

Influence of Earthquake Induced Geo-tectonic Shift on Coastal Mangrove Forests of Andaman Islands, India

Andaman and Nicobar Islands

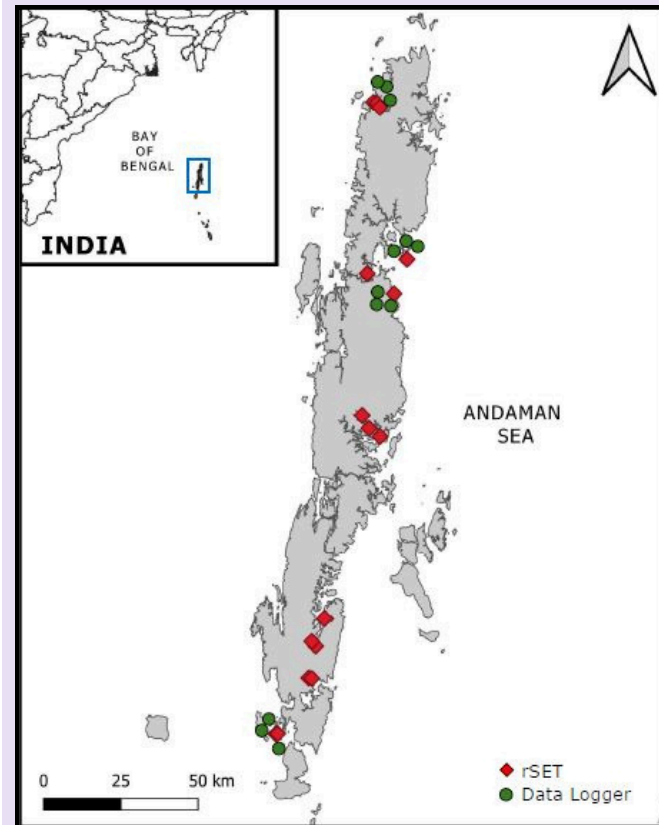
The Andaman and Nicobar Islands (ANI) are located in the Bay of Bengal (6° - 14° N; 92° - 94° E). They consist of 572 islands, covering approximately 8,250 sq km. Of this, more than 80% (~6,740 sq km) is classified as forest land. This includes nine national parks, 96 wildlife sanctuaries, and a biosphere reserve. ANI accounts for 12.3% of the total mangrove cover of the country (FSI, 2021).

Background

Conservation and sustainable management of the blue carbon ecosystems form a significant part of our strategies for mitigating the impacts of climate change. Mangroves are one such socio-ecological system that ensures the sustainability of coastlines and the sustenance of coastal communities in response to changing climate. However, accelerated climate change events (e.g., Sea level rise) present a challenge for natural adaptation processes. A lack of site-specific information and scientific data on these vulnerable zones limits our ability to respond to such challenges and apply appropriate nature-based solutions.

The Sumatra-Andaman earthquake and resultant tsunami in 2004 have altered the topography of the Andaman Islands by causing coastal uplift (~ 135 cm) and subsidence (~ 285 cm), which is akin to a sea level drop/rise. These natural changes in ground elevation offer a unique living laboratory to study the response of mangrove communities and the fate of sequestered carbon to climate extremes manifested in the form of changed hydrology and tidal characteristics.

Study Area - Andaman Islands



Biodiversity

- 38 true mangrove species belonging to 13 families and 19 genera.
- About 6540 species of Fauna including 834 endemics (ZSI, 2010).
- More than 2500 floral taxa including 261 endemics (ZSI, 2010).

Socio-Economic Importance

- Collective annual economic worth (of services) ~ USD 1.5 million.
- Household value from goods and services ~ 1000 USD /yr/family.
- Tourism- The Islands attract around 2.2 lakhs visitors annually.



Aim

The project aimed to establish ecological monitoring sites across ANI to help understand the response of mangrove communities to sea-level changes. Information and scientific data generated as part of this exercise will be useful for better and informed management practices for the conservation and sustenance of mangroves.

Activities and Outputs

Field campaigns were conducted during 2021-2024 with the support of the ANI Forest Department. These campaigns aimed to assess the long-term response of mangroves to the sea-level change gradient created by coastal uplift and subsidence along the Andaman Islands.

- The **total ecosystem carbon stocks** of Andaman mangroves were estimated from sites in North, Middle, and South Andaman, representing uplifted, subsided, and unchanged areas, respectively.
- **17 Rod Surface Elevation Tables (rSETs)** were installed to study the sedimentation dynamics across a subsidence-uplift gradient.
- **20 automated sensors and data loggers** (4 for salinity, 12 for water depth, and 4 reference) were deployed at monitoring sites for measuring environmental parameters such as salinity, temperature, and water depth.
- **Early career researchers** were trained in mangrove monitoring techniques, and **scientific papers** are under preparation.
- Three **capacity-building workshops** on mangrove monitoring and mangrove restoration were conducted for the Andaman and Nicobar Forest Department, with **94** staff members participating.



Way Forward

Data collection on long-term sedimentation dynamics and environmental changes is underway. The information and scientific data collected will help understand the resilience capacity of mangroves. This information will assist the forest department in planning interventions and activities for the management and conservation of mangroves in a more scientific and adaptive manner.

We are thankful to the Andaman and Nicobar Forest Department for their support in this study.

Project Team

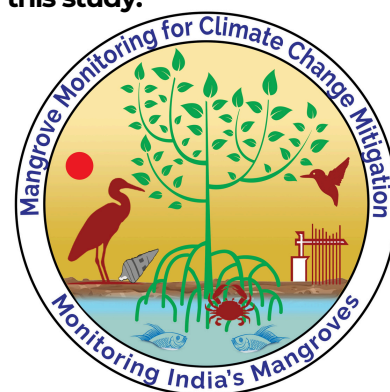
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