



Geospatial Techniques for Vulnerability Assessment of Coastal Areas & Mangrove Eco-Restoration in Andhra Pradesh

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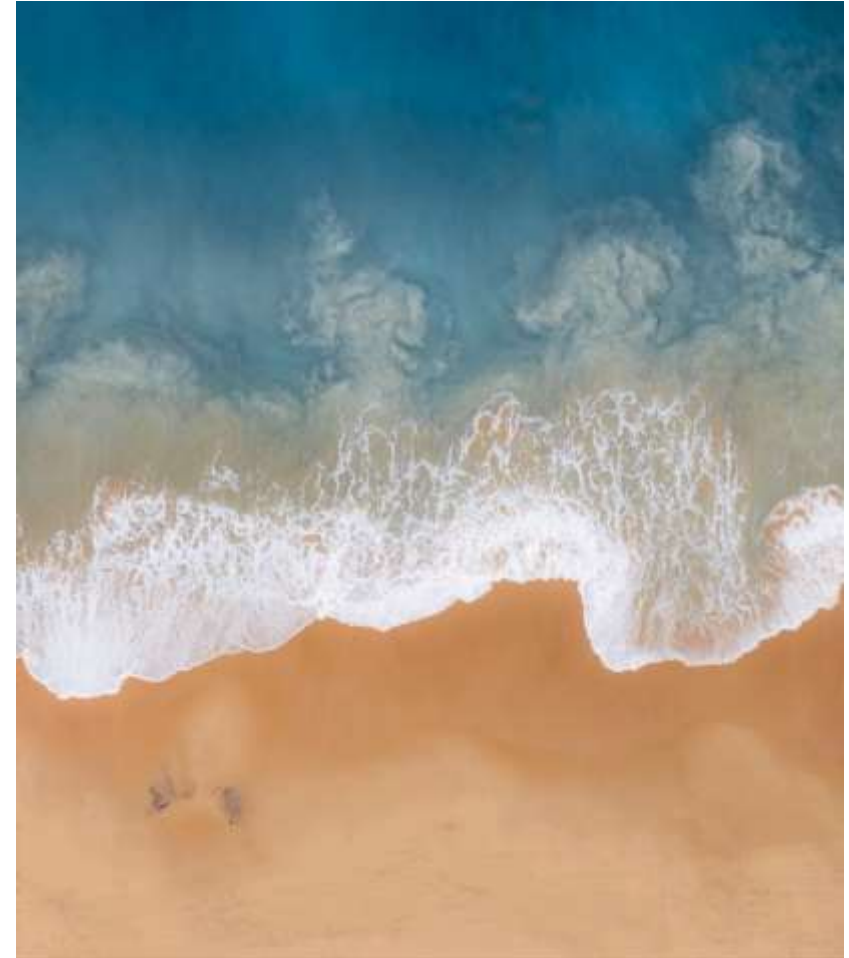
CONTENTS

I Assessment of Shoreline Changes and Erosion Hotspots

II Coastal Composite Hazard Line Mapping

III Climate Change Vulnerability Assessment of Critically Vulnerable Coastal Areas (CVCA)

IV Prioritizing Mangrove Restoration Sites through Habitat Suitability Models



I. Assessment of Shoreline Changes and Erosion Hotspots

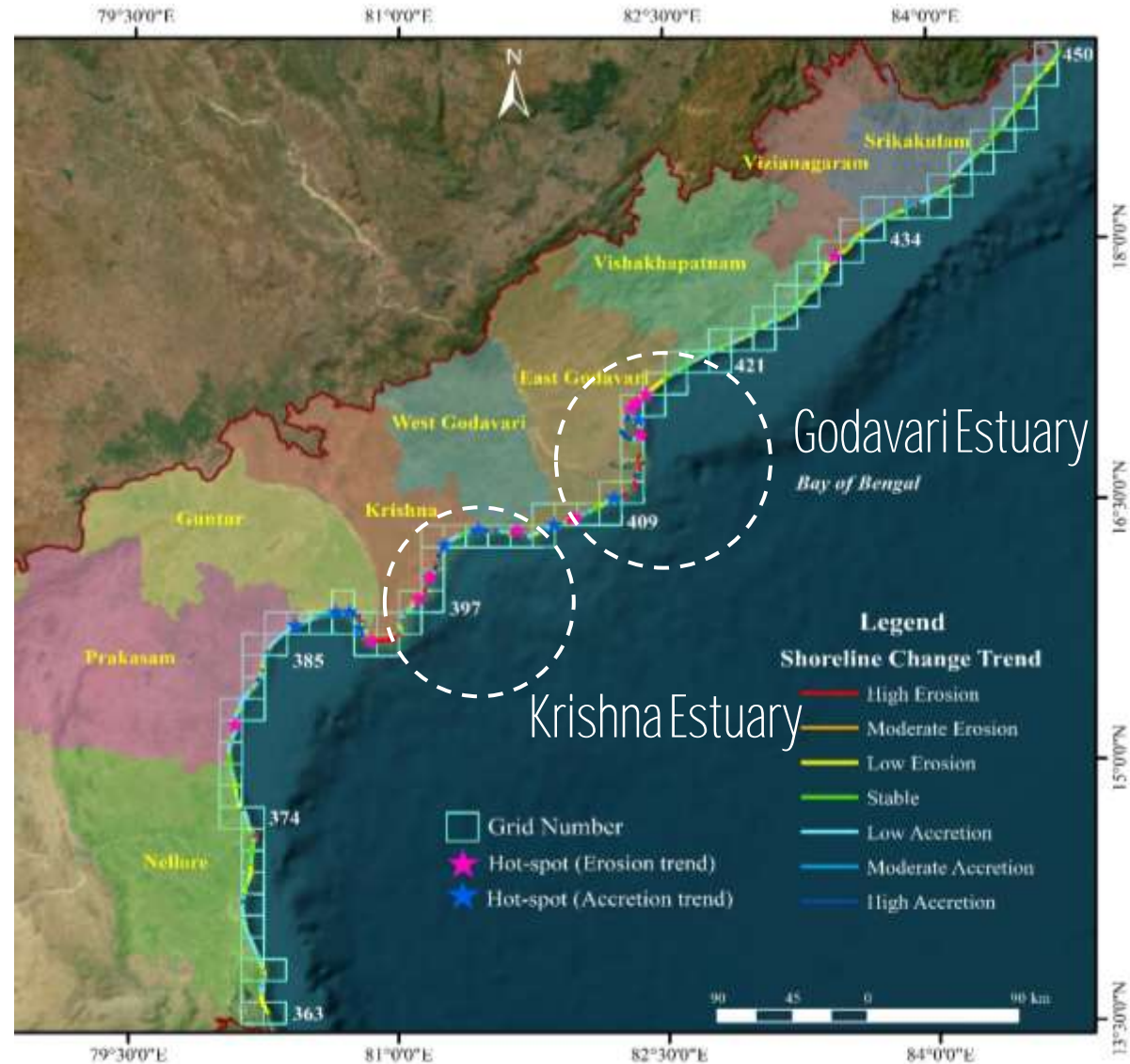
The National Centre for Coastal Research (NCCR) has carried out a study on shoreline changes along the mainland of Indian coast.

Methodology: Weighted Linear Regression (WLR) rate:

- Determined by plotting the shoreline positions w.r.t time and calculating the linear regression equation
- Used for long-term shoreline change studies

The coastal districts of **East Godavari, Vizianagaram, Krishna and West Godavari** (prior to reorganization) are the major erosion hotspots in the state.

District Name (Old)	Coastal Length (km)	Erosion
		In (%)
Nellore	172.1	31.0
Prakasam	107.18	12.8
Guntur	64.24	11.7
Krishna	133.36	43.2
West Godavari	17.98	43.0
East Godavari	189.84	47.0
Visakhapatnam	136.98	18.8
Vizianagaram	32.78	45.3
Srikakulam	173.12	14.5
Total	1027.58	28.7



Source: National Centre for Coastal Research (NCCR)

II. Coastal Composite Hazard Line Mapping: Using Aerial Photography

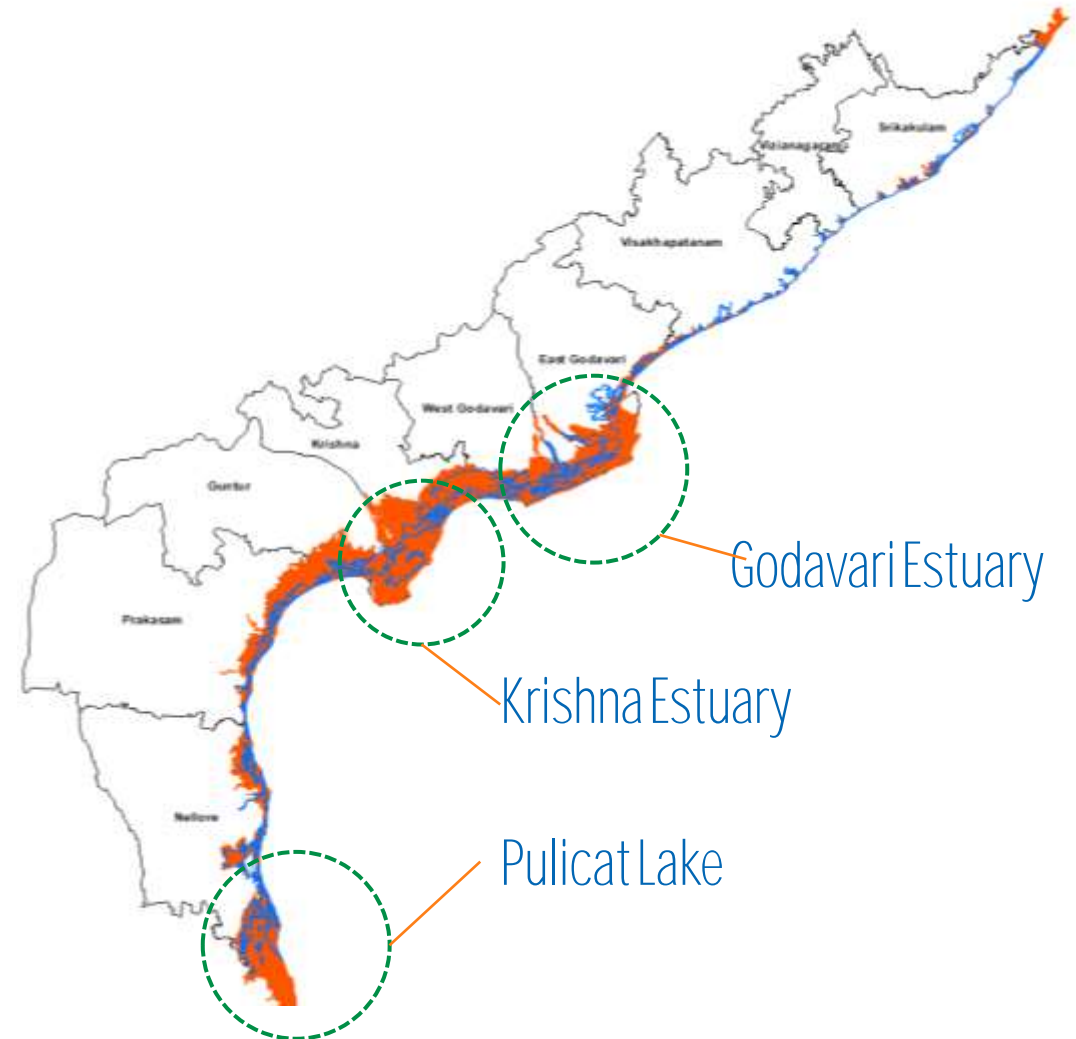
The hazard line for the entire mainland coast is being mapped and delineated by National Centre for Sustainable Coastal Management (NCSCM)

Delineation of Hazard Line

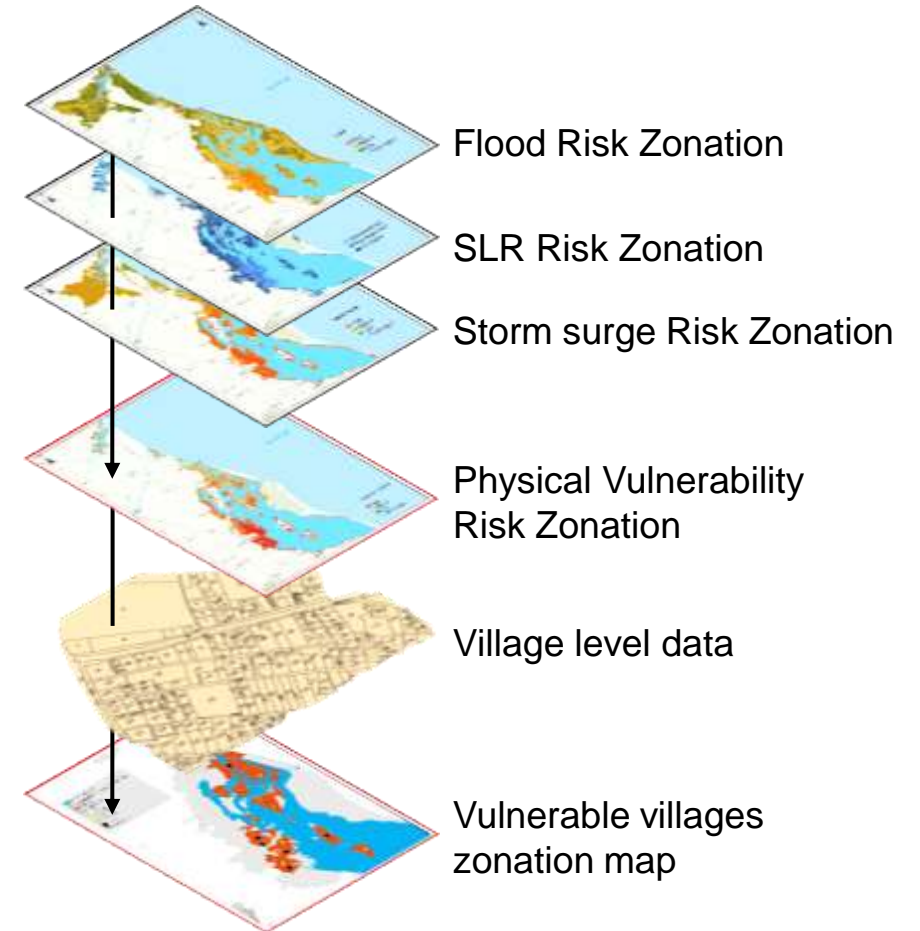
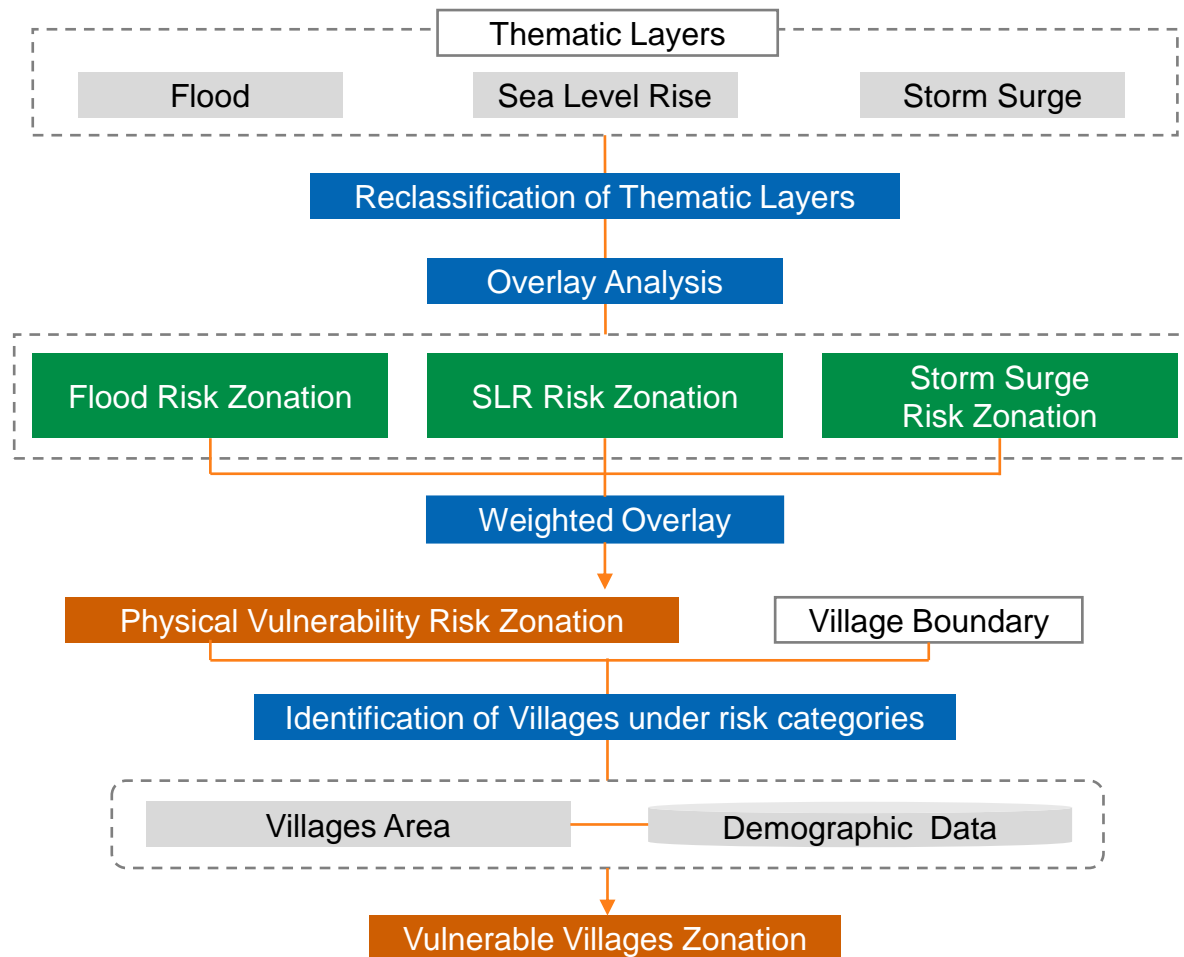
- The higher the erosion and flood line, the higher the hazard line.
- This line is demarcated on the Digital Elevation Model (DEM) developed from aerial photography being carried out all along the coast up to 7 km from the coast.

Output from Hazard Line Mapping

1. Contours with 0.5m (2.5 m for hills)
2. Flood level with 100 years return period
3. Predicted shoreline of 100 years
4. Composite hazard line (the most landward of the 100-year flood line & erosion line)



III. Climate Change Vulnerability Assessment of Critically Vulnerable Coastal Areas (CVCA) | Methodology



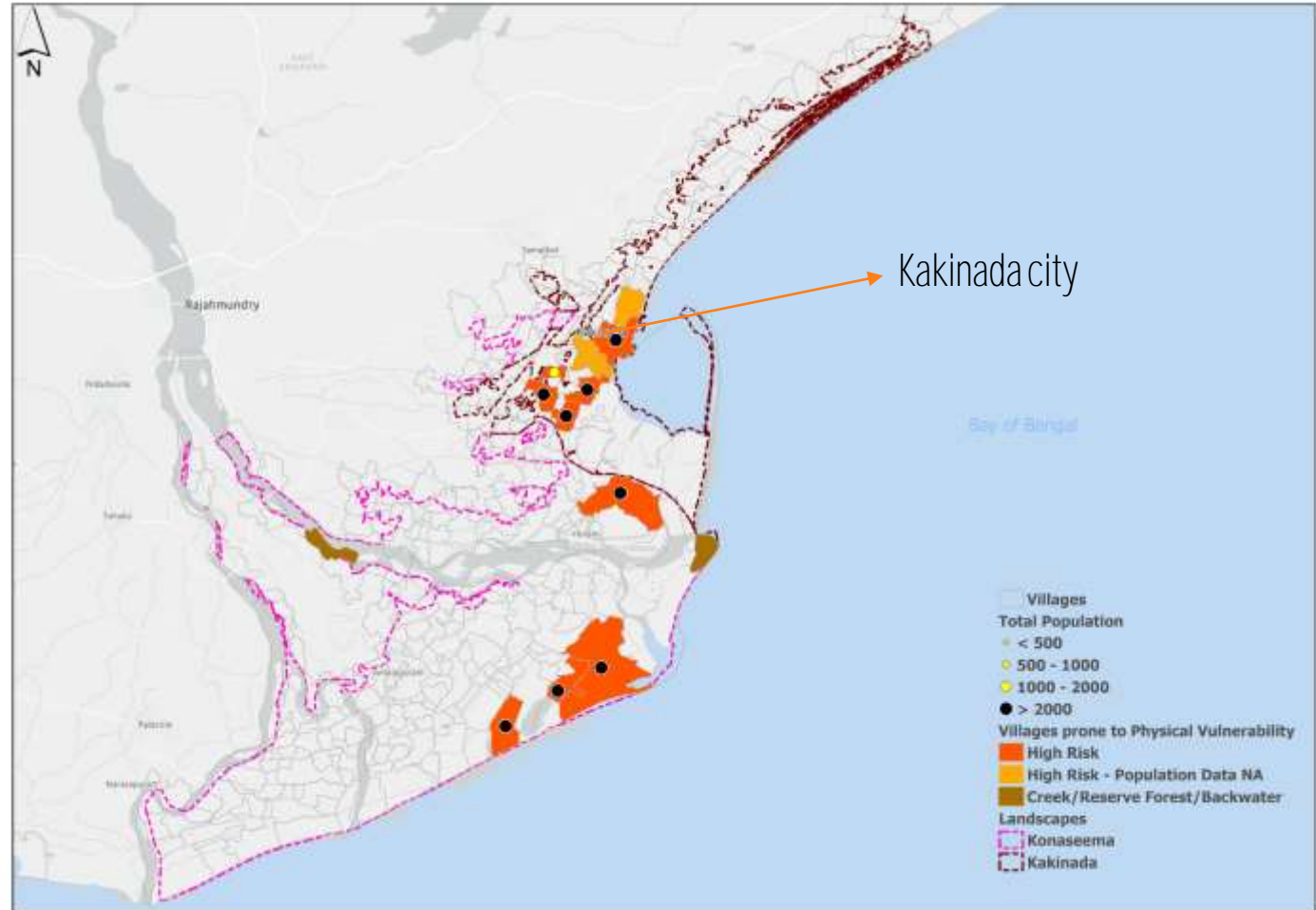
CASE - CVCA - Godavari Estuary

18,000-20,000 ha (approx.)
Total Area of the estuary

16
Villages under High risk

Kakinada
City under High risk

3.93 Lakhs
Population under High risk



Way Forward

To reduce coastal erosion and physical vulnerabilities along coastlines using geospatial techniques, several strategies can be implemented:

- Coastal Monitoring: This includes **monitoring beach erosion, sediment movement, and shoreline shifts**, which can provide early warnings of vulnerabilities
- Erosion Control Structures: Implement geospatial techniques to plan and construct erosion control structures **such as seawalls, breakwaters, and groins** in vulnerable areas.
- Restoration of Natural Barriers: Geospatial data can aid in identifying suitable locations for the restoration of natural barriers like **mangroves, shelterbelt plantations and dunes**.
- Emergency Response Planning: This includes creating **evacuation routes, identifying safe shelters, and developing early warning systems** for tsunamis and storms.

Integration
into Kakinada
Smart City
plan

- To integrate the climate adaptation elements
- To develop ecological infrastructure to address CC issues
- **Coastal Calculator** tool will act as a decision support system in designing infrastructure
- Facilitate state-level interdepartmental platforms

• SHORELINE MANAGEMENT PLAN

Sea Wall



Sea Wall and Riprap



Salt Marsh



Coral



Mangrove



Oyster



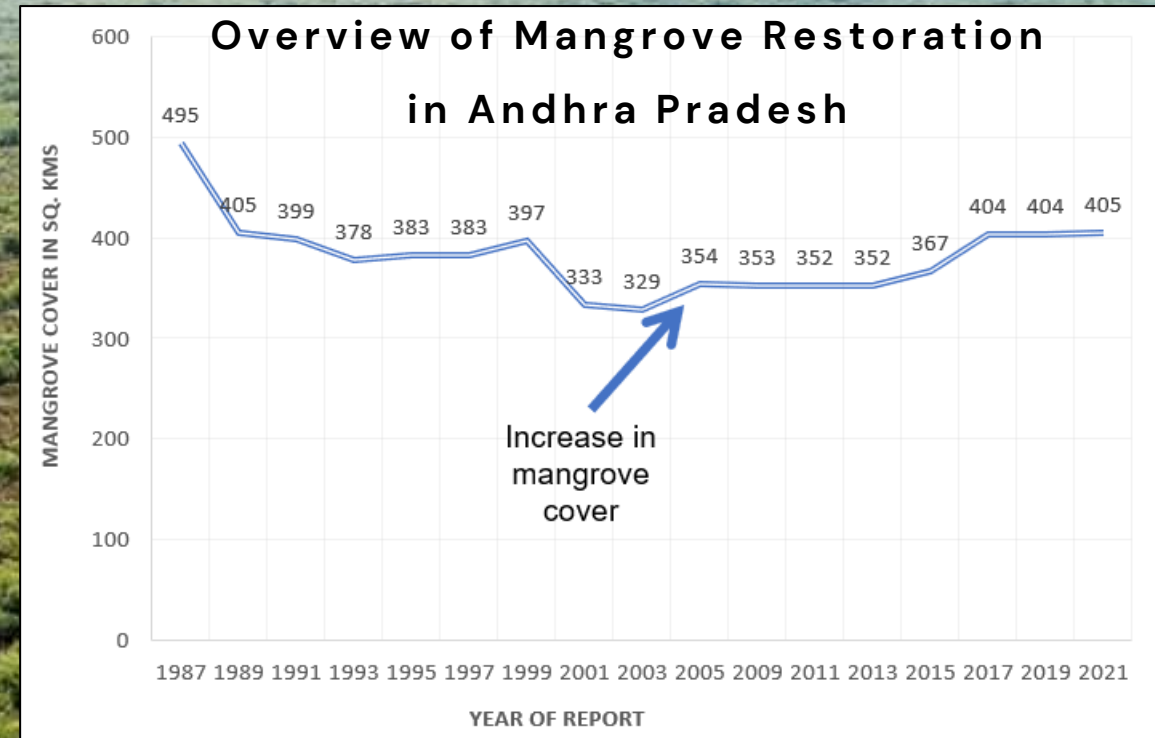
Dunes



IV MANGROVE ECO-RESTORATION

Positive trend

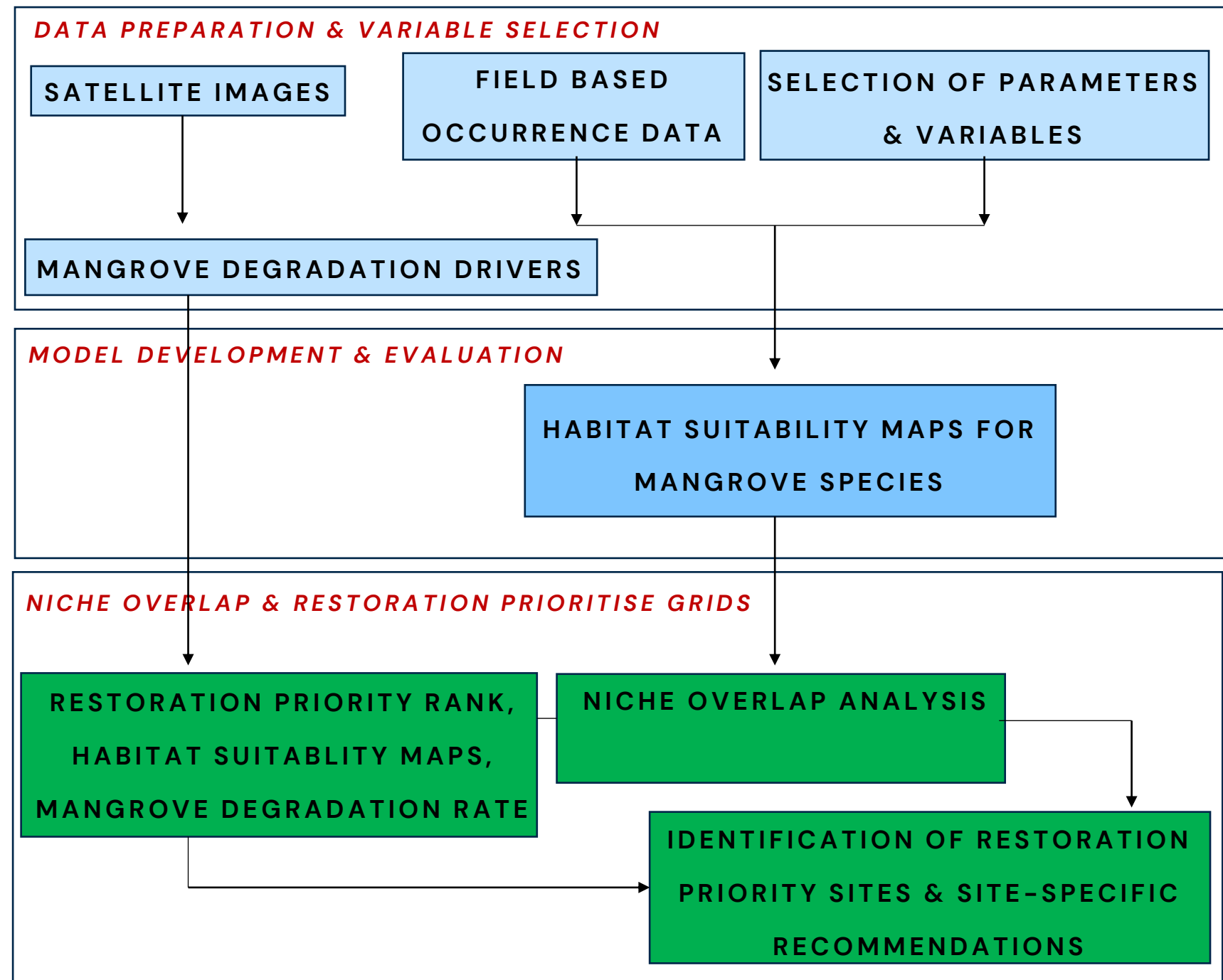
- ✓ Eco-restoration efforts have expanded mangrove cover.
- ✓ In Krishna estuary natural regeneration & hydrological rehabilitation have increased mangrove cover from **221.8** sq. kms in 2010 to **278.8** sq. kms in 2023
- ✓ Around **57** sq. kms increase in a span of 13 years



Source: Forest Survey of India

Way Forward

PRIORITIZING
MANGROVE
RESTORATION
SITES THROUGH
HABITAT
SUITABILITY
MODELS



ECOLOGICAL ENGINEERING

THANK YOU

Pallam Village

