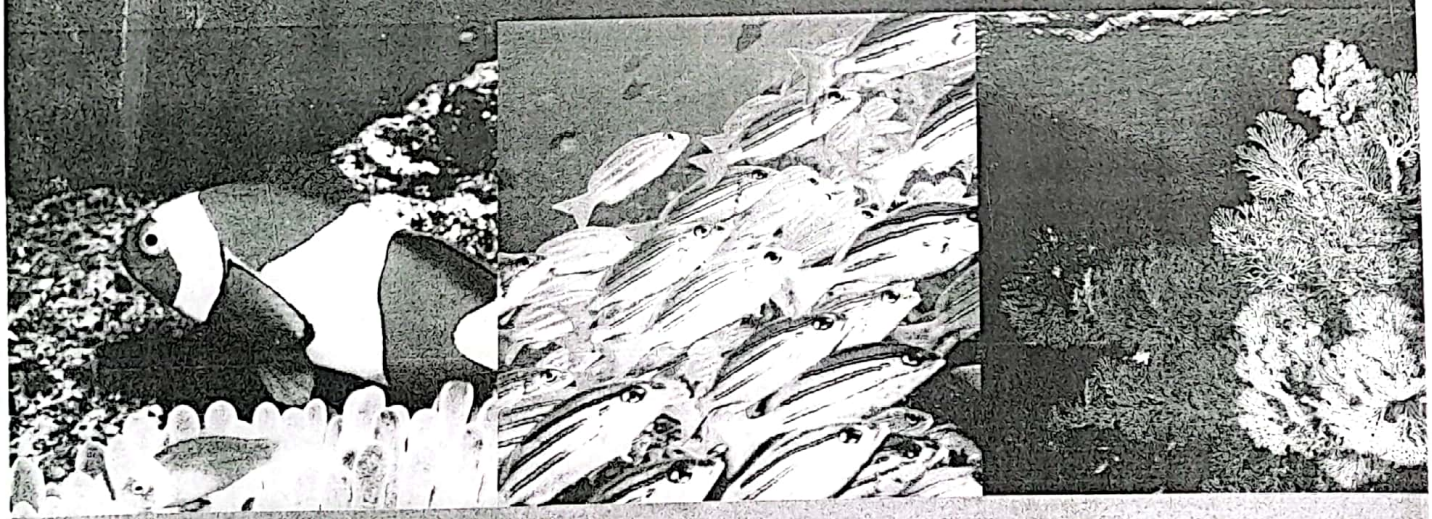
WORLD OCEAN CONFERENCE

CORAL TRIANGLE SUMMIT 2009

WORLD OCEAN CONFERENCE SIDE EVENT

INTERNATIONAL SYMPOSIUM ON OCEAN SCIENCE, TECHNOLOGY AND POLICY

MAY 12-14, 2009
MANADO, NORTH SULAWESI
INDONESIA



ABSTRACTS

WORLD OCEAN CONFERENCE 2009 AND CTI SUMMIT SIDE EVENT

ABSTRACTS

INTERNATIONAL SYMPOSIUM ON OCEAN SCIENCE, TECHNOLOGY AND POLICY

MANADO, NORTH SULAWESI

12 – 14 MAY 2009

Abstracts are listed alphabetically by abstract title. Each topic represents one Chapter. Only abstracts of confirmed oral presenters which have been received by 24 April 2009 are included in this book.

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Assessment of the Impact of Sea Level Rise in Sorong City, West Papua, Indonesia

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Faculty of Animal Husbandry, Fisheries, and Marine Science, The State University of Papua, Indonesia
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Rising sea level due to global warming potentially poses a threat to many coastal areas. Coastal cities with dense population and small islands are more vulnerable in terms of location. A study has been carried out to assess the impact of sea level rise in Sorong City and the small islands surrounding the city. By analyzing tidal data from 1985-2006 gathered from Bakosurtanal (Coordination Agency for Survey and Mapping), the mean annual sea level rise has been estimated at about 0.54 cm/year. A Digital Elevation Model (DEM) of the city was subjected to three different flooding scenarios to demonstrate maximum, average, and minimum condition of possible sea level rise due to global warming. The elevation class maps were overlaid with the land use data result from the supervised classification Landsat-7 ETM+ image. The areas of specific land use types that fall within a certain elevation class were calculated. The result showed that the residential areas will be the hardest hit in terms of land area followed by the industrial areas and agricultural areas. The impact of flooding to the population and land will be very enormous.

Climate Change and the Tropical Coastal Zone: A Southeast Asian Perspective

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The tropical coastal zone of the global ocean constitutes, by area, the largest proportion of coastal seas, and it is within this zone between land and the open ocean where some of the most severe human-induced impacts are occurring. Due to increasing population pressure, tropical coastal waters have been, and are currently being, affected in a myriad ways, including a decline in habitat area (mangroves, coral reefs), water quality, top predators, fisheries stocks and biodiversity, and by an increase in pollutants, debris, ocean acidification, habitat alteration, and introduction of exotic species. Further, the tropical coastal zone is experiencing an alteration of freshwater discharges and sediment transport that greatly impact coastal productivity and fisheries output. Coastal waters of temperate and boreal seas are expecting similar human impacts, but arguably human encroachment will, over the long term, have a greater impact in the tropics due to greater ecosystem fragility and complexity, and the proportionally greater role of microbial processes in waters of low latitude. It is in the coastal zone of Southeast Asia where changes are forecast to be greatest owing to both rapid economic and population growth. These changes will have deleterious consequences for the health of the global ocean, as these regional seas presently receive most of the supply of freshwater and riverine material discharge to the world ocean. The IPCC predictions of increased sea level, atmospheric CO_2, CH_4, and N_2O concentrations, ocean temperatures, the incidence of flooding, drought, fire and disease, and changes in weather patterns, suggest that the coastal ecosystems of Southeast Asia will be greatly altered in future, with likely simpler food webs more greatly controlled by microbes and small-sized groups, greater primary production, greater frequency of storms, but less top predators, less edible items, less stability of coastlines, and less ecosystem stability.

Assessment of the Impact of Sea Level Rise in the City of Sorong, West Papua, Indonesia

THOMAS F. PATTIASINA
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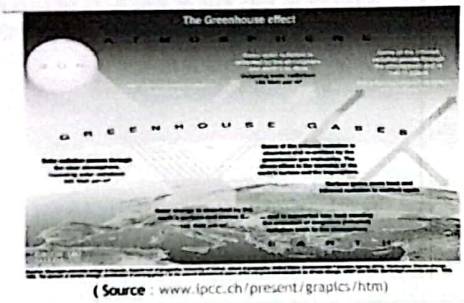
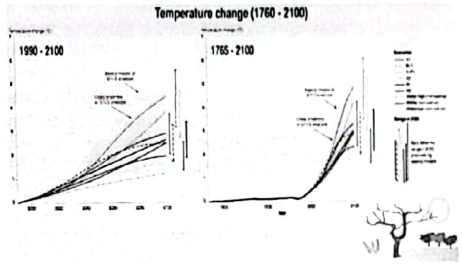
The State University of Papua Manokwari

The Greenhouse Effect



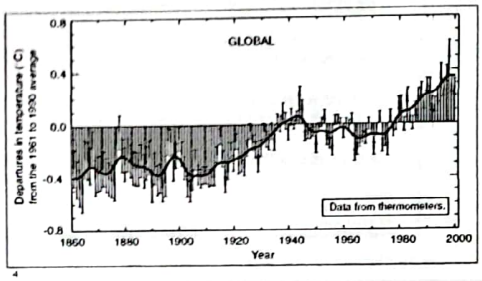
(Source : www.ipcc.ch/present/grapics/htm)

Global Trend of Temperature Change

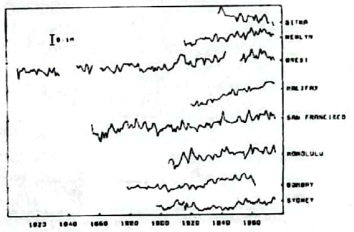


(Source : www.ipcc.ch/present/grapics/htm)

The Increasing of Global SST



Sea Level Rise at Several Locations



(Source :)

Introduction

- Sea level rise poses a particular threat to countries with heavy concentrations of population and economic activity in coastal regions
- Indonesia is one of some countries in Asia which are affected by sea level rise

Introduction

- Sorong city is a coastal city in West Papua Province, Indonesia which is currently growing very fast
- Because of its strategic position the city become a trade, industrial, and service city
- This condition has attracted people from other places to migrate into the city and stimulated the growth of industries in the city.
- Despite its obvious impact, the issue of sea level rise has not been incorporated in the Sorong city planning
- Since settlement and industrial area are mostly located in low-lying area, it increases numbers of people and assets at risk

Objective

- An initial study to assess the impact of sea level rise to land use in the city of Sorong using remote sensing and GIS

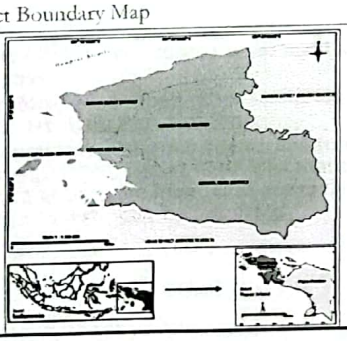
Study Area

- Sorong city is situated approximately longitude 131° 15' East and latitude 0° 54' South
- The city is located in Bird Head Peninsula of Papua Island
- **Border:**
  - **East** Sorong Regency
  - **West** Dampier Strait
  - **North** Sorong Regency and Dampir Strait
  - **South** Sorong Regency dan Raja Ampat Regency

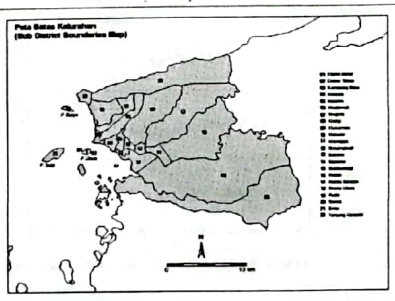
Study Area

- The city is divided into 5 districts and 22 sub districts
- Topography of Sorong varies from mountains to lowlands
- Mountains and hills mostly situated in the north and northeast of the city, while lowlands situated in the west and the south of the city
- Settlement and industries are mostly located in the lowland areas, while forest covers highland areas
- Dense mangrove forest covers lower areas in the south.

District Boundary Map



Sub District Boundary Map

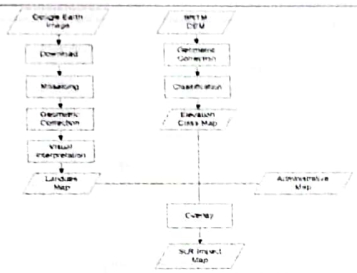


Material & Methods

Material

- R.S. Data: Topographic data (SRTM DEM), Satelite imagery (High Resolution).
- Additional Data: Administrative map, Population number, Sea level rise trend (Bakosurtanal).
- Since high resolution satelite data is expensive, we tried to use image from Google Earth Program.

Method



The Flowchart of Method

Defining Scenarios of SLR

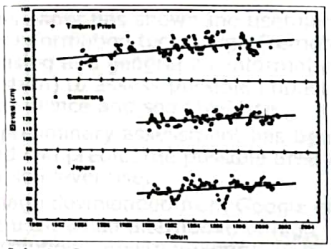
- Elevation class map created based on different scenarios.
- Scenarios, actually should be defined based on information about sea level rise trend in Indonesia from Bakosurtanal which is about 0.50 mm per year.
- The scenarios in year 2100 should be 0.25 m (pessimistic), 0.50 m (average) and 0.75 m (optimistic).
- However, in this study, since there is no detail topographic data, and there is only SRTM DEM (90 m) data available, those scenarios could not be applied.

Defining Scenarios of SLR

- SRTM DEM is very coarse to be used in this case.
- Therefore, we defined other scenarios which are 1 m, 2 m and 3 m.
- Although this scenarios seems like to be over estimated, but at least information about the possible inundated areas due to rising sea level can be predicted.

Result

Trend of Sea Level rise in Indonesia

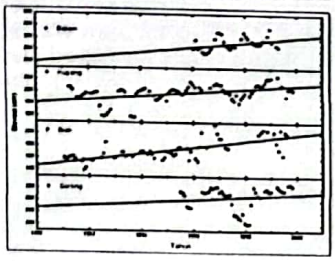


Jakarta, Semarang, Belawan (1980-2001)

Source: Diposaptono *et al.* (2009)
Data: Bakosurtanal (2002)

Trend of Sea Level rise in Indonesia

Batam, Kupang, Biak and Sorong (1991-2000)



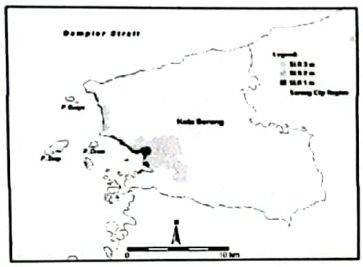
Source: Diposaptono *et al.* (2009)
Data: Bakosurtanal (2002)

TABLE QUALITATIVE SYNTHESIS OF DIRECT SOCIOECONOMIC IMPACTS OF CLIMATE CHANGE AND SEA LEVEL RISE ON A NUMBER OF SECTORS IN COASTAL ZONES AND SMALL ISLANDS

No	Sector	Biogeophysical effect						
		Flood frequency	Erosion	Inundation	Rising underlain	Saltwater intrusion	Biological effects	Extreme storm
1	Water resources				▼	▼	▼	
2	Agriculture	▼	▼	▼	▼	▼		▼
3	Human health	▼		▼			▼	
4	Fisheries	▼	▼	▼		▼	▼	▼
5	Tourism	▼	▼	▼			▼	
6	Human settlement	▼	▼	▼	▼			
7	transportation	▼	▼	▼				▼

Sumber : Soleadono, 2008

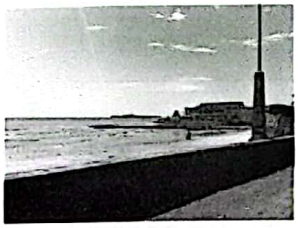
Map of Possible Inundated Areas



Possible Landuse Area Affected

Landcover	1 m	2 m	3 m
Settlement/Building	223,39	882,19	1810,19
Fish Pond	33.70	80.20	87.32
Mangrove	50.84	235.97	493.17
Agriculture/Plantation	0	250.10	470.63
Forest	7.38	42.74	112.76
Bareland/Bush	8.65	39.25	83.24
Total	223,39	882,19	1810,19

Adaptation to Sea Level Rise



Sea wall built to protect the coast

Conclusion

- This paper has shown the usefulness of geoinformation technology (remote sensing and geographic information system) to assess possible impact of land subsidence and sea level rise.
- A preliminary assessment has been done, and can predict the possible area affected by sea level rise.
- Image downloaded from Google earth can be used as an alternative of high resolution satellite imagery.

Recommendation

- Further study with more compatible data, especially more detailed topographic map should be carried out to get more accurate result.

Thank You