CHARACTERIZATION OF MANGROVE AREAS AND PROFILE OF HUMAN ACTIVITIES IN SELECTED BARANGAYS OF SANPASADA

IN COLLABORATION WITH

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Policy Recommendations on Management of Mangroves within Communities: The Case of SANPASADA

For the past decades, the Philippine fisherfolks have been experiencing declining fish catch. Many coastal communities are also experiencing displacement due to storm surges in their areas.

A major contributor to these problems is the disappearance of our mangrove forests. In 1995, it was recorded that there were only 117,000 hectares of mangrove forests left from a high of 500,000 hectares a century ago. Mangrove forests have been converted to fishponds, used indiscriminately as firewood and as a resource for housing construction as well as for other uses.

With the disappearance of the mangrove forests, breeding grounds of fishes were destroyed and the disappearance of natural wave barriers left communities vulnerable to storm surges. While national laws were enacted in the 1990s to protect and restore the mangrove forests, communities within the mangrove forests remain.

Davao Gulf is one of the productive fishing grounds of the country but it too has been experiencing diminishing fish catches. As in other parts of the country, the introduction of aquaculture programs opened the clearing of mangrove forests for fishponds growing prawns and milkfish in Panabo City and Sta. Cruz. In recent years, the coastal communities of Davao City and Sta. Cruz have been affected during the monsoon season.

To evaluate the impact of human settlements in the mangrove areas, there is a need to study the relationship between the mangrove forests and the human settlements in the SANPASADA area to come up with recommendations that would ensure the restoration of the mangrove ecosystem.

Study Objectives

Last 2005, a group of researchers from the University of the Philippines, University of Mindanao, University of Immaculate Conception, University of Southeastern Philippines and local government units (LGUs) conducted a research aimed at establishing the relationship between the coastal population and the remaining mangrove stands in the Davao Gulf area. Specifically the study focused on the Metro Davao area comprising of the following LGUs: Sta. Cruz (SAN), Panabo City (PA), Island Garden City of Samal (IGaCoS) (SA) and Davao City (DA), also known as SANPASADA. Eight barangays were selected to provide a representation of the area.

Socio-economic data on the communities living in the mangrove areas and their social acceptability of existing policies were determined. The status of the mangrove stands, water quality within the selected communities current utilization of mangrove stands community activities and participation in mangrove sustainability programs were also assessed.

Study Sites

The study examined two barangays for each of the local government units mentioned. The local government unit's technical experts were consulted in identifying one barangay with good mangrove cover and another barangay with a high risk in losing its mangrove forests.

For barangays with good mangrove forest covers, Barangay Bato in Sta Cruz, Davao del Sur was selected. It has 30 hectares of mangrove forests comprising 24% of the total mangrove area of the municipality. Barangay JP Laurel of Panabo City and Barangay Tambo of IGaCos were selected to represent their LGUs. In Davao City, Barangay Lasang was selected. It has 20 hectares of thick reforested mangrove forest.

For the areas where mangrove forests are designated as a high risk, the selected barangays were Zone 1 of Sta. Cruz, Davao del Sur; Caganguhan of Panabo City; Cawag of IGaCoS and 76-A Bucana of Davao City. These mangrove areas have experienced land use conversion and deforestation during the past decades. Most of these barangays are in close proximity of the city center. Barangay 76-A Bucana especially is a densely populated area due to its designation as a human settlement reclamation site.

Mangroves and their importance

Mangroves belong to a higher group of plants which may exist as a tree, shrub, palm, herb or fern. They dominate in the intertidal areas of tropical and subtropical shorelines which are always subjected to salt water conditions, floodwater or wet anaerobic mud or soil conditions (Primavera 2004).

Majority of the true mangrove species are found in the intertidal habitats or where tidal inundation occurs, whereas associate species may be distributed above high-water line in beach forests close to mangroves or beyond the inner landward boundary of mangroves. The natural distribution and abundance of mangrove species is limited by the hydrodynamics of tides to disperse propagules or seedlings (Primavera et al. 2004).

They have tough root systems, special bark and leaf structures and other unique adaptations to enable them to survive in harsh and salty habitats which have soft and silty substrates coupled with endless ebb and flow of water providing support for mangroves which have aerial or prop roots known as pneumatophores. While mangroves thrive on muddy soils, they also grow on sand, peat and coral rock. If tidal conditions are optimal, mangroves and associate species can flourish far inland, along the upper reaches of the coastal estuaries. Mangroves vary in height according to species and environment, from mere shrubs to 40-meter trees.

Importance of mangroves in the ecosystem includes provision of erosion control through silt entrapment (Salmo III 2005), flood regulation (Primavera 2005), waste treatment capability (White and Trinidad 1998; Melana et al. 2000), disturbance regulation, raw materials production, and nutrient recycling (DENR Anon.) and food production (Mann 2000). The role of mangroves may be gleaned from Melana's 2000 study that said the loss of significant functions of mangroves may result in fish kills and harmful algal blooms. Mangroves house species that could serve as biological indicators (Primavera et al. 2004) of the said ecosystems. As such, mangroves provide wildlife habitat for many organisms including nursery for fish or shellfish (DENR Anon).

As mentioned, mangroves are rich tropic marine biodiversity regions in the world with a potential high economic value of $50,000/km^2/yr (Schatz 1991). They are known to provide 3.65 tons of litter per hectare in a year to the coastal fishery (DENR Anon). This litter serves as food for various marine life within and near the mangrove areas.

Relationship of Mangroves and Human Settlements

The relationship between the population and the carrying capacity of the environment has always been a delicate issue. It has been observed that when local population grows where there is a lack of access to good residential lands, settlers tend to illegally occupy the foreshore areas that are deemed public lands. This situation puts them in conflict with the mangrove forests in the area. The mangrove stands of the country were largely diminished due to the conversion of mangrove forestland for fishpond operations and residential areas of illegal settlers. This massive conversion however has impacted on the very livelihood that these shoreline communities depend on – fishing. The loss of the mangrove ecosystem has resulted in the loss of breeding grounds and habitat for some of the marine fishes. This

further exposes the vulnerability of these communities to the elements of nature as well as poverty.

Summary of Research Findings

1. Of the eight barangays included in the study in the SANPASADA area, there was a total of 21,899 mangrove trees covering 69 hectares. This translates to an average of 402 trees per hectare.

2. In the SANPASADA areas, ten mangrove species were identified. This include five true mangrove species: (*Sonneratia alba, Avicennia marina, Rhizophora apiculata, Rhizophora mucronata* and *Avicennia officinalis*) and five associate mangroves (*Hibiscus teliaceus, Morinda citrifolia, Dolichandrone spathacea, Premma odorata* and *Nypa fruticans).*
    a. Mangrove species that were seaward-oriented were found lacking in areas that were high risk in deforestation.
    b. Mangroves species were more diverse in areas that had low risk of exploitation.
    c. *Sonneratia alba* was the most widely distributed true mangrove species in the entire SANPASADA followed by *Rhizophora apiculata* and *R. mucronata*.

3. The results of the Biochemical Oxygen Demand (BOD) showed inconsistency. The BOD of two barangays in good mangrove areas were below the lower limit of 7mg/L while one was near the boundary limit. In contrast, only one barangay considered as high risk mangrove area was below the lower limit. The observed lower BOD levels in those areas were due to high input of organic matter. High organic matter increases biological activity that eventually leads to anaerobic decomposition thereby depleting the dissolved oxygen in the area.

4. High values of coliform count appear to be present in all areas except IGaCoS. Presence of coliform indicates that the water is

contaminated with fecal matter. An average of 40% of the households communities living in mangrove areas do not have access to sanitary toilets. This may indicate the lack of good sanitary practices in communities living within the mangrove areas. This poses a health risk to people living in the area.

5. An average of 53% of households of SANPASADA communities living within mangrove areas depend on fishing as their main livelihood. If further destruction of mangrove forests is to continue, it will result in smaller fish catch, thereby affecting the income of the majority of the population.

6. SANPASADA communities in mangrove areas with good stands gather more products within the mangrove areas than those in communities with diminished stands. This shows that local communities can benefit from the by-products of a healthy ecosystem of mangrove stands.

7. Communities in diminished mangrove areas within the SANPASADA fished farther out from shore. This is a reflection of breeding grounds gone. The lesser mangroves, the lesser fish there are; therefore the fisher folk must seek other areas with high fish densities.

8. Mangrove deforestation was contributed mainly by mangrove areas converted into fishponds and reclaimed for road construction, cutting of timber size mangrove trees for the construction of houses and for charcoal making.

9. Majority (75%) of the residents settled within mangrove areas because it remained as an “open access area” despite the existence of laws. In most cases, existing laws. In most cases, existing laws are not enforced due to the absence and/or lack of enforcers.

10. In terms of awareness in preserving the mangrove forest, majority (93%) of the community households were keen in protecting and conserving the mangroves. They have shown this by participating in mangrove planting activities within their community. Further, majority of the community claim that they are aware of the national laws and local ordinances for the protection and conservation of mangroves.

Recommendations

- **An integrated SANPASADA comprehensive mangrove management plan must be formulated to enable each LGU to be a co-manager of their common resources.**

  Prior to the formulation of the mangrove management plan, the LGU must establish partnership with DENR as embedded in the Joint Memorandum Circular (JMC) No. 98-01 and JMC 2003-01. The output of this partnership is a joint Memorandum of Agreement (MOA). The major activity to be implemented under the MOA is the formulation of the mangrove management plan which is an integral part of the coastal resource management (CRM) plan. Under this plan, various zones can be established but not limited to protection, production, aquaculture and settlement zones. The mangrove management plan will be managed by the project management office under the supervision of the multi-sectoral based Steering Committee chaired by the Local Chief Executive and co-chaired by the DENR. In drafting the plan, all sectors will be involved and will be empowered to effectively manage and protect the mangroves within their communities.

  The mangrove management plan must be approved through a resolution and ensuing enabling ordinances including the ordinance on revenue generation that will be enacted for each of the zones identified. Some examples of activities to be conducted in each zone are as follows:

Protection or reserve zone. This is strictly a “no take zone”. No form of activity under this zone is allowed except re-planting of mangrove species suitable to the area, and for education and scientific purposes. There must also be no settlers in this zone.

Revenue generating zones (production, aquaculture and settlement zones)

Production zone or multiple use zone. The entire area must be replanted with mangroves (i.e., particular species for seaward, middleward, landward and riverine fringe zones) which can later serve as aquasilviculture, source of timber and charcoal, and for other needs of the community including the mangrove nursery area. Seedbanks and nurseries for the present and identified potential mangrove species must be established. Buffer zones as well as close and open seasons for fishing ought to be designated.

Aquaculture zone. This is the zone intended for culturing of bangus, tilapia, prawn and others not previously awarded by fishpond lease agreement (FLA). Abandoned fishponds with lease agreement that already reverted back to DENR can fall under this zone.

Settlement zone. This identified area will be dedicated for settlement. Each settler will be allotted a space where they can build their house following the regulations stipulated in the settlement zone ordinance.

- **Provision of alternative land-based livelihood programs to reduce the stress on the coastal resources**

Land-based sustainable, livelihood opportunities and even vocational courses must be introduced to enable people to find new, alternative economic opportunities to lessen the stress on the coastal resources.

- **Increase environmental consciousness of the local population on the benefits of the mangrove ecosystem.**

  While the consciousness of the SANPASADA coastal communities on the local laws and importance of mangroves is high, there is still a need to integrate coastal resource management (CRM) in schools through the Department of Education (DepED) and CHED. This should be approached both by theory and field exposure trips to mangrove forests and the adjacent marine habitats. Similarly, local stakeholders must be empowered to implement national and local ordinances to protect mangroves.

- **Increase productive collaboration and open communication among LGU's, academic institutions, settled communities in mangrove areas, and development-oriented organizations.**

  Settlers in mangrove areas must be empowered to manage their coastal environments through massive information and education campaign on proper waste disposal, population control, coastal cleanup, tree planting and pertinent coastal resources management activities.

- **LGU's to manage population and development programs properly by taking into consideration the costs and benefits of converting mangroves into industrial or agricultural areas with due consideration to the ecological roles they play.**

  Apart from the socio-economic and environmental considerations, ,it is suggested that the bases for the implementation of programs are pertinent research or science-based information. Issues that threaten the mangrove ecosystem such as proliferation of dwelling places and fishponds must be constantly addressed.

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