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Space-based Technologies for Disaster Risk Reduction - Assessing the Unseen Risks

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Assessment of Climate Change and Coastal Inundation through Satellite-Derived Datasets

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Agenda

- Introduction
- Climate change
- Coastal vulnerability/disasters
- Case Study Area(s)
- Methodology
- Results
- Summary
- Future activities

Introduction
About Me

Dr. Komali Kantamaneni
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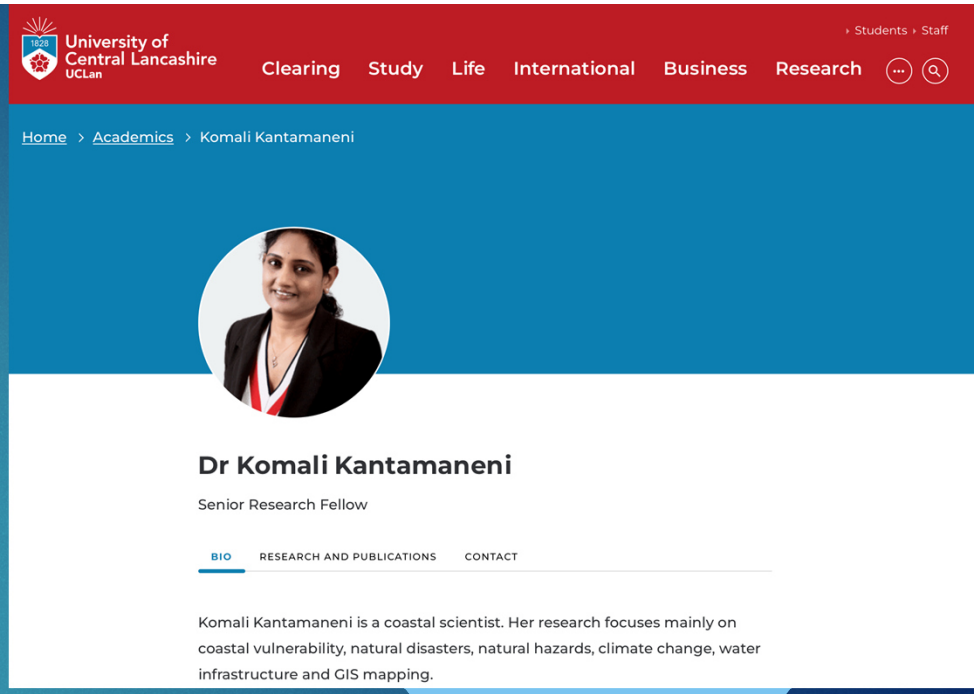
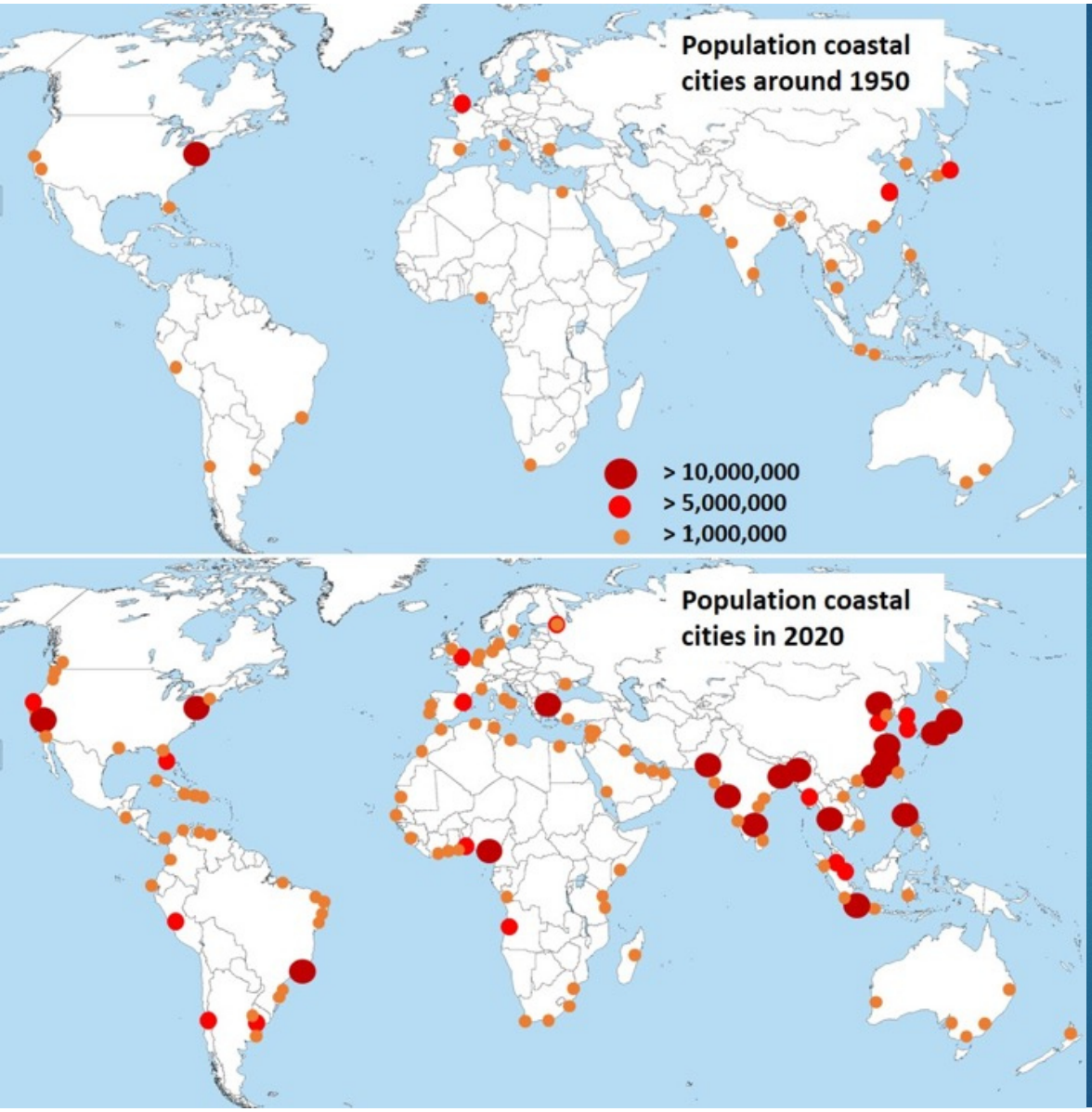


Research Interests

1. Coastal Vulnerability /Engineering
2. Climate Change
3. Disasters and Natural Hazards
4. Disaster Risk Reduction
5. Water Infrastructure
6. GIS Mapping



Global Coastal cities & Population- **1950-2020**

Case Study Area(s)

Sabang Island -an Indonesian Island has been selected for this study to appraise the Climate Change and Coastal Inundation Scenarios

Case Study Area

Sabang Island -an Indonesia

- Sabang Island/Weh Island, one of the Indonesian islands, is situated in the southwestern part of Indonesia.

- An areal extent of ~131 sq km and a ~95 km long coastline.

- Sabang is a cluster of five islands (i.e., Pulau Weh, Rubiah Island, Seulako Island, Pulau Klah, and Pulau Rnondo), of which Pulau Weh (i.e., Weh Island) is the largest island, where Sabang, the largest town, with a population of 33,217.

Case Study Area

Indonesia, Far East Asia, is an island nation with an 81,000 km coastline comprising over 17,500 islands.

Several extreme weather events, such as intense rainfall, tropical cyclones, and tsunamis, have occurred in the coastal areas of the islands in recent decades.

Sabang Island has the highest risk area- climate change-coastal floods and associated risks

Methodology

Data Sources

The long-term (1981–2020) climatic parameters, including minimum temperature, maximum temperature, rainfall, and relative humidity were extracted from the National Aeronautics and Space Administration (NASA) POWER Release 8 platform.

All the cloud-free LANDSAT 5 8 satellite datasets available (1988–2021) for Sabang Island were used to compute long-term trends in land use/land cover through enhanced vegetation index

The data on sea level anomalies of the island coasts were extracted using the satellite altimeter datasets obtained from Jet Propulsion Laboratory MEaSUREs gridded sea surface height anomaly (SSHA) dataset.

Methodology

Methods

- Assessment of Land Use/Land Cover Change
- Enhanced Vegetation Index (EVI)
- Normalised Difference Built-Up Index (NDBI)
- Trend Analysis
- Mann-Kendall Test
- Modelling of Coastal Inundation

Results

Climate Change in Sabang Island

- The long-term data (1981–2020) show that the average annual temperature of the case study island is 28 ◦C with a diurnal variation of 25–31 ◦C.
- The relative humidity is about 80%, and it is comparatively high September–December. The annual average rainfall of the island is about 2000 mm, and it is well distributed throughout the year.
- Except for February, all the months contribute more than 100 mm of rainfall, and the contribution is at its maximum in May and October–December