PART ONE:
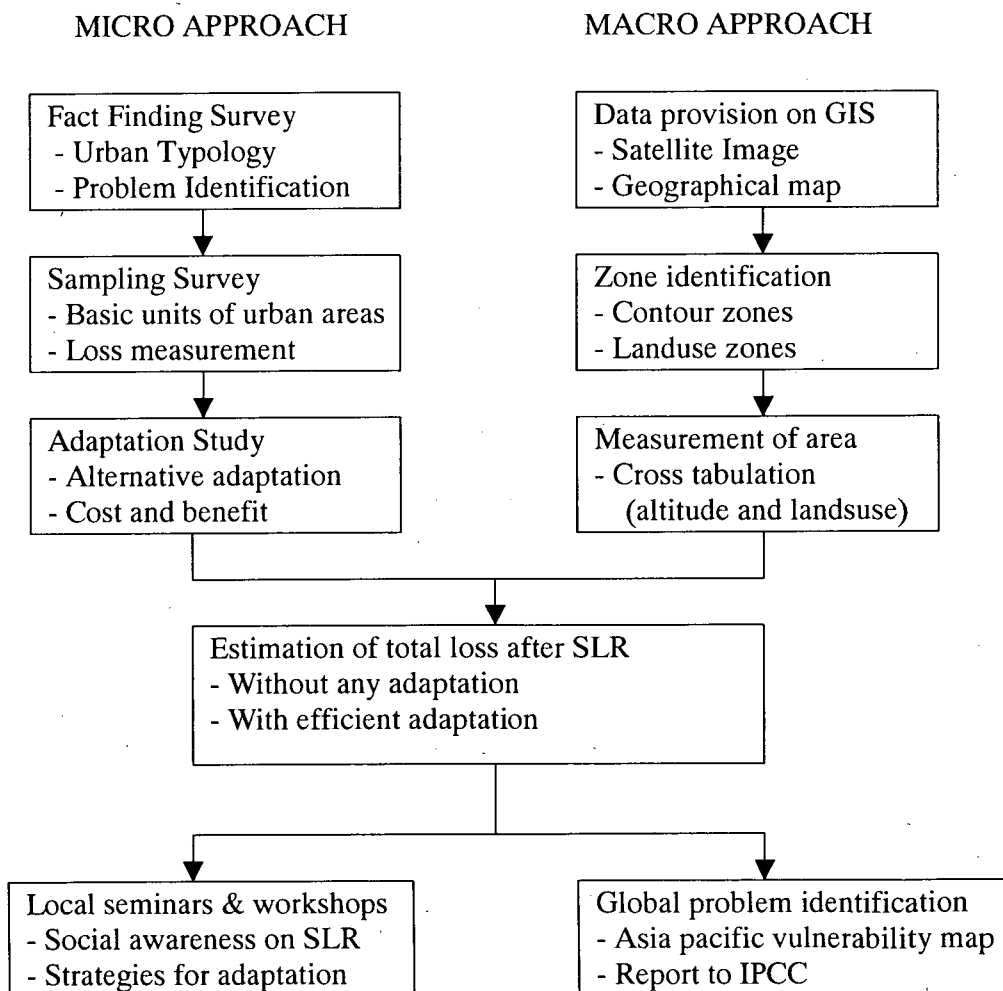
INTRODUCTION

In this part, logical framework of this research is shown.
Micro approach through field survey and macro approach through analysis of satellite images on GIS are combined and integrated, to obtain the quantitative estimation of total loss caused by SLR.

MICRO APPROACH   MACRO APPROACH

| Fact Finding Survey
- Urban Typology
- Problem Identification | Data provision on GIS
- Satellite Image
- Geographical map |

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| Sampling Survey
- Basic units of urban areas
- Loss measurement | Zone identification
- Contour zones
- Landuse zones |

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| Adaptation Study
- Alternative adaptation
- Cost and benefit | Measurement of area
- Cross tabulation
   (altitude and landsuse) |

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| Estimation of total loss after SLR
- Without any adaptation
- With efficient adaptation |

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| Local seminars & workshops
- Social awareness on SLR
- Strategies for adaptation | Global problem identification
- Asia pacific vulnerability map
- Report to IPCC |

1.1. General Framework

It is highly predicted that rising global temperature raises the sea level and changes precipitation and other local climate condition that rely on the alteration of forest, crop yields and water supplies and at finally may generate storms and droughts. When sea level rises faster than the ability that the wetlands adapt to the change, the wetlands tend to decline. National Academic Science – 1989 presents data that the rate of sea level rise varies from 0.3 m up to 2 m in the next century (Sampurno, 2001).

Although the impact of sea level rise phenomenon remains on discussion within scientists, everyone has to have an awareness of its risk associated with degradation of the living quality of mainly ones located along the seashore. Many centuries people have shaped the coastal environment that offer rich resources such as fertile soil, fishing grounds, waterways for transport, building materials and so on, that generate wealth. Conversely, the development is more likely to contribute flooding, erosion, congestion and degradation of natural habitats meaning vulnerable degradation. In relation with sustainable living areas, mitigation should be taken into consideration intended to minimize the damage or to decelerate the degradation.

The activity on the **Global Environmental Impact Study of Urban Development and Housing Construction in Indonesia** with the special interest on the **Impact of Sea Level Rise onto Coastal Urban Areas** is now being carried out by the National Institute for Land and Infrastructure Management (NILIM), Ministry of Land, Infrastructure and Transport - Japan cooperated with Research Institute for Human Settlements (RIHS), Ministry of Settlements and Regional Infrastructure – Indonesia, in 1999. This research is part of the general study organised by the Geographical Survey Institute (GSI) and financially supported by the Ministry of Environmental – Japan.

The current third stage of the study concentrates on **Loss Measurement of Houses on the Physical and Socio-economical Aspects.** The first stage done in 1999/2000 was mainly concerned about the recognition of relationship between urban development and air pollution of CO_2 gas at side of product of building materials production. The second stage completed in 2001 focused on the identification of the impact of sea level rise on coastal housing areas in 6 (six) Indonesian major cities. The finding can describe the following statement:
1. The natural capability of the residents living in the coastal areas to adapt to their living condition through gradual improvement brings about rather hardness to find out the actual loss of the living areas,
2. Unpredictable cost and benefit of the land development cause an unpredictable loss quantity.
3. The responsibility of the people in the maintenance of the coastal areas is classified low, that might be due to less socialization of living and development of coastal areas.

With the intention of giving contribution to world wide study, as an archipelago, Indonesia is viewed as a suitable location as case study representing condition of the Asia-Pacific region or more specifically South-east Asia region. It also has the following reasons: having coastal area nearly 81,000 Km in length, most coastal areas are being dwelled and having something in common with other South-east Asian countries.

1.2. Aim

The aims of this study are to find out the amount of loss of houses and disturbed daily activities of residents living in that house because of inundation and/or flooding as the effect of sea level rise. It is also expected to be able to identify general loss of the living area due to inundation assuming that the sea level rises 1 M above the current level.

1.3. Scope

In order to fulfill the aims, surveys have been conducted in 7 (seven) coastal large cities i.e.; Jakarta, Semarang, Surabaya, Denpasar, Mataram, Banjarmasin and Makassar. Field survey records physical condition of totally 84 (eighty four) house cases or 12 (twelve) houses in each city. Whilst 329 (three hundred and twenty nine) household cases or 47 (forty-seven) households in each city have been interviewed to obtain social activity disturbed by inundation in their living areas. A seminar, as part of the study, has been carried out in Indonesia to gain further information from the experts.

1.4. Research Design

Survey and field observation is the methodological framework used in this study. Secondary data is explored prior to field survey especially ones collected in the same city that has been done on previous study (second stage). Dealing with the main interest of the study to estimate loss of a living area due to uprising sea level about 1 M, the study area is selected by the following procedure:

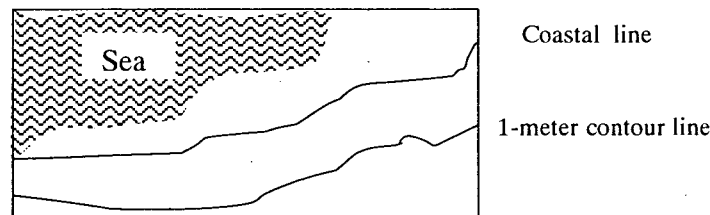- Determine the contour line of 1 M based on the geomorphological map

Figure 1.4.1.Contour

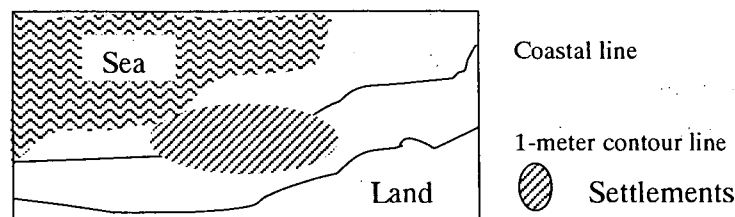- Determine the housing area based on Land Use Planning map

Figure 1.4.2.Landuse

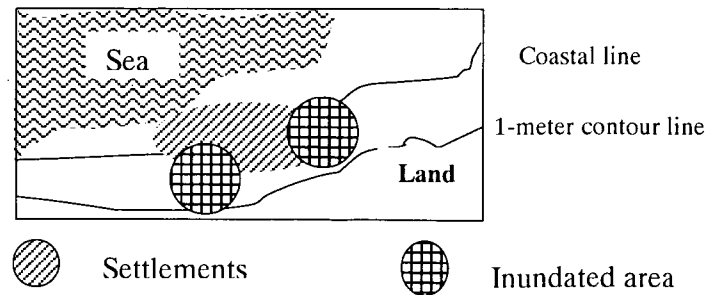- Determine inundated areas based on inundation map on the drainage planning

Figure 1.4.3.Inundated area

- Determine study area as superimpose of three characters i.e. a housing area having maximum 1 m height from sea level and frequently inundated.
- The analysis unit is houses and households. Cased houses consist of variant building type found in thesettlements.

1.5. Research Methodology

The method to obtain data of physical and function loss of a house and daily activities of residents prior to, during and after the inundation caused by changing condition of sea level. The method can be described as follows:

1. Literature reviews to complete related information/data with regard to impact of sea level on the coastal housing areas and method of loss measurement and calculation of function loss of a house.
2. Field observation to get primary data on the cased houses. To know the damage, the condition of five main building components (foundation, floor, wall, roof and ceiling) were measured and recorded. This basic data can express the remaining function of the building. Questionnaire was an instrument to collect the data.
3. Direct interview to the inhabitants of the cased houses and many more residents in adjacent areas is done. Questionnaire was an instrument to collect the data.
4. The physical data were analysed, using basic method for building assessment, while the social data were analysed with SPSS technique to describe frequency and correlation among intensity of inundation and disturbed activities.
5. Basic unit for macro analysis, as for each building typology, is calculated and integrated with the geographical data on GIS, which are obtained through satellite image, geographical maps, etc. to get the total assessment of damages caused by SLR.

1.6. Seminars and workshops

In the end of every fiscal year, seminars and/or workshops were held in Bandung, and all the research findings were reported and discussed, inviting Indonesian resource persons and central/local governmental officials on related fields. The outlines of the seminars/workshops are reported in Appendix 4.

All the seminar papers and records are disclosed from:
http://sim.nilim.go.jp/GE