THE COASTAL ZONE MANAGEMENT IN ADAPTING TO CLIMATE CHANGE:

A case of Manterawu Island, North Sulawesi, Indonesia

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Overview

Introduction

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Introduction

Climate change is any long-term significant change in the “average weather” of a region or the earth as a whole. This change may be caused of the dynamic processes in the earth, external forces including variations in the climate outside the sunlight intensity and no less important result of human activity itself. Global temperatures increasing accelerate the historical rate of global mean sea-level rise from 1 to 2.5 millimeters per year to about 5 mm/yr (50 cm/century).
Introduction cont’d

Small Island in Indonesia Consist of 92 the most outer islands, including Manterawu Island.
Small islands are among the most vulnerable to climate change impacts.
Small Islands characteristics:

- Limited natural resources
- Concentration of population, socio-economic activities, and infrastructure along the coastal zone
- High susceptibility to disaster
- Dependence on water resources for freshwater supply
- Relative isolation and great distance to major markets
- Extreme openness of small economies and high sensitivity to external shocks
- Generally high population densities
- Inadequate infrastructure
- Limited physical size
- Insufficient financial, technical and institutional capacities
Center for Marine Resources Surveys – National Coordinating Agency for Survey and Mapping (PSSDAL – BAKOSURTANAL) conducted several surveys in several small islands.

The main goals: carry out inventory and mapping of natural resources as well as the compilation of primary data and secondary of ecosystem in small islands.

What we get?
The information about:
1. Physical: Land (soil, geology, and hydrology);
2. Social: demography and people behavior (culture);
3. Ecological (natural resources)
small islands directory (UNEP)
Objectives of this study

- to describe the main problem of Manterawu Island management related to climate change
- to estimate the inundate area of Manterawu Island due to the sea level rise
- to adapt and mitigate facing the climate change and/or sea level rise problem in Manterawu Island
Study Area

• Located in the Sulawesi Sea, coordinate 1° 45’ 47” N, 124° 43’ 51” E and bordered by the country the Philippines
• It has two seasons: west season (October – March) and the eastern season (May – August), the rainfall average 3000 – 3500 mm / year.
• The closest city can be reached within 1 hour 15 minutes by motor boat.
• This island has a 1,894 peoples which consists of 983 men and 911 women and
• consists of four ethnic groups, namely Sangihe Talaud, Bajo, Minahasa and Gorontalo.
Method

- **Preliminary stage**, including literature review, secondary data collecting, pra survey to get the early information of study area particularly the information about accessibility and accommodation and image processing (geometric correction, atmospheric correction, enhancement, interpretation / classification.

- **Implementation stage**, including Field survey to achieve the information about land (soil, geology, and hydrology), demography, people behaviour as well as culture in those small islands, and also natural resources found in those islands, such as mangrove, coral reef and reef’s fishes, and seagrass. Field survey was conducted by the Centre of Marine Resources Surveys in June 2007.
- **Final stage**, including re-interpretation of remote sensing data, data analysis (some alternative options for Manterawu Island due to climate change.) and reporting
Analysis & Result

- Problem of Manterawu Island
- 3-D analysis
- Proposed Adaptation and Mitigation due to Climate Change on the Manterawu Island
Problem faced Manterawu island

- Mangrove ecosystem: mangrove ecosystem in this region is very vulnerable to damage and very difficult to do re-establishment, this is due to the occurrence of abrasion, very poor of mangrove growing media (less of the mud), and strong sea waves during the west and east season which drift the young mangrove. In addition, there is a significant increasing of mangrove exploitation as the high demand of wood and land clearing for the pond.

- Coral reef ecosystem: the coral reef spread around the island Manterawu, The condition is vary from excellent to poor condition. But in general, the water condition of Manterawu Island is still good; hence it is still support the growth of coral. However, it is necessary for the community and local government to prevent this coral reef from destruction. The implementation of law and the awareness of local people should be improved.

- Seagrass ecosystem: this ecosystem along with mangrove and coral reef ecosystem make a harmonized coastal process. This ecosystem is spread around the island Manterawu, but the most large distribution is the western island. In general, Manterawu Island has a mix species (mixed species Meadows). This ecosystem is still good condition.

The problems faced Manterawu Island, in the next years it is very important to take a appropriate actions to overcome it.
The profile of coastal ecosystem of Manterawu Island
Land cover, mangrove, and coral reef map:
3 – D analysis

Manterawu island consists of two separate islands. When viewed from the height of the northern part to the southern part, the northern part of this island is relatively flat (between 0 - 2.5 m above sea level) and in the southern part is relatively higher with range between 10 - 27 m above sea level (profile 1). The altitude of entire island is between 0 - 7 m above sea level (profile 2).

Based on the result above, the main island Manterawu will not be lost because of sea level rise, at least until 2100. Area with a height of up to 1 meter (mangrove area) will inundated by the sea water around year of 2050 with the assumption of an average sea level rise is 2 mm per year. However, local governments must remain aware of the occurrence of sea level rise face as the effects of climate change, especially related with the sustainability of coastal ecosystems (coral reefs, mangrove, and seagrass).
Proposed Adaptation and Mitigation due to Climate Change on the Manterawu Island

• adaptation is very essential in the climate change issue. Related to the impacts and vulnerabilities assessments and the other; related to the development and evaluation of response options.

• some alternatives adaptations to minimize the vulnerabilities as well as maximize the capacities found, such as: Hard Structure / Hard engineering; Soft Structure and Integrated Coastal Zone Management (ICZM) – integrated, sustainable coastal zone resource. (This ICZM approach observes small islands as an environment and could not be separated from its physical and biological condition. It can be regarded as both an anticipatory and a predictive tool, with the capability to plan for and respond to medium- and long-term concerns and provide an effective framework for resolving potential conflict among competing stakeholder.
RECOMMENDATION

- the climate change and its effects cannot be prevented entirely. However, we need to do some adaptations due to climate change in order to minimize the impacts of this issue.
- government, both in national and local level should cooperate to carry out some strategies to deal with this problem. The best strategy to overcome climate change is using the combination of top-bottom management and bottom-up management which included people’s knowledge in risk management. In addition, government should implement and develop the legal aspect in order to reduce the illegal fishing; otherwise people will keep doing this and it could cause environmental degradation in Manterawu Island. Under these circumstances, progress in adaptation to climate change will almost certainly require the integration of appropriate risk reduction strategies with other sectoral policy initiatives such as sustainable development planning, disaster prevention and management, integrated coastal management, and health care planning.