Climate Change Vulnerability and Adaptation Assessment (1)

Cooperation: Ministry of Environment, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH & Australia

Timeline: 2010 – 2012

Project Sites: Tarakan, South Sumatra, Malang Raya

Background - Indonesia is strongly exposed to climate change. With over 17,000 islands, the rising sea level, changes in precipitation and extreme climate events are already a major issue. It is expected that climate change will exacerbate this trend. Figure 1 below shows Rainfall Projections, while table 1 summarizes Sea Level Rise Projections according to Tide Gauge, Altimeter and Model outputs.

Period	Tide Gauge	Altimeter ADT	Model	Level of confident
2030	24.0cm±16.0cm	16.5cm±1.5cm	22.5±1.5cm	Moderate
2050	40.0cm±20.0cm	27.5cm±2.5cm	37.5±2.5cm	Moderate
2080	64.0cm±32.0cm	44.0cm±4.0cm	60.0±4.0cm	High
2100	80.0cm±40.0cm	60.0cm±5.0cm	80.0±5.0cm	High

Table 1 . Projection of Sea Level Rise in Indonesian waters according to tide gauge, altimeter and model data, relative to the year 2000. Source: Government of Indonesia (GoI) 2010, Indonesia Climate Change Sectoral Roadmap (ICCSR), National Development

Climate Change Impact in Indonesia - Climate Change will particularly impact water resources, agriculture, forestry, fishery as well as health and infrastructure. These are already considerably affected by climate induced hazards such as Land subsidence, rise in the sea level, floods, droughts, landslides, and forest fires. Adaptive Measures can mitigate damage and avoid exacerbating impacts of natural disasters. Therefore the necessity for adaptation measures at national and local levels is rapidly emerging as a central issue in the debate around policy responses to climate change. The Government of Indonesia (GoI) has initiated this process with the aim of enabling informed decision-making and subsequent climate-smart development and spatial planning at all administrative levels.

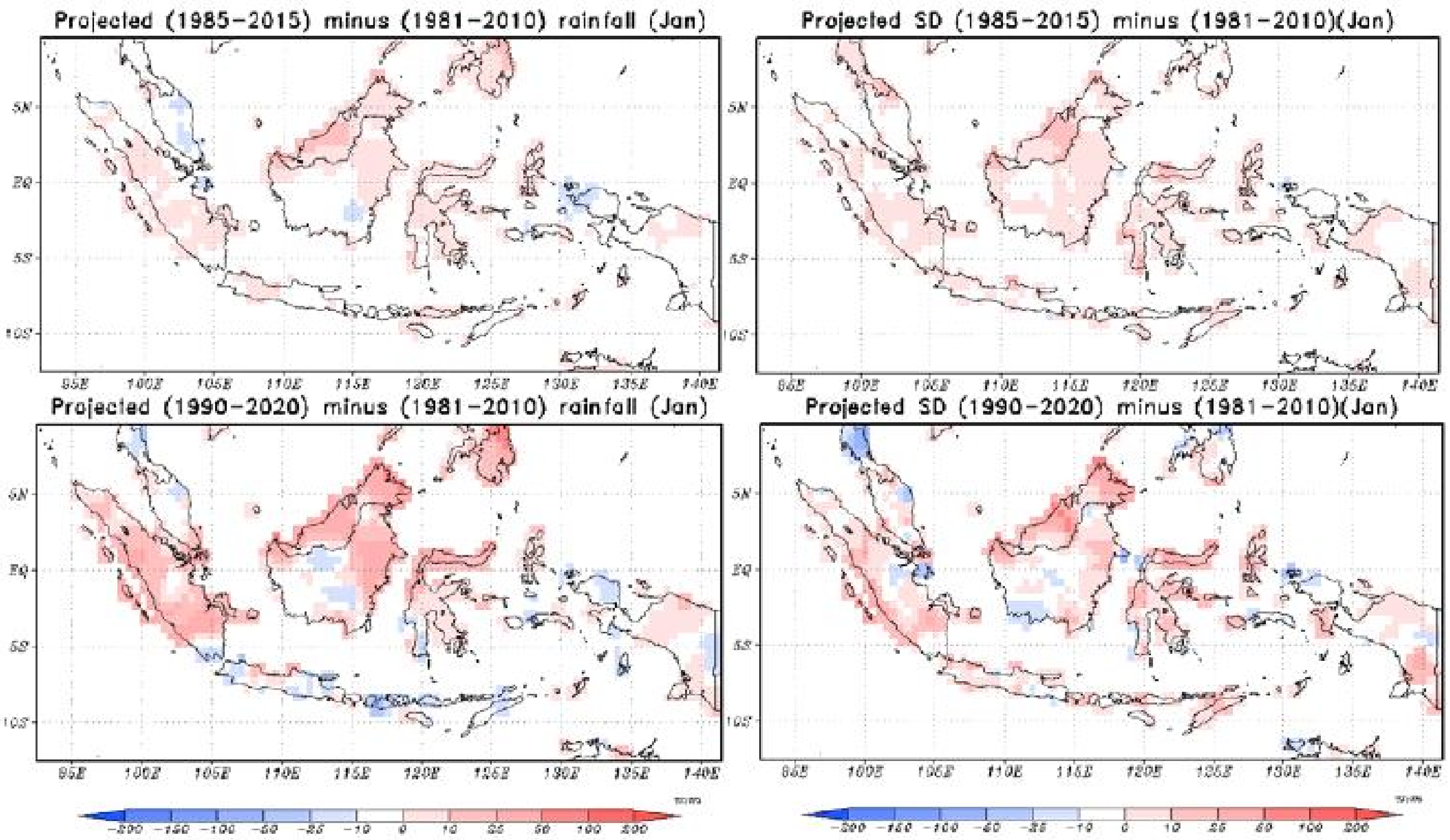

Fig 1. Rainfall Projections for the Month of January for the period 1985-2015 (upper figures, mean and standard deviation) and for 1990-2020 (lower figures, mean and standard deviation). Scenario: A2. Source: GoI, 2010, Indonesia Climate Change Sectoral Roadmap (ICCSR), National Development Planning Agency. The red color indicates an increase in rainfall and the blue color indicates a decrease in rainfall.

Climate Change Vulnerability and Adaptation Assessment (2)

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Timeline: 2010 – 2012

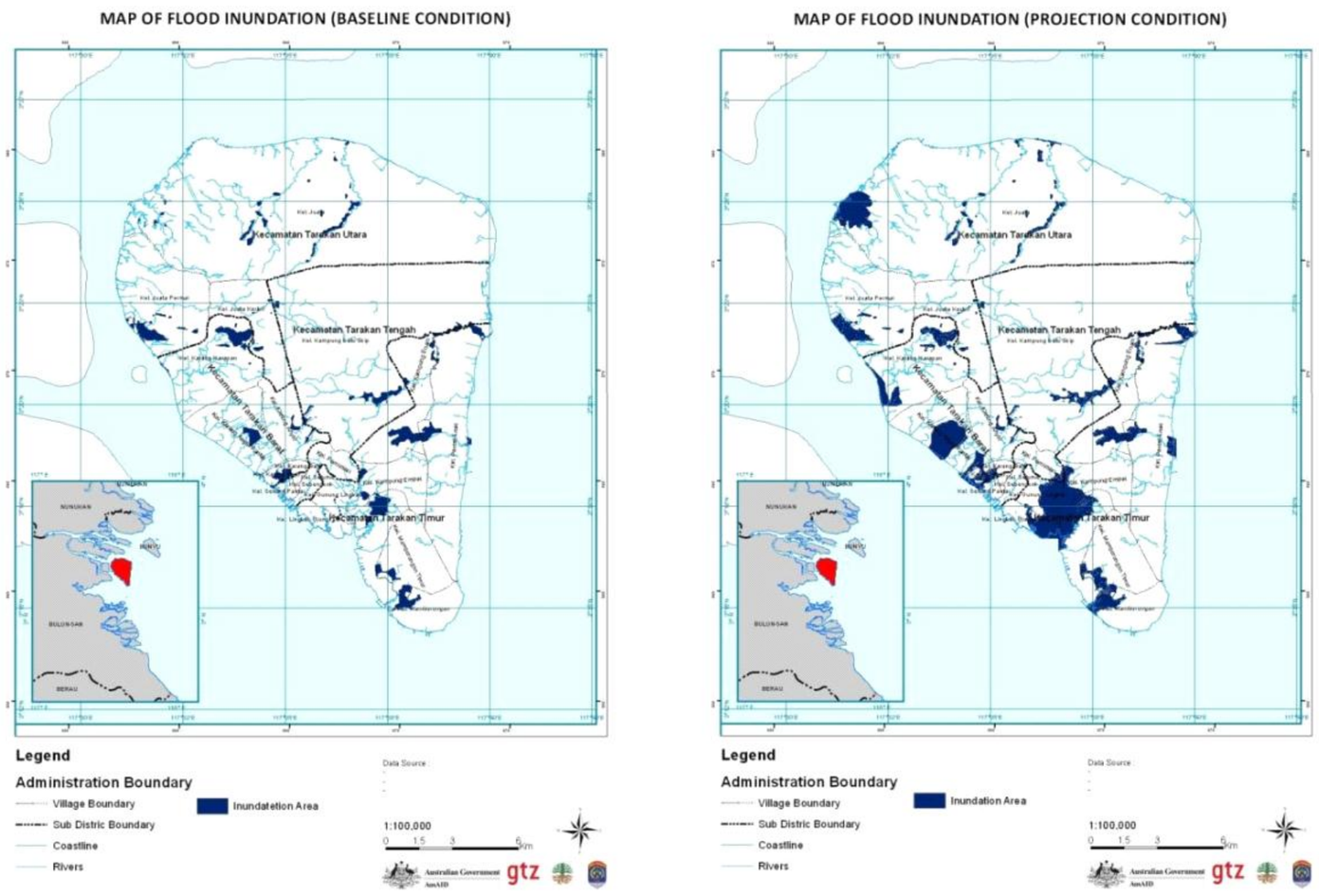
Project Sites: Tarakan, South Sumatra, Malang Raya

In order to prioritize, design and implement interventions to adapt to Climate Change, it is essential to adopt a coherent set of approaches, frameworks and methods for examining vulnerability as well as adaptive capacity. Climate Change Vulnerability and Adaptation Assessments are an integral part of this, and the Ministry of Environment (MoE) is actively involved in developing and standardizing a corresponding approach, known under the name of KRAPI (*Pedoman Kajian Risiko dan Adaptasi Perubahan Iklim*).

The Project – To this end, the Project supports local governments (Province/District/City) in applying a "meso-level multi-sectoral" *Climate Change Vulnerability Assessment* approach at the Provincial level and a "micro-level multi-sectoral" *Climate Change Vulnerability Assessment* at the City/District level. This means assessing Climate Vulnerability at the meso- and micro- levels while considering the multi-sectoral impacts of climate change. Impacts are estimated for the **Water, Agricultural, Health and Coastal/Marine Sectors** with the help of Climate Change Risk Maps.

The Project is being conducted in the City of Tarakan (East Kalimantan), the Province of South Sumatra, and the District/Cities of Malang area (East Java). An example of a Risk Map for Tarakan Island is shown below and shows the **Flood Risk for the Water Sector for 2030.** Risk is a function of Hazard and Vulnerability and estimating Risk means comparing a baseline condition (without climate change) and a projection condition (with climate change). The different maps (Hazard & Vulnerability) are then overlaid and a Climate Change Risk Map is obtained. On the basis of the Risk Map, adaptation options are developed and mainstreamed into spatial and development planning.

Figure 2. Tarakan Island (East Kalimantan). Source: Google Maps



Process – There are three steps to the process:

STEP 1: Determine Baseline and Projection Condition for the Flood Hazard

STEP 2: Determine Baseline and Projection Condition for Vulnerabilty to Floods

STEP 3: Overlay Hazard & Vulnerability Maps together with long term Land Use Plans per Watershed

Figure 3. **STEP 1** - on the left hand side: Baseline condition for Flood Hazard, on the right side: Projected Flood potential for Tarakan Island – It can be seen that the potential for Floods increases considerably in the Western part of the Island.

Climate Change Vulnerability and Adaptation Assessment (3)

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Project Sites: Tarakan, South Sumatra, Malang Raya

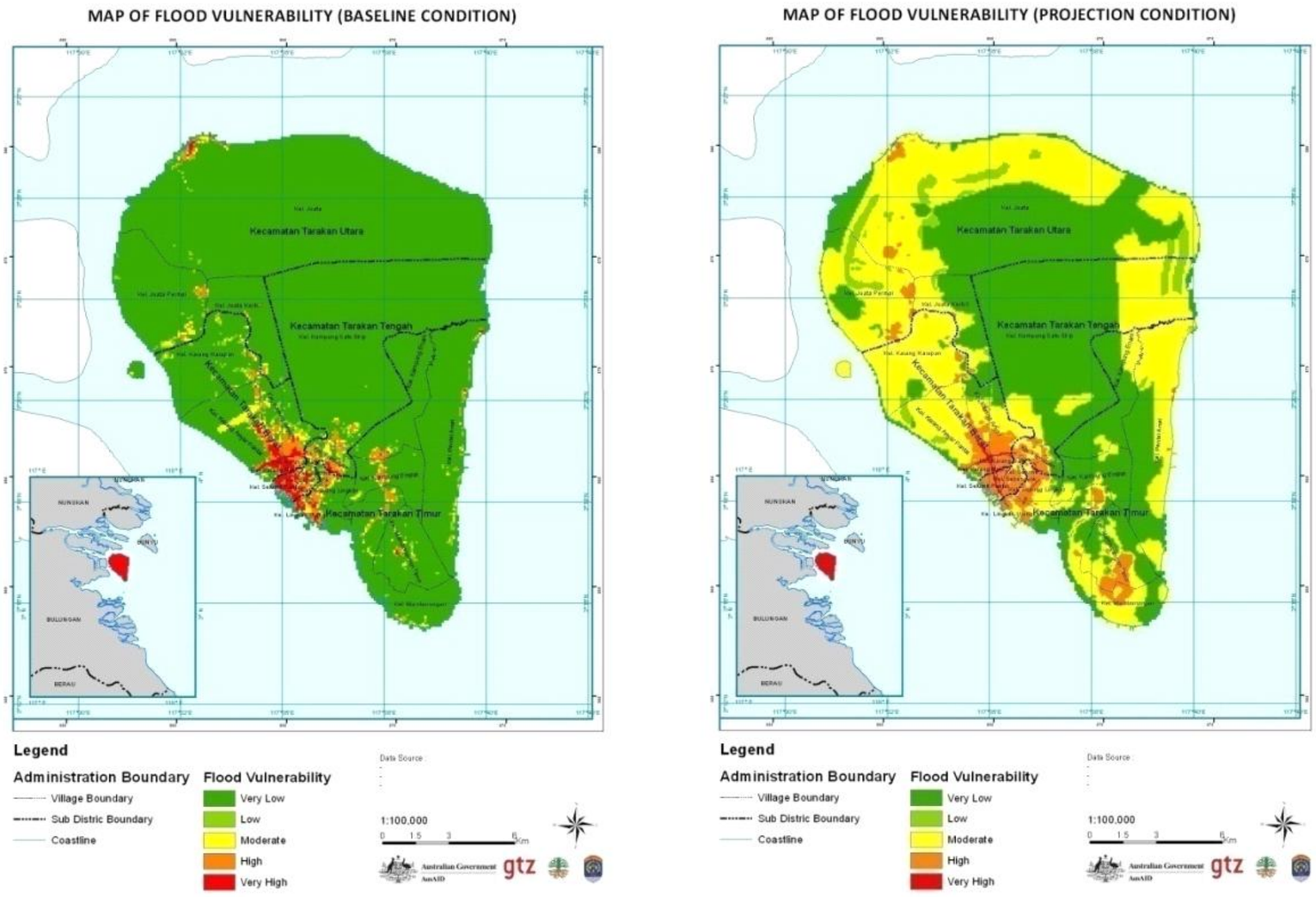
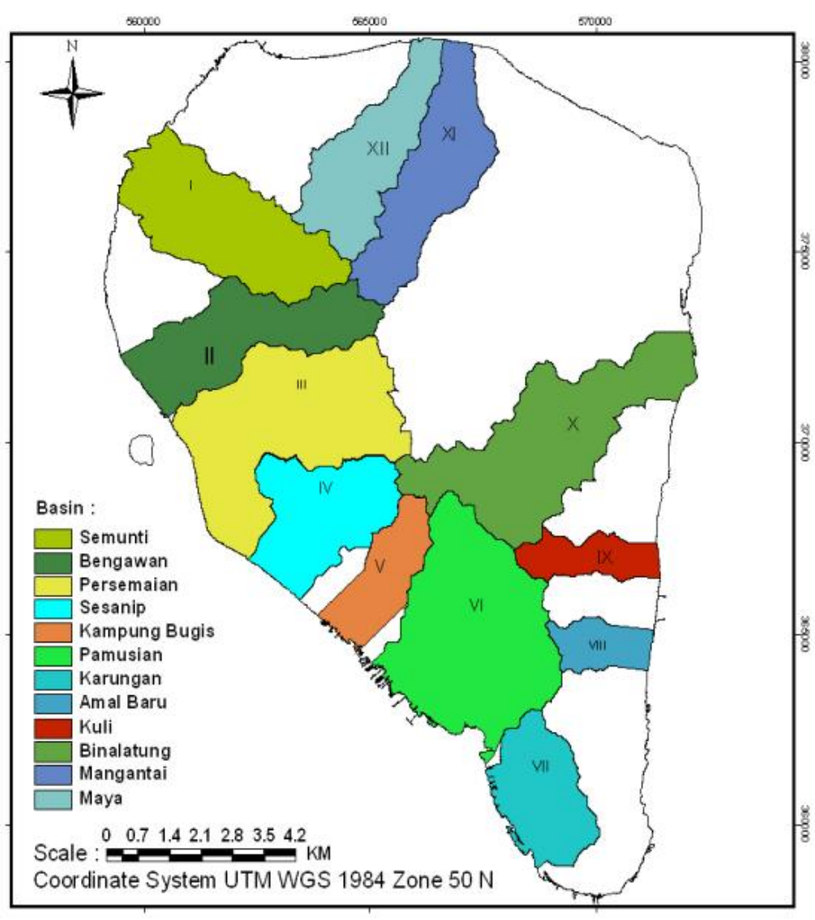
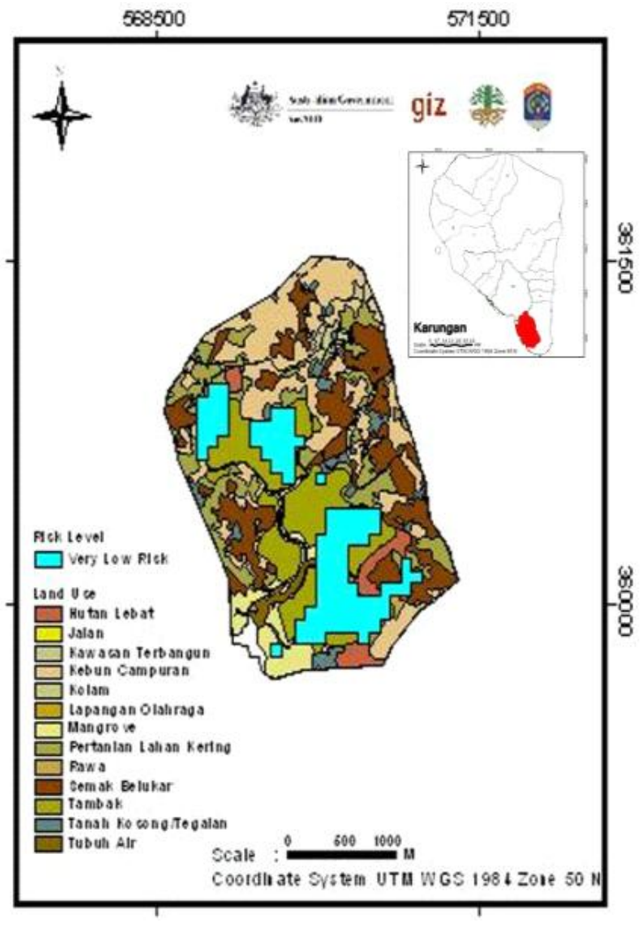
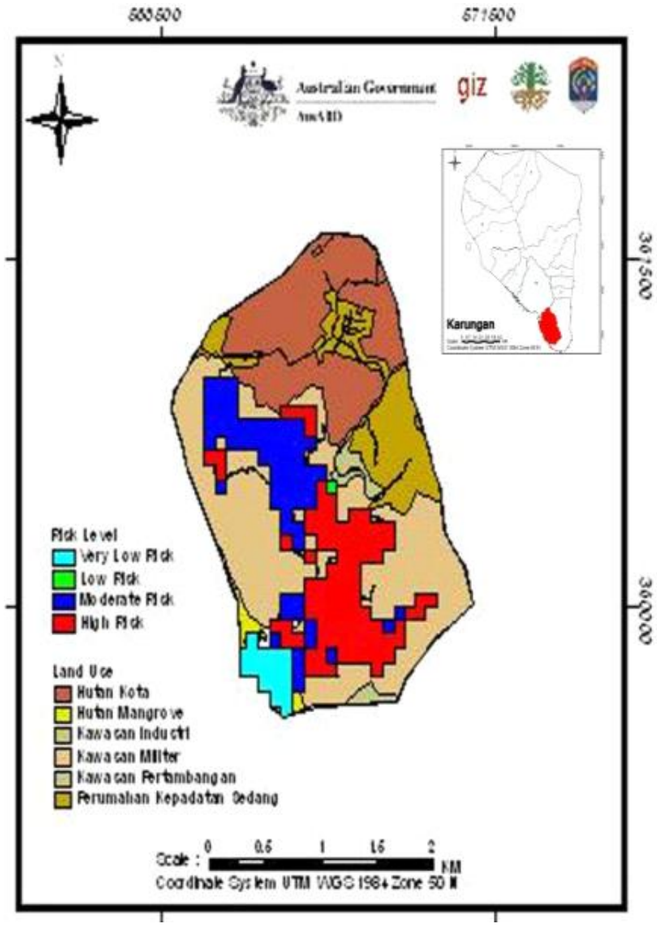


Figure 4. **STEP 2** - the Vulnerability to Floods in Tarakan is analyzed in Baseline Condition (left) and Projection Condition (right) according to Exposure, Sensitivity and Adaptive Capacity. This captures elements such as Population Density, Population Welfare, Land Use, Government Programs, Role of Infrastructure, Housing Types etc. It can be seen that the level of vulnerability to Floods increases all along the coastline.







Figures 5 (left) and 6 (middle and right). **STEP 3** - In order to increase the applicability of the study, the analysis will focus on the watershed level, Figure 5 shows Tarakan's 12 Watersheds. Figure 6 shows an example of a Flood Risk Map for the Karungan Watershed in the South West of Tarakan. Upper left part of the Figure shows the Flood Risk baseline condition where the Hazard and Vulnerability Maps have been overlaid, alongside Land use Maps for 2008. The upper right Figure shows projected Flood Risk for 2030 where projected Hazard and Vulnerability Maps have been overlaid, alongside long term Spatial Plan for 2030. It can be seen clearly where the Flood risk increases and what land use type it affects, thereby providing an improved basis for decision making, esp. for spatial & development planning

Improving framework conditions for local level adaptation - This Project will considerably help refining KRAPI (*Pedoman Kajian Risiko dan Adaptasi Perubahan Iklim)*. KRAPI will prove particularly useful in the framework of the new Indonesian Environmental Law (Act 32/2009) that outlines the framework of mitigation and adaptation issues in Indonesia. More precisely, the act requires local governments (Province/City/District) to prepare Strategic Environmental Assessments and Environmental Management Plans that include climate impacts and vulnerabilities as a basis for local spatial and development planning. KRAPI will provide guidance on how to include climate impacts and vulnerabilities in the framework of Strategic Environmental Assessments and Environmental Management Plans .

The Project Partners – The Project is a collaboration between MoE, Australia and GIZ. For more information please contact:
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