waters and seamounts, as well as migratory corridors of ecoregional importance. The Berau MPA and the larger Sulu-Sulawesi Marine Ecoregion shared by Indonesia, Malaysia and the Philippines, is widely considered by marine experts to have exceptional marine bio-diversity and is of global conservation significance.

Institutionalization of the Berau MPA has been initiated in order to make Berau Islands a permanent component of the Berau District Spatial Planning and National Program of Marine Protected Areas. A Steering Team of

MPA in the District level composed of multi-sectoral representative has been formalized on July 2004 following the Memorandum of Understanding between local government and Joint Marine Secretariat of NGOs. On March 2004, it was declared a Protected Landscape of Kakaban Island by Head of District decree. This protected Island of Kakaban consist of 700 Ha of conservation area, including the unique 'jelly fish' marine lake, forest and coastal waters of that island. The Kakaban island will be an important part of the Berau Islands MPA network, besides two islands which already protected by National Decree as Sangalaki Island Tourism Park and Semama Island Nature Reserve.

Undertaking a 'collaborative project' on the basis of it being a process, with any output from the 'project' being way-points in the overall development picture, necessitates two changes in perception from a traditional project: a. that the implementing joint team are only a small part of much bigger picture. The more encouragement / support that can be given to partners to achieve results and gain credit from the outcome, the greater the result of the project will be (share the glory/cater for the ego; b. Whilst it is almost always quicker easier and cheaper to do something by oneself, the "multiplier effect" of supporting other actors to undertake activities that share the same vision as a project will in the medium and long term far out-way the initial projects budget and success criteria.

### 3.3 Coastal Management Policy Cycle and MPA Development.

Protection of biodiversity will ensure sustainable marine resource use, including fisheries, for the benefit of local communities. The strategies pursuant to this goal will be arrived upon through the linkage of partnerships that have been created, and the objective will be achieved by establishing a large, co-managed Marine Protected Area that will include extractive use zones, non-extractive use zones and fully protected (no-take) zones.

A Marine Protected Area has been chosen for managing of coastal and marine areas of Berau; since it can accommodate multi-stakeholders, or users, to ensure sustainable use of the resources and maintain marine ecosystems to be resilient from future pressures such as global warming.

The ecological assessment as issues identification in the coastal management, using spatial information can give recommendations for decision makers and stakeholders include

zoning as an integral part of a management plan. It is believed that working together as a network will achieve better outputs than working for conservation individually, given the limitations of resources, and that the area of coverage is large. A partnership program has been established in July 2004, through a Memorandum of Understanding (MoU) among government and non-government institutions. Since 2004 a joint secretariat of the Non Government Organizations (TNC/WWF/CRMP II/Kehati/Bestari-Kalbu) have been established as one of the implementations of that agreement.

All parties share a long term vision which is to conserve marine biodiversity as a marine resource base for local communities in the waters and coastal areas around the Berau islands. This will be achieved by working through partnerships to establish a large, co-managed Marine Protected Area (MPA) that includes extractive use zones, non-extractive use zones and fully protected no-take zones. The five main programs as implementation of the policy cycle of coastal management that will be embedded into outcomes of collaboration are:

**1) Design and development of an MPA management plan (2004-2005);**

The first step is the identification of a policy and legal framework to develop and establish the MPA, and to clarify authorities and responsibilities for the various government agencies and stakeholders in establishing and managing the MPA. This has been accomplished by the Joint Secretariat, although many issues remain in flux as the central government is currently in the process of drafting a series of regulations to implement the recently enacted Law No. 31/2004 relating to Fisheries. At the same time – and to be grandfathered in to the preexisting framework notwithstanding any future regulations — the District head has approved by decree the establishment of the MPA and identified its outer boundaries, including a total marine and coastal area of 1.2 million hectares, including mangrove habitats along the shoreline, small islands, and seaward from the shoreline to 4 nautical miles, which is the limit of district maritime jurisdiction under Law No. 32/2004. This area also tracks the boundary of the District of Berau as provided in its Spatial Plan of Coastal Area.

**2) Education and outreach (2004-2006);**

The Joint Secretariat sponsored many activities to explain the concept of MPAs and MPAs to government agencies, user groups and conservation organizations to gain support for the establishment of a large Marine Protected Area in the coastal villages. These activities included workshops, consultations, seminars, meetings, cross-visits to other MPAs and MPAs throughout Indonesia, This approach will help to ensure that the collaborative, co-managed and regionally-based Berau MPA is different from the old paradigm of centralized National Parks.

**3) Establishment of management authority (2005-2006);**

Also essential is the formation of a management committee/authority for the Berau MPA. The management authority should include government agencies, representatives from user groups and conservation organizations. Under the umbrella of the management authority, different zones within the MPA may have different forms of management among government agencies, user groups and conservation agencies.<sup>3</sup>

**4) Development of an MPA zonation plan (2006-2007);**

Once the MPA is formally declared and the management authority formally established, the management authority can prepare a draft Zonation Plan. This Plan should be based on the scientific findings of the Rapid Ecological Assessment and other surveys, and on public consultations and stakeholder participation. The Zonation Plan should consist of core protected zones (no-take zones), buffer zones, and use zones. The proposed core zone would be selected based on scientific information in order to meet ecological benefits without conflicting with other use zones. Other zones would address local needs, and could include locally managed zones.

**5) Development of an MPA management plan (2007-2008); and**

Once the management authority is formed, it should also begin preparation of a management plan that will address all aspects of administration and management of the MPA, including general administration and decision-making, regulatory measures, outreach programs, monitoring and evaluation, and budget and financing.

#### 6) Financial sustainability (2008-2009)

Once the MPA is functional, with a management structure, a zonation plan and a management plan, the management authority can then explore ways to ensure that the MPA becomes financially and economically sustainable. This would require an increase the diversity and reliability of funding sources to support the Berau MPA and conservation programs within the MPA.

#### 4. CONCLUSIONS

REA activity is an important step in designing of an MPA in order to generate baseline data, maps, classifications, descriptions, and threats identification for management. The REA result indicated overall hard coral diversity in Berau Islands was very high and with the confirmation of the added species, this area may prove to be the second richest area for hard corals in the Indonesian archipelago (and the third of the world) after Raja Ampat in Papua and Solomon Islands.

Currently many activities were implemented and are being implemented by various agencies either government or NGOs to conserve and manage coastal and marine resources of this area. Unfortunately, so far there is no formal integrated management in action as a guideline for coastal and marine program of Berau District.

A collaborative joint program among government and non-government partners was initiated in early 2004, and was formalized in May 2004 with the establishment of the Berau Joint Marine Secretariat. The Secretariat was established through a Memorandum of Understanding among the District of Berau and TNC, the World Wildlife Fund (WWF), the Coastal Resources Management Project II (CRMP II/Mitra Pesisir), Kehati, Bestari and Kalbu. This consortium shared administrative responsibilities, developed a joint work plan, and coordinated marine conservation activities in Berau. This included the development of a decree signed by the Regent to identify the outer boundaries of a marine conservation area for the Berau Islands. All parties share a long term vision which is to conserve marine biodiversity as a marine resource base for local

communities in the waters and coastal areas around the Berau islands. It is believed that working together as a network of collaboration will achieve better outputs than working for conservation individually, given the limitations of resources, and that the area of coverage is large. Further steps following the coastal management policy cycle need to be followed up after Berau MPA has been declared.

#### REFERENCES

- Allen, G.R. 2003. Coral Reef Fishes of Berau, East Kalimantan. TNC Consultancy Report. The Nature Conservancy, East Kalimantan.
- Green, A and P.Mous. 2003. Proceeding of Expert Workshop on Delineating Coral Triangle. South East Center for Marine Protected Area. The Nature Conservancy.
- Kahn, B. 2004. Berau Archipelago Rapid assessment visual and acoustic cetacean and training program. Technical Report The Nature Conservancy. The Nature Conservancy, East Kalimantan.
- Susanto, H.A.. and B. Wiryawan. 2003. Stakeholder analysis for marine conservation activities in Berau Regency, East Kalimantan. TNC Report. The Nature Conservancy East Kalimantan.
- Tomascik T., Mah AJ, Nontji A, Moosa MK, 1997: The Ecology of the Indonesian Seas. Periplus, Singapore.
- Turak, E. Rapid ecological assessment of Coral reef ecology of Berau Islands. 2003. The Nature Conservancy Report. The Nature Conservancy East Kalimantan.
- Wiryawan, B, S. A. Stanley, I. Yulianto H. A. Susanto. 2004. Profil Kepulauan Berau. Kerjasama The Nature Conservancy dengan Pemerintah Kabupaten Berau dan UNOCAL. East Kalimantan.
- Wiryawan, B, M.Khazali, M.Knight. 2005. Menuju Kawasan Konservasi Laut Berau: Status Sumberdaya dan Proses Pengembangan. Kerjasama Pemerintah Kabupaten Berau dengan Mitra Pesisir-TNC-WWF.