Crabs on the Move: Influence of Coastal Uplift and Subsidence on Crab Community in the Andaman Islands

Mayur Fulmali[1], Anoop Raj Singh[1,2] & Nehru Prabakaran[1]

[1]Wildlife Institute of India, Dehradun, Uttarakhand, 248001

[2]Department of Zoology and Environmental Science, Gurukula Kangri (deemed to be) University, Haridwar 249404.

Abstract

Catastrophic natural events provides rare opportunity to study disturbance ecology at large scale. Mangrove die-off as a result of altered coastal geomorphology is well studied in the Andaman Islands; however, studies on mangrove crabs are still lacking despite their integral role in mangrove ecosystem. This study provides first baseline data on crab species richness and documents their zonation pattern across elevational changes.

Introduction

Ecosystem Services

Play a critical role in nutrient cycling & functioning of mangrove ecosystem

Species Distribution

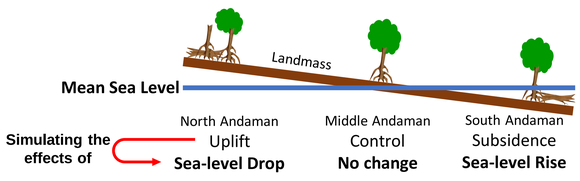
Habitat preference of crab varies with physiochemistry and tidal flooding

Sea Level Change

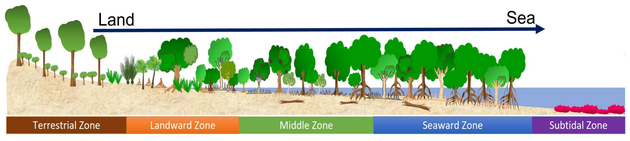
2004 Earthquake caused coastal uplift[~1.4 m] and subsidence [~1 m] in Andaman Islands

Response of Mangrove Crabs ?

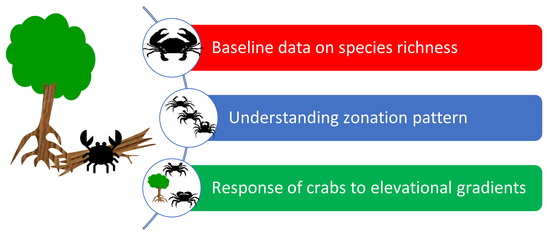
2004 Post-Seismic Changes in A&N Islands



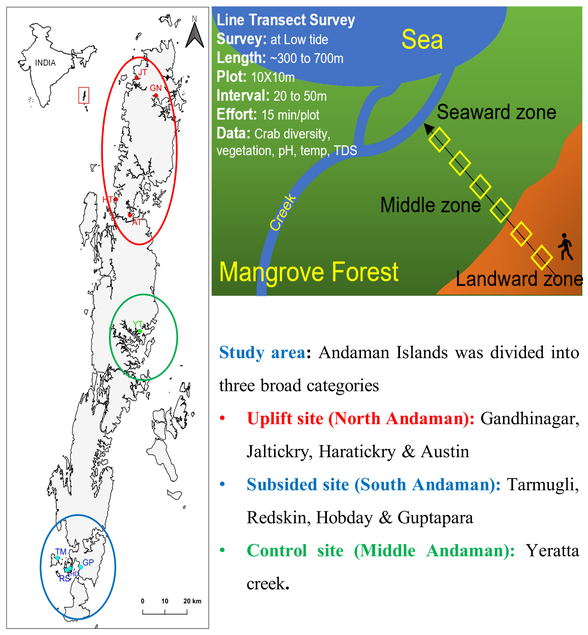
Typical Mangrove Zonation



Objectives



Methodology



Study area: Andaman Islands was divided into three broad categories

- **Uplift site (North Andaman):** Gandhinagar, Jaltickry, Haratickry & Austin
- **Subsided site (South Andaman):** Tarmugli, Redskin, Hobday & Guptapara
- **Control site (Middle Andaman):** Yeratta creek.

Results

- **71** mangrove crab species, 32 genera, 14 families **(Fig. 4)**
- Sesarmidae, Varunidae & Ocypodidae crabs are the most dominant taxa
- Species richness and zonation varied across the zones and sites **(Fig. 5)** and crabs were confined to remnant mangrove vegetation at uplifted sites **(Fig. 5C)**
- Most of the species favored middle and seaward zone of mangrove forest
- *Cardisoma carnifex* & *Thalassina anomala* population progradation was observed at uplifted site and transgression at subsided sites as a response to elevational changes.

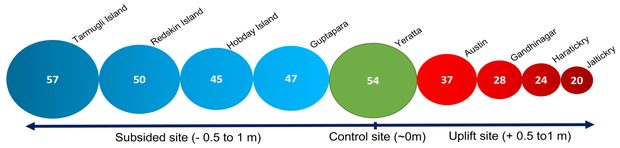


Fig. 4. Mangrove crab species richness at the study sites.

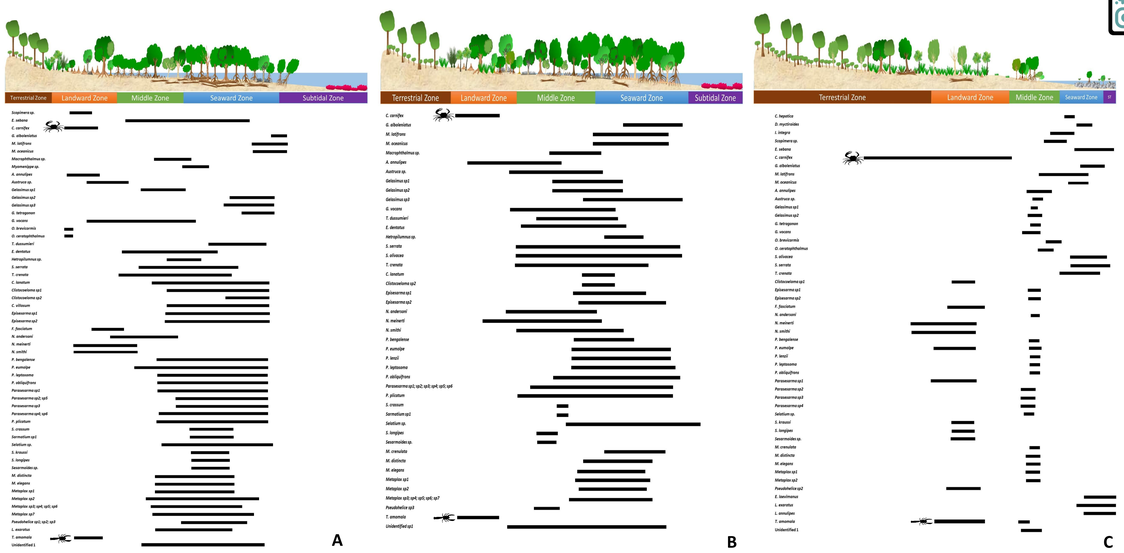


Fig. 5. Mangrove crab zonation pattern across subsided *(A),* control *(B),* and uplifted *(C)* site. Black bars depicts the occurrence range.

Conclusion

- Coastal uplift simulating sea level drop had profound impact on the crab community than the Coastal subsidence simulating sea level rise
- Both scenarios created new microhabitats for mangrove crabs, especially for *C. carnifex* & *T. anomala* at uplifted sites and Varunid & Sesarmid crabs at subsided sites
- Response of each crab group to elevational changes varied significantly however, species-specific response needs further evaluation
- Our study generated first post-tsunami baseline data on mangrove crab species richness across Andaman Islands; however, more studies on population abundance, recruitment patterns, habitat utilization and functional diversity will generate deeper ecological insights

References & Field Photos (Scan QR)

Wider impacts of the work

1. Laid foundation for mangrove crab ecological studies in the A&N Islands
2. Transgression and progradation of specific crab species can be used as bioindicators for sea level changes
3. Similar event elsewhere will help identify crab response & evaluate effects of coastal changes on crabs' ecosystem engineering activities

Acknowledgements

Department of Science and Technology for funding. Forest Department, A&N Islands for logistics support and permissions. Mr. Thirumurgan V, Mr. Nikunju, Mr. Sekhu, Mr. Justin for field logistics & support.

Contact

MF: fiddoca99@gmail.com (+91 9345531893)
ARS: anooprajsingh23@gmail.com
NP: nehrumcc@gmail.com / nehrup@wii.gov.in

WII is a premier institute dedicated to wildlife conservation biology and ecological studies in India.