

MAPPING CRITICAL COASTAL AND MARINE HABITATS FOR RESTORATION

Deepak Samuel V, Ph.D.

Scientist E & Project Lead (i/c)

Conservation of Coastal and Marine Resources Division (CMR)

National Centre for Sustainable Coastal Management (NCSCM)

Ministry of Environment, Forest & Climate Change (MoEFCC)

Government of India, Chennai

ICZM – NCSCM

ACTIVITY

Demarcation of hazard line

78,000 km² of mainland coast of India mapped using aerial photography to delineate composite hazard line (flood line and erosion line), for a total length of 56,661 km



Demarcation of coastal sediment cells

- 26 coastal sediment cells demarcated with 10 sediment cells on the west coast and 16 on the east coast
- Sediment cells used as coastal boundaries for preparation of ICZM plan



Delineation of Ecologically Sensitive Areas (ESA)

- 34127 km² of ecosystems, habitats, geomorphological features and archeologically and historically important sites delineated for 11 Ecologically Sensitive Areas
- 12 Critically Vulnerable Coastal Areas (CVCA) demarcated and used in CZMP



OUTPUTS

CRZ-IA Areas (Ecologically Sensitive Areas - ESA)

As per para 2.1.1 of the CRZ Notification, 2019

Mapping of Ecologically Sensitive Areas as detailed in the CRZ Notification

- (a) Mangroves
- (b) Coral reefs
- (c) Sand Dunes
- (d) Mudflats
- (e) Marine Protected Areas, Reserve Forests, Marine Biosphere Reserves
- (f) Salt Marshes
- (g) Turtle nesting grounds
- (h) Horse shoe crabs habitats
- (i) Sea grass beds
- (j) Nesting grounds of birds
- (k) Areas/ structures of archaeological importance and heritage sites



I. Ecosystems & 2. Habitats



Mangroves



Corals



Seagrass



Salt marsh



Bird Nesting Sites



Turtle Nesting



Horseshoe Crab Habitat

3. Geomorphological Features & 4. Others



Sand Dunes



Mudflats

Significance of ESAs:

- **Bio-shield** (e.g. mangroves, sand dune)
- **Livelihood** (e.g. fishing, tourism etc.)
- **Habitat** (reef fish, turtle nesting, bird nesting, horseshoe crab, etc.)

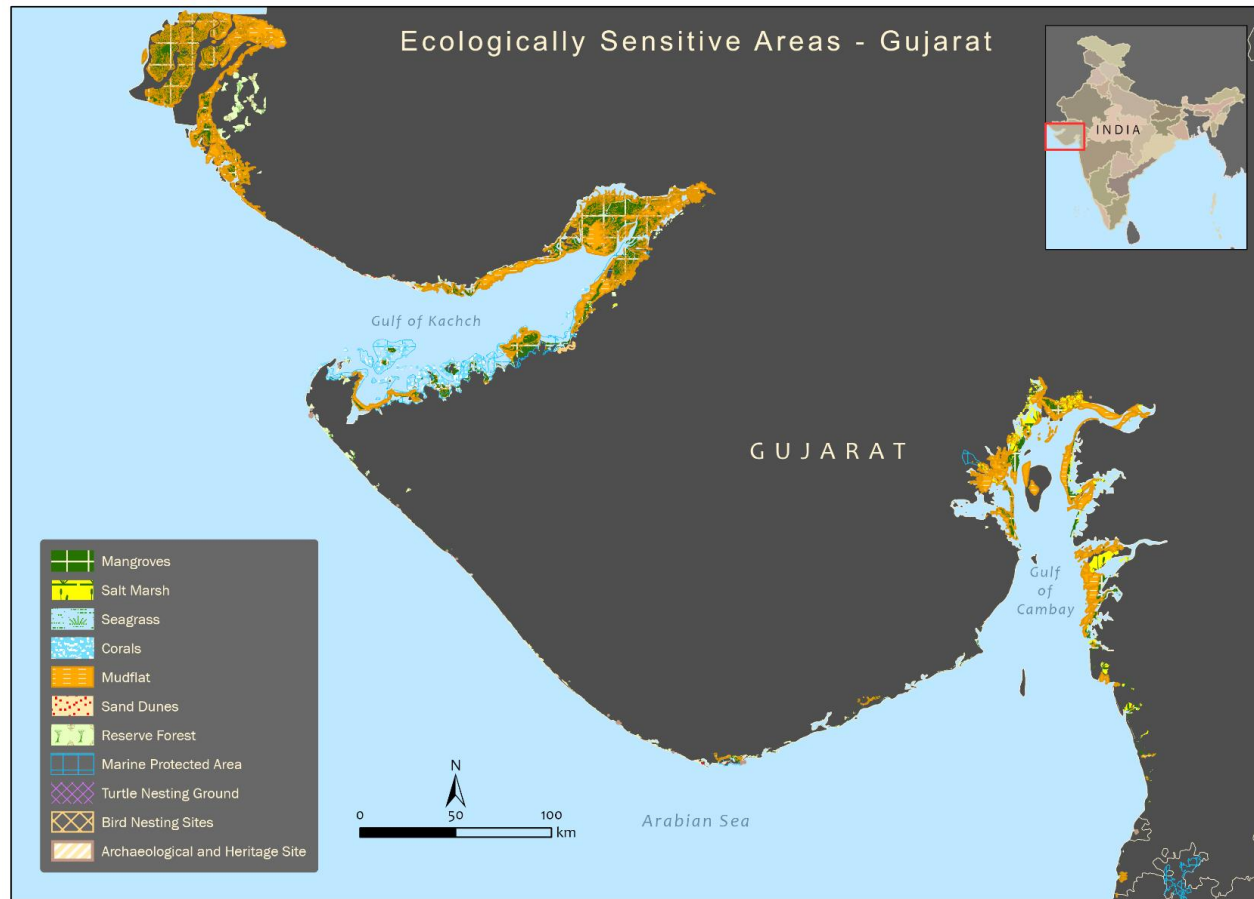


Heritage Site

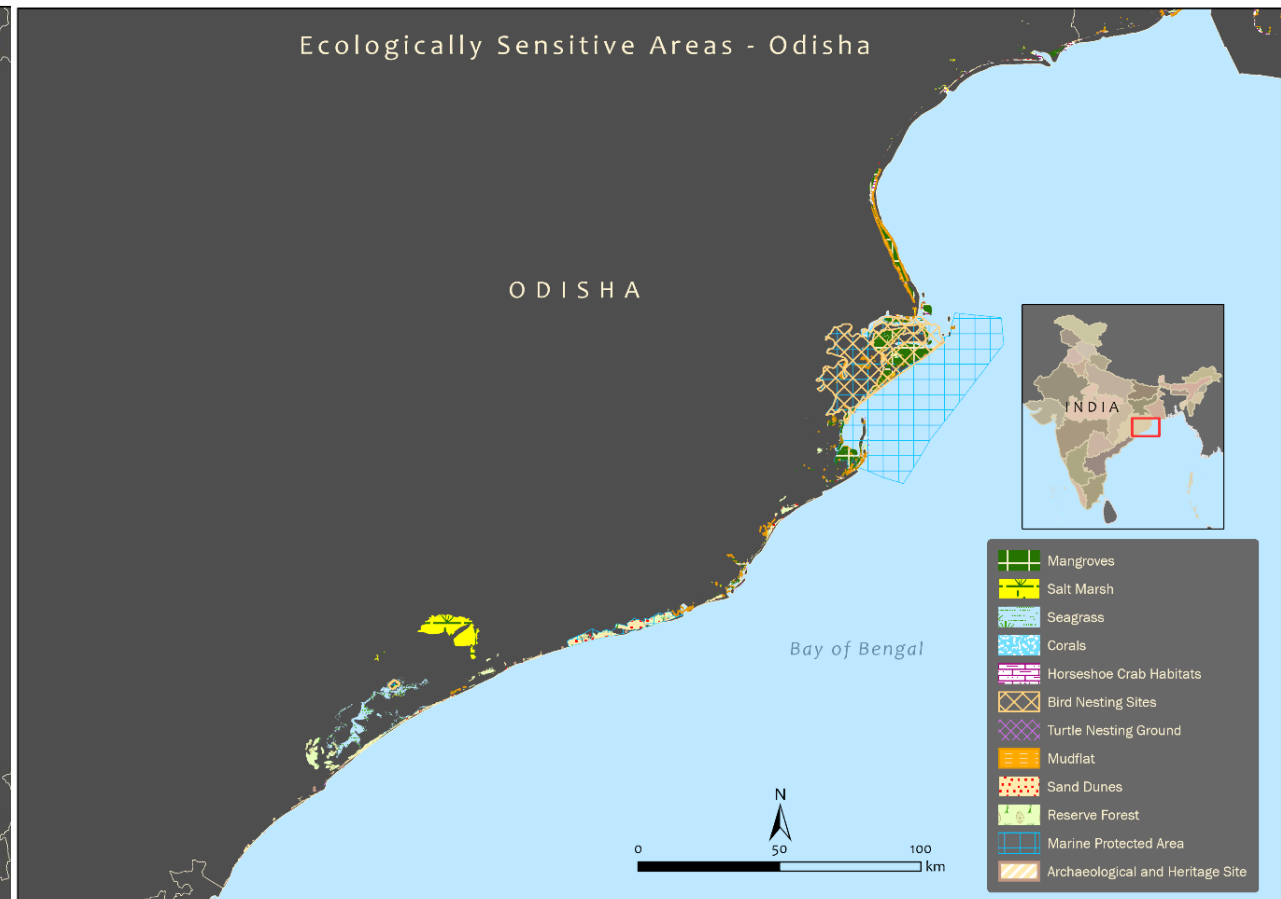


Archaeological Site

Maps of CRZ-IA - Examples



Gujarat on West Coast



Odisha on East Coast



COASTAL ZONE MANAGEMENT PLAN
TAMIL NADU

Sheet No: C 44 M 8 / SW

Prepared - UTM Datum - WGS 1984

Map No. : TN 27



- Legend**
- Light House
 - Fishing Port
 - Fish Landing Centre
 - Road
 - High Tide Line
 - Low Tide Line
 - Reef Wall
 - Fishing Vessels
 - Chennai Metro City Boundary
 - Municipal/Other Urban Areas
 - Village Boundary
 - Tanuk Boundary
 - Breakwater or Jetty
 - Survey Pile
 - Fish Drying or Boat Parking Area
 - Fishing Harbour
 - Fisherman Settlement



- CRZ Lines & Boundary**
- Hazard Line
 - 100 m Line in CRZ II Area
 - 200 m CRZ Line - HCC
 - CVCA Boundary
 - Stand Zone Beyond CRZ Boundary
 - CRZ Boundary
 - Water Line - 100m to Bay - 100 m or width of the creek whichever is less along the low water mark water bodies
- CRZ CATEGORY**
- CRZ - I**
- CRZ - IA
 - 50 m Mangrove Buffer Zone - CRZ IA
 - CRZ - IB
- CRZ - II**
- CRZ - II
- CRZ - IV**
- No Development Zone
 - 200 to 500 m from HTL
- CRZ - IV**
- CRZ - IVA
 - CRZ - IVB



- DATA SOURCE**
- 1) National Centre for Sustainable Coastal Management (NCSCM), U.S. CHS, CHS
 - 2) CRZ - I
 - 3) Mangrove Buffer Zone (Mangrove Buffer Zone - MBBZ)
 - 4) Survey of India
 - 5) Survey of India
 - 6) Survey of India
 - 7) Survey of India
 - 8) Survey of India
 - 9) Survey of India
 - 10) Survey of India
 - 11) Survey of India
 - 12) Survey of India
 - 13) Survey of India
 - 14) Survey of India
 - 15) Survey of India
 - 16) Survey of India
 - 17) Survey of India
 - 18) Survey of India
 - 19) Survey of India
 - 20) Survey of India
- ABBREVIATIONS**
- CRZ - Coastal Regulation Zone
 - HCC - Hazardous Coastal Corridor
 - CVCA - Coastal Vulnerability Coastal Area

PREPARED AS PER COASTAL REGULATION ZONE NOTIFICATION 2011

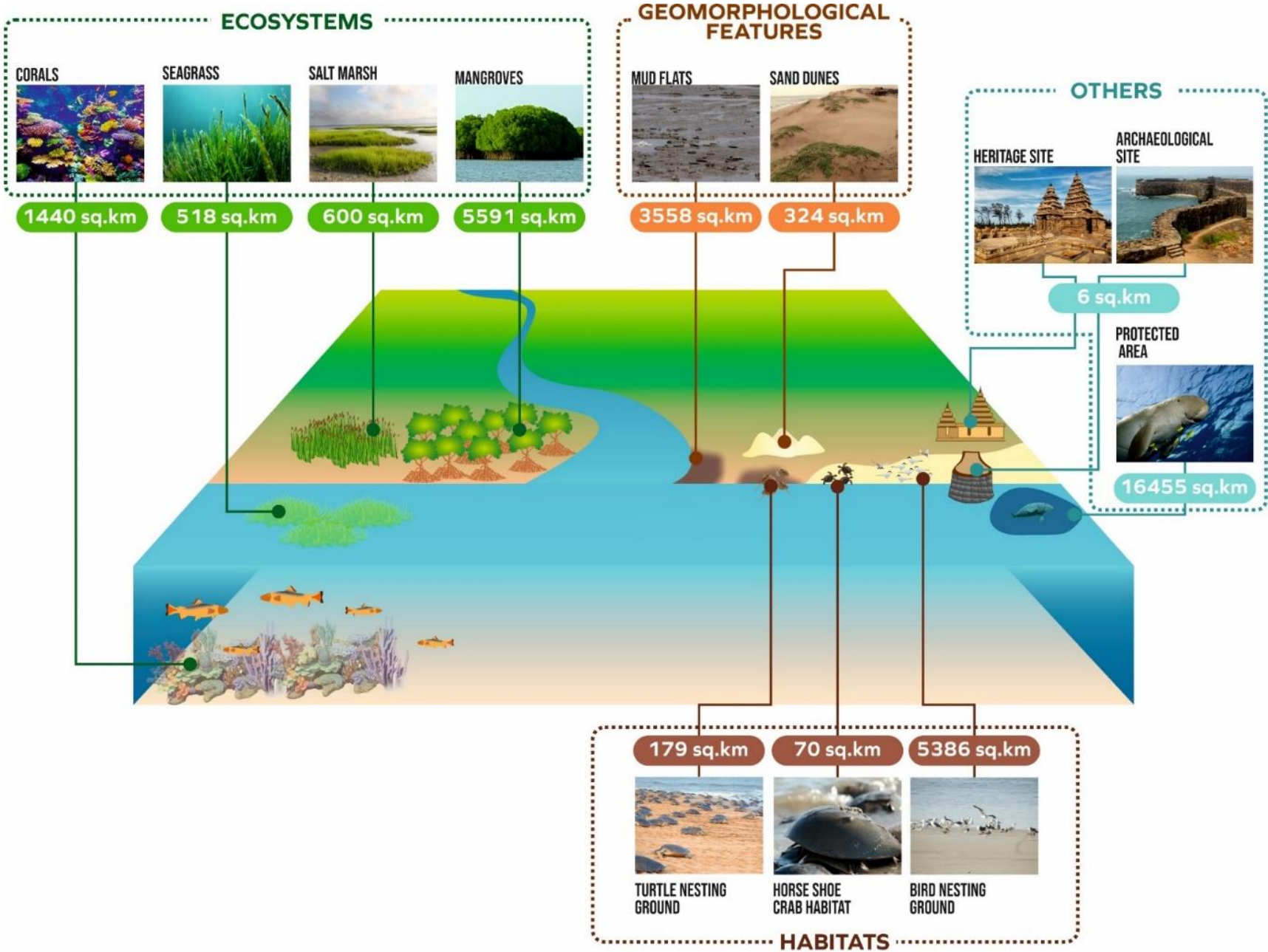
Scrutinized by	Certified by	Approved by
Technical Director National Centre for Sustainable Coastal Management	Director National Centre for Sustainable Coastal Management	Director National Centre for Sustainable Coastal Management

Prepared by
NCSCM
National Centre for Sustainable Coastal Management
(Ministry of Environment, Forest & Climate Change)
Chennai - 600 025

Prepared for

Department of Environment
Government of Tamil Nadu


Ecologically Sensitive Areas along Indian Coastline



34127 sq km of 11 identified ESA mapped



Legend

 Mangroves
(Area : 11.008 Sqkm)



Acanthus ilicifolius



Aegiceras corniculatum



Avicennia alba



Avicennia marina



Avicennia officinalis



Bruguiera gymnorrhiza



Ceriops decandra



Excoecaria agallocha

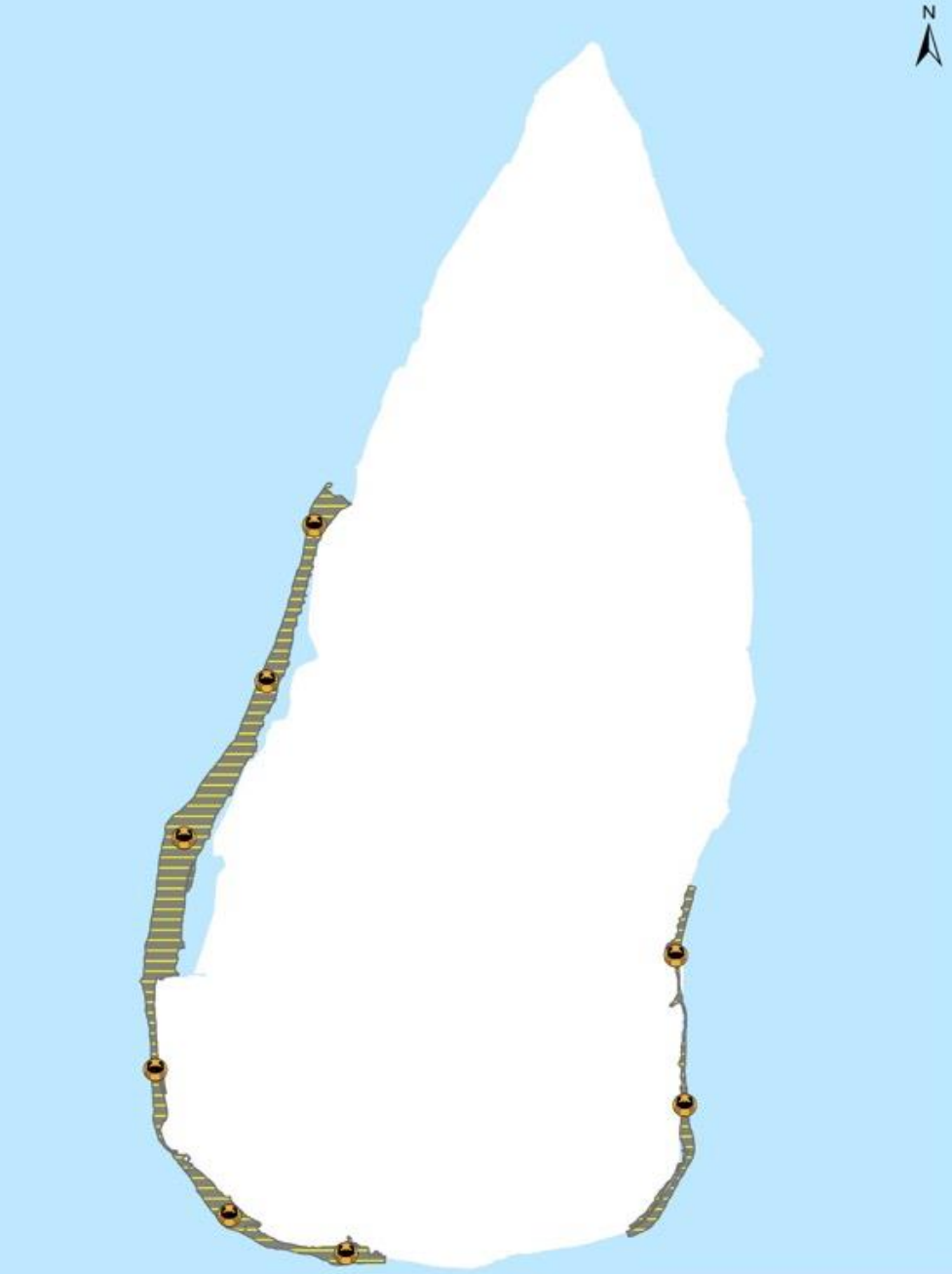


Sonneratia apetala


Key Locations

Kastala, Mandirtala, Naraharipur, Krishnanagar, Mahishamari-
Chandipur, Sagar, Gangasagar, Chemaguri, Benuvan,
Mritunjaynagar, Kayalapara, Govindapur, Sikarpur

Distribution of mangroves in Sagar Island



Legend

 Horseshoe crab Habitat
(Area : 9.77 Sqkm)







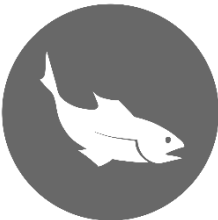




Key Locations

Continuous stretch from Gangasagar in the south to Naraharipur in the north-west. Along the mudflats of Chemaguri and Bankimnagar on the eastern side.

Horseshoe crab habitats of Sagar Island

NATURAL RESOURCES IN SAGAR ISLAND

ECOSYSTEMS	<p>Mangroves</p>  <p>11.01 sq km</p>	<p>Salt marsh</p>  <p>0.375 sq km</p>		
HABITATS	<p>Horseshoe crab Habitat</p>  <p>9.77 sq km</p>	GEO-MORPHOLOGICAL FEATURES	<p>Mudflat</p>  <p>15.16 sq km</p>	<p>Sand dune</p>  <p>0.395 sq km</p>
OTHERS	<p>Wetlands</p>  <p>Creeks, Estuaries, Ponds</p>	<p>Fisheries</p>  <p>Hilsa, Bombay Duck, Sardine, Anchovies</p>	<p>Biodiversity Hub</p>  <p>Sacred Groves</p>	<p>Non-Living</p>  <p>Minerals</p>





Myriostachya wightiana



Porteresia coarctata



Salicornia brachiata



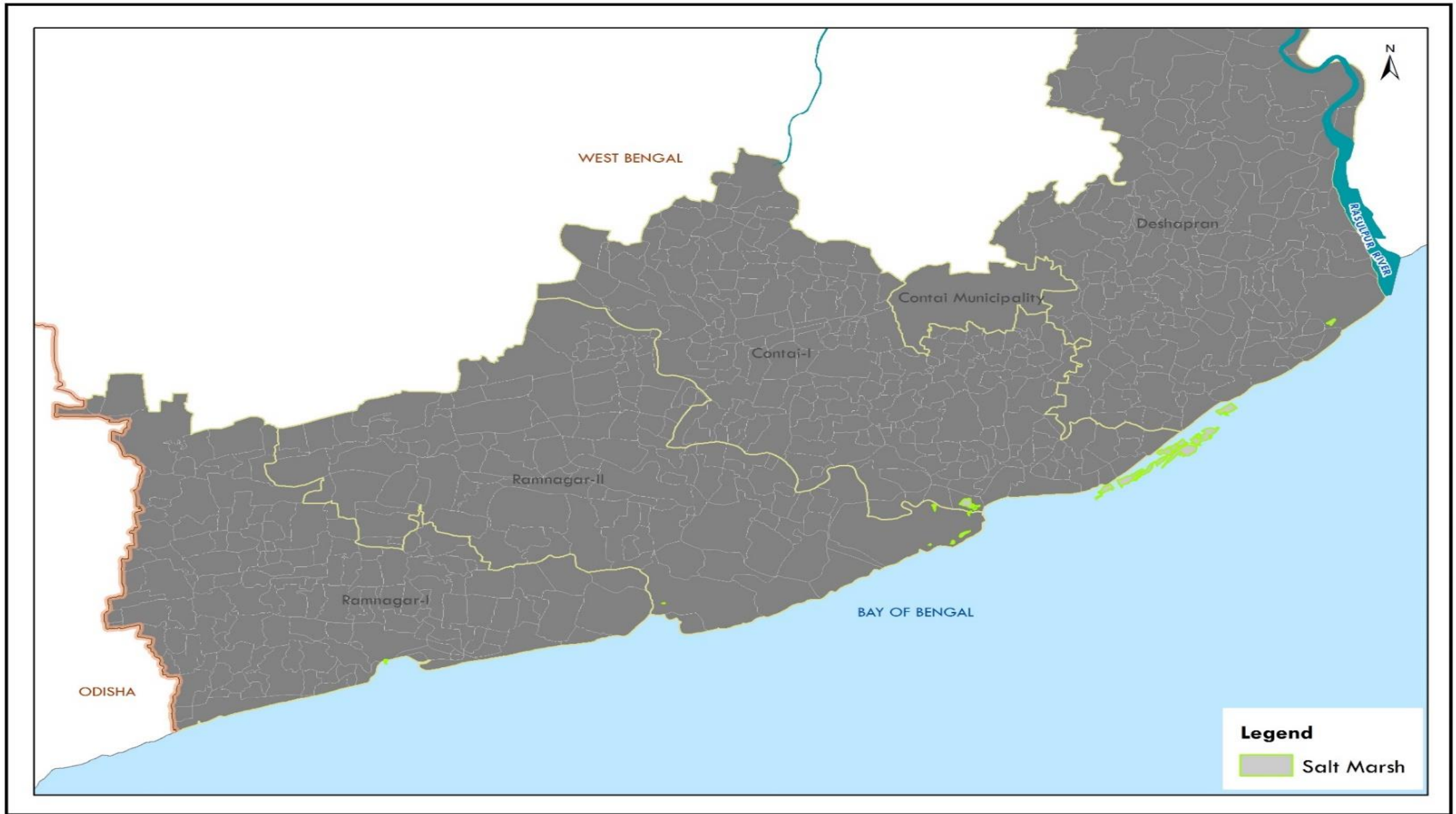
Suaeda maritima



Suaeda monoica



Sesuvium portulacastrum



Distribution of salt marshes along the Digha-Sankarpur coastal area (current status - 2017)

PARTICIPATORY COASTAL RURAL APPRAISAL (PCRA)



PCRA at Sagar Island



PCRA at Digha-Sankarpur

PCRA FINDINGS FROM SAGAR ISLAND

KEY FINDINGS	EXPLANATORY TEXT
Mangrove loss	Mangrove cover had declined in the last 20 years but mangrove plantation initiatives were undertaken by Forest Department
Salt marsh used as food and fodder	Certain salt marsh species are collected for domestic cooking and also sold in the local market. It is also give as cattle feed. Historically salt marsh was used to catch crabs
Decline in horse shoe crabs	Trawling close to the shore has resulted in the increased and unsustainable mortality of horse shoe crabs
Increased Aquaculture activities	Conversion of agriculture land for brackish water aquaculture of shrimps and collection of wild shrimp seeds (post larvae) is on the rise
Erosion	Construction of embankments due to erosion
Decline in fisheries	Decline in the populations of food fish species like <i>boyal</i> and <i>bam</i> . <i>Bekti</i> , <i>Hilsa</i> , <i>Bombay duck</i> and ribbon fish are also used to make salted dry fish. <i>Vola</i> and <i>Chingri</i> are targeted fishery resources
Less connectivity	Islanders stressed the need for constructing a bridge from Kakdwip to Sagar for better connectivity especially for selling of fish catch

PCRA conducted in four villages namely –
Gangasagar,
Radhakrishnapur,
Gobindapur and
Krishnanagar

CVCA: Provisions & Status



- **CRZ Classification:**

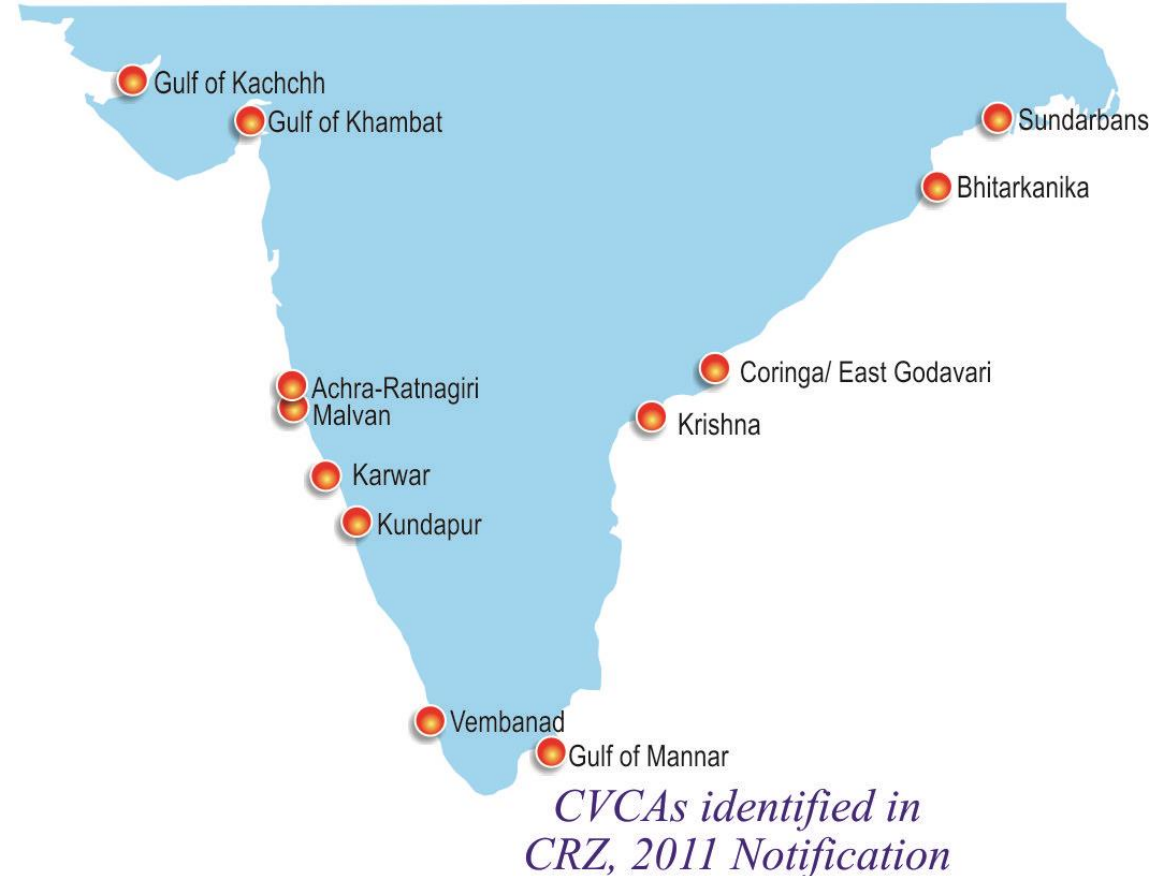
CRZ Notification 2011 classified CRZ area for the purpose of conserving & protecting the coastal areas & marine waters as follows:

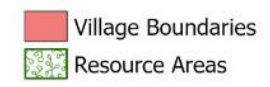
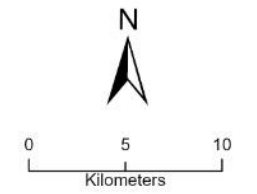
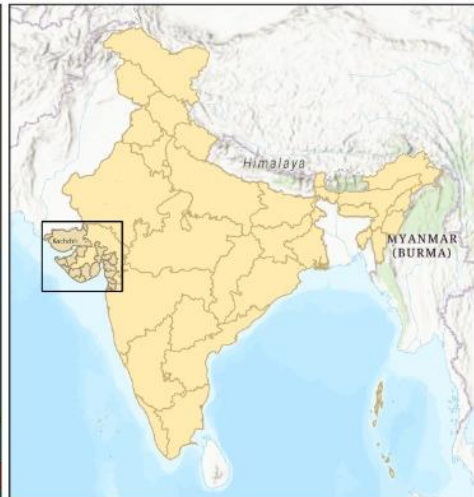
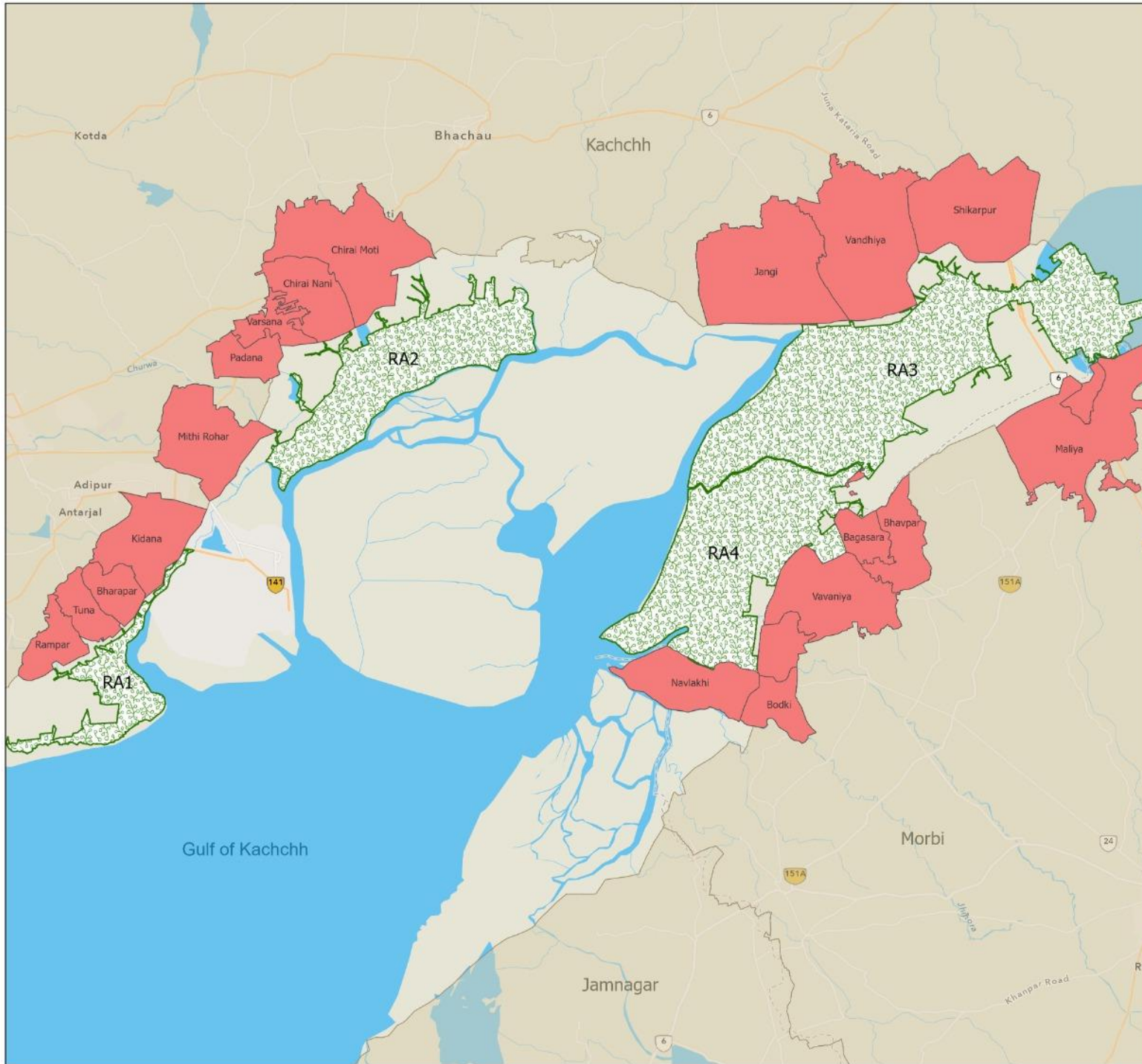
- CRZ-I
- CRZ-II
- CRZ-III
- CRRZ-IV
- CRZ areas of Greater Mumbai, Kerala & Goa
- **Critically Vulnerable Coastal Areas (CVCA)**

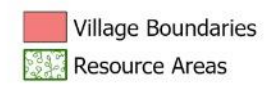
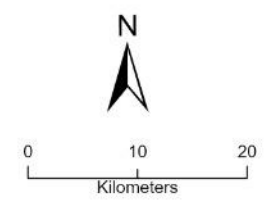
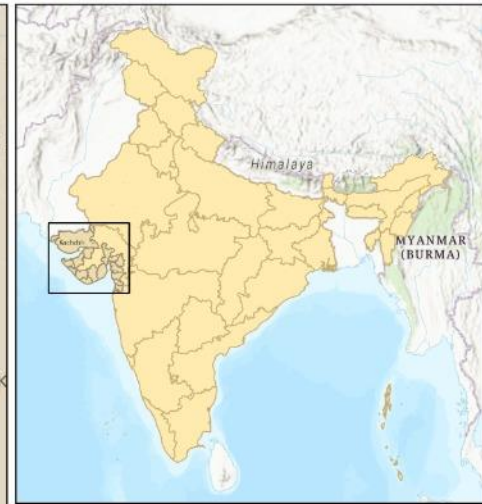
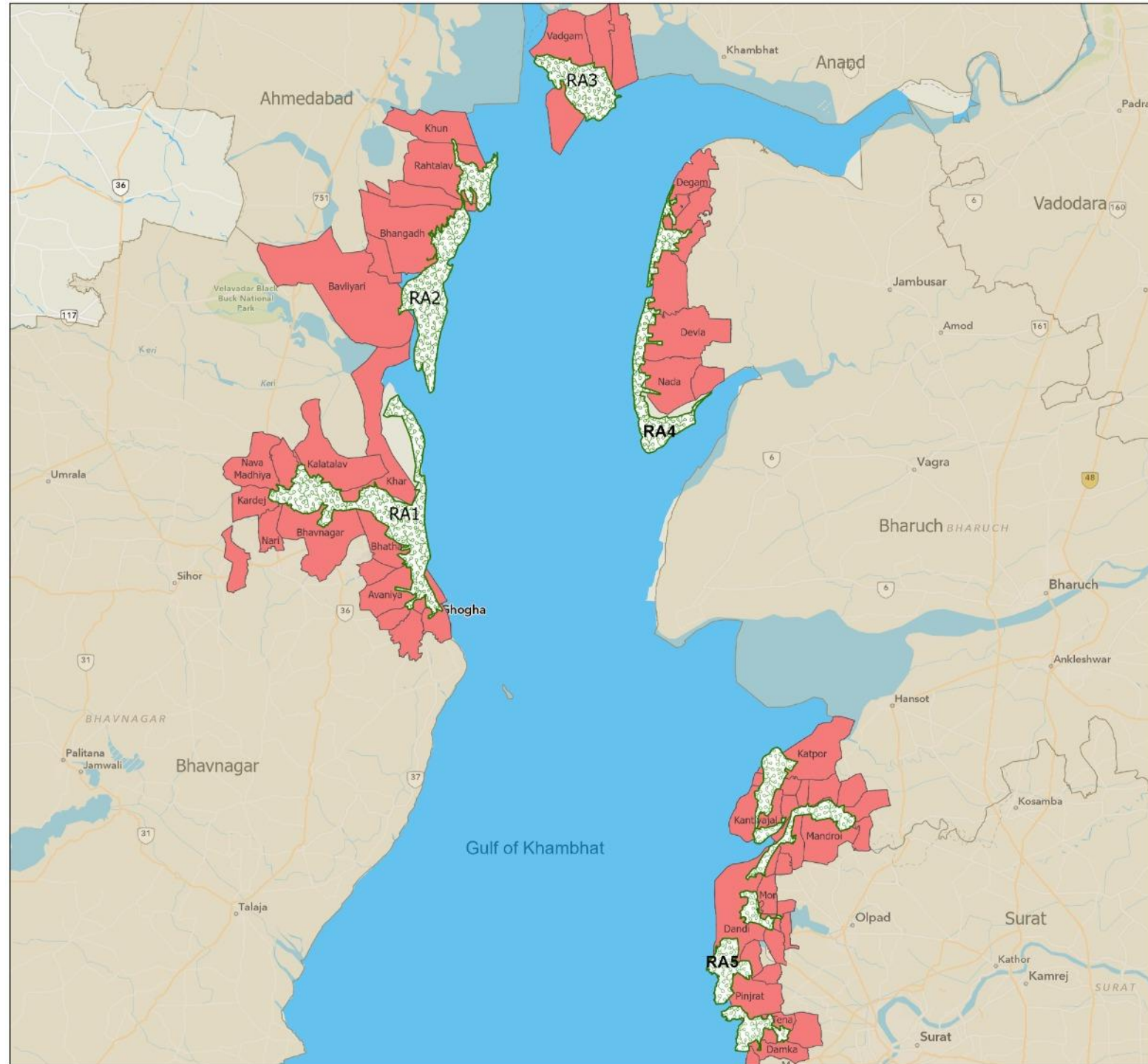
- **CVCA: *Identified ESAs*** to be managed by the local community including the fisher folk (Section 4(a) of CRZ 2011)

- **12 CVCA's listed**

A step towards promoting conservation and sustainable use of coastal resources and habitats.







SOME SAMPLE OUTPUTS – ANDHRA PRADESH

Bapatla Landscape

Adavuladeevi

Adivi

Allur

Amudalapalli

Chirala (Rural)

Dindi

Ganapavaram

Kankatapalem

Nizampatnam

Pedapalle

Perala

Perali

Pregnam

Krishna Landscape

Forest

Ganapeswaram

Interu

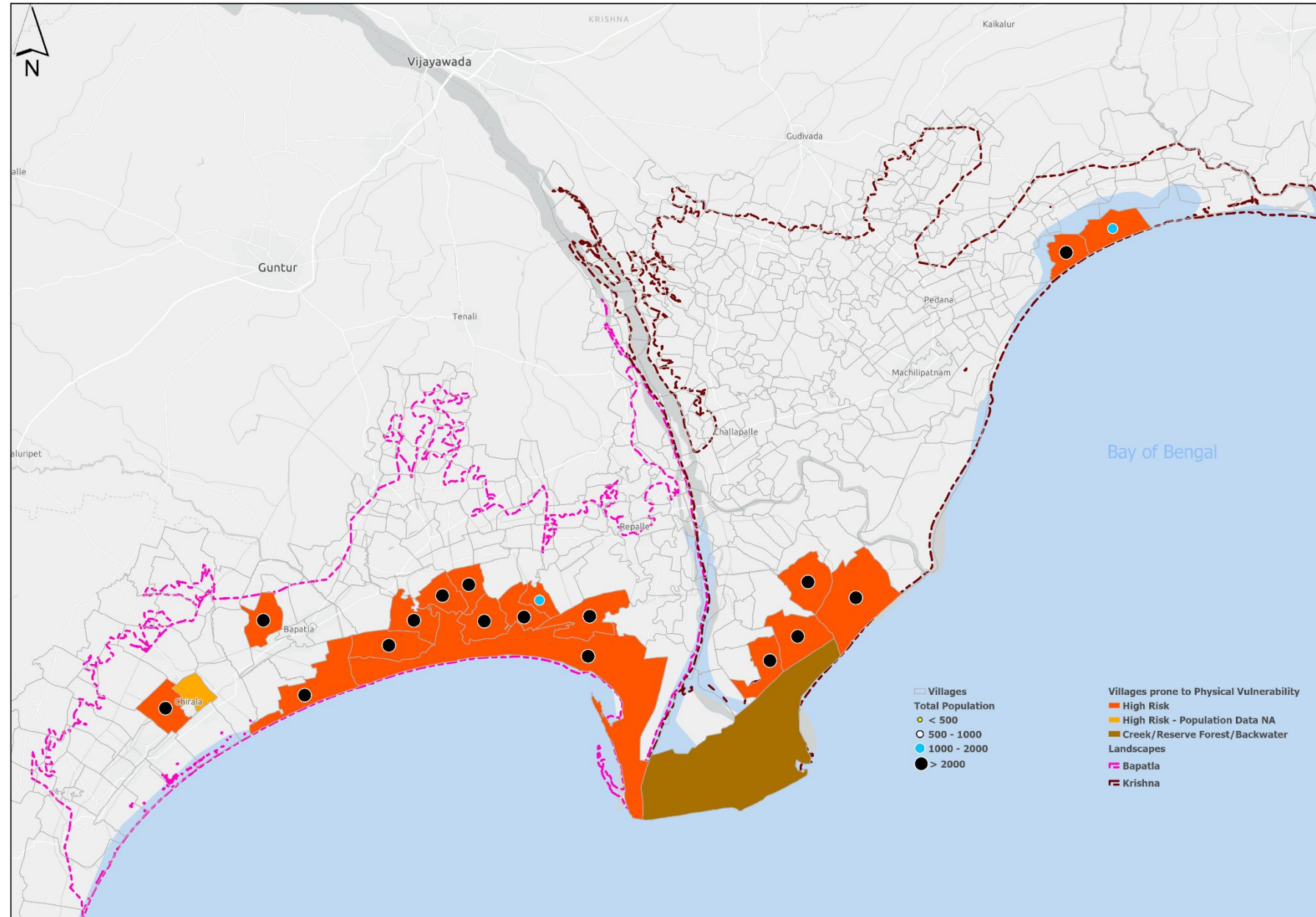
Kammanamolu

Koduru

Mandapakala

Pedayadara

Ramakrishnapuram



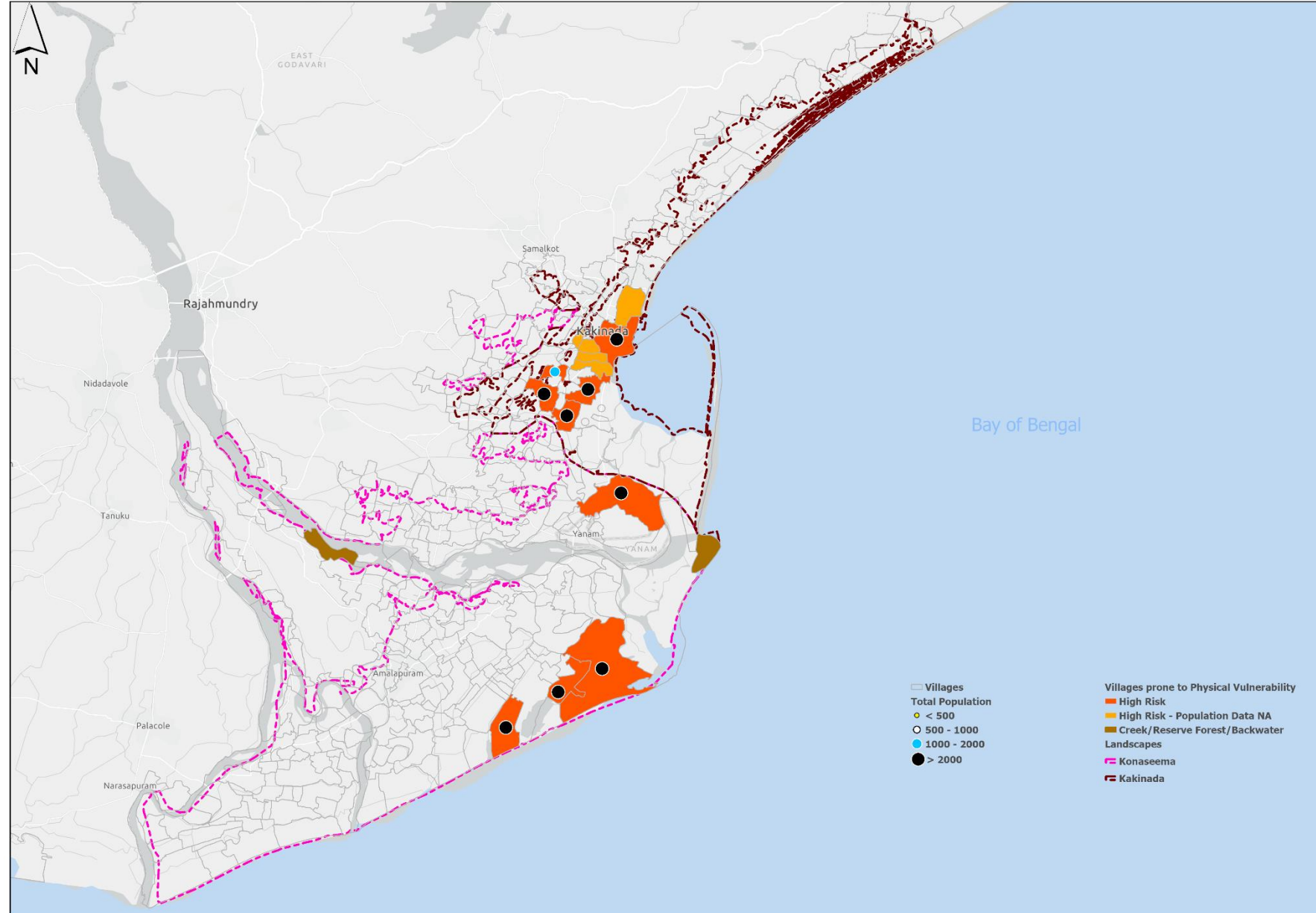
SOME SAMPLE OUTPUTS – ANDHRA PRADESH

Kakinada Landscape

- Chidiga
- Gorripudi
- Gurajanapalle
- Jagannadhapuram
- Kakinada (M)
- Karapa
- Medaline
- Reserved Forest
- Turangi
- Vakalapudi
- Z. Bhavaram

Konaseema Landscape

- Kandikuppa
- Nimmakayala Kothapalle
- Pallamkurru
- Polekurru
- River



SOME SAMPLE OUTPUTS – ANDHRA PRADESH

Srikakulam Landscape

Ampalam

Korlam

Manikyapuram

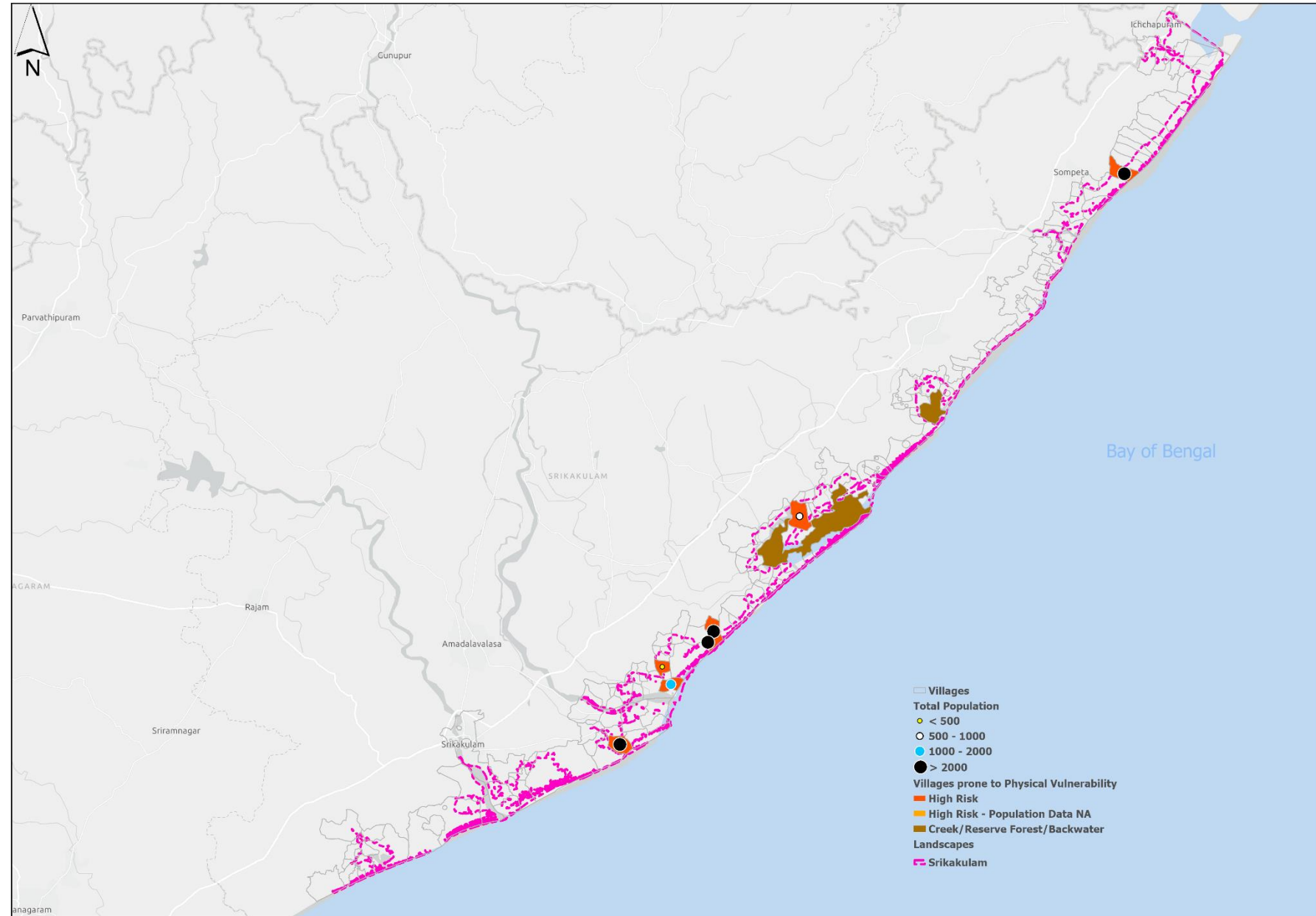
Pundi Backwater

Rajapuram

Tekkali Creek

Vodhipadu

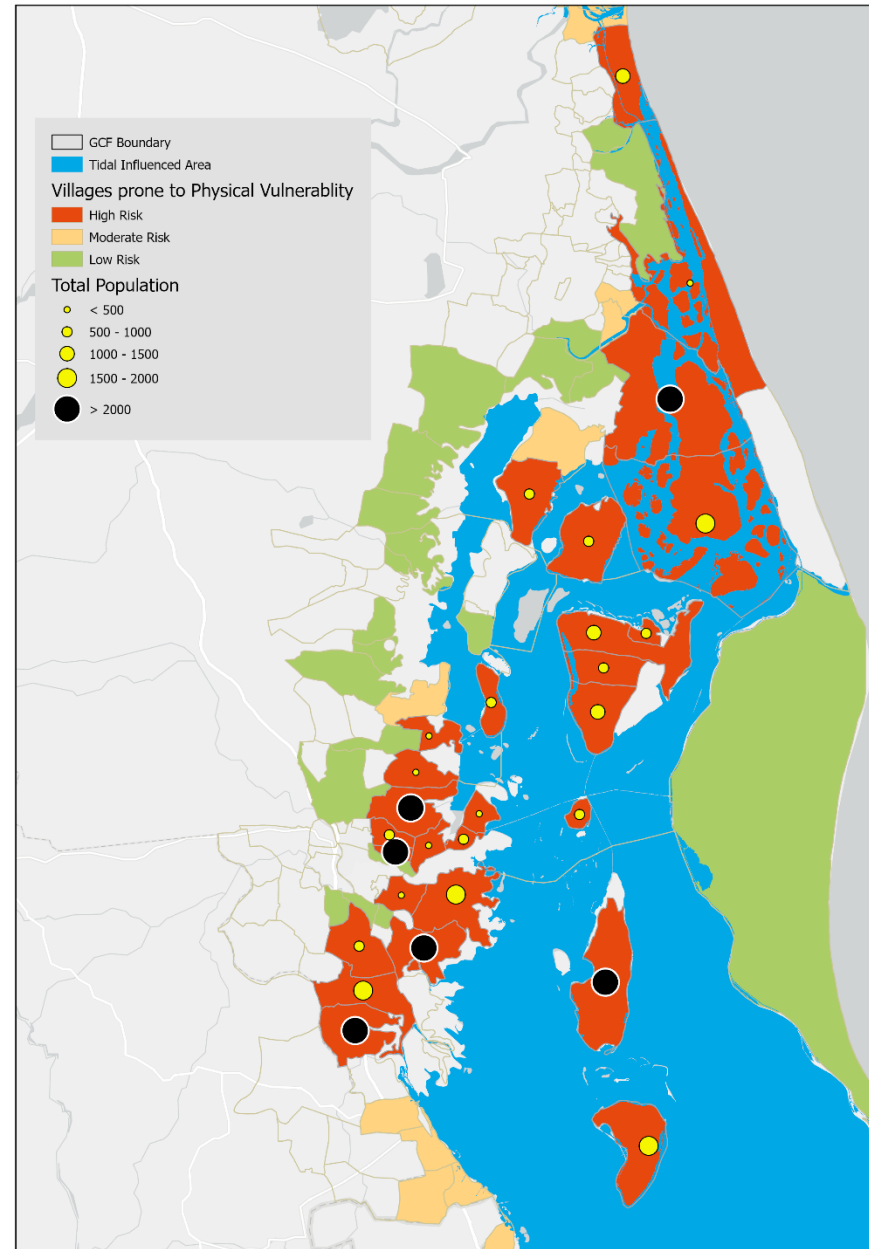
Yemalapeta



SOME SAMPLE OUTPUTS – ANDHRA PRADESH

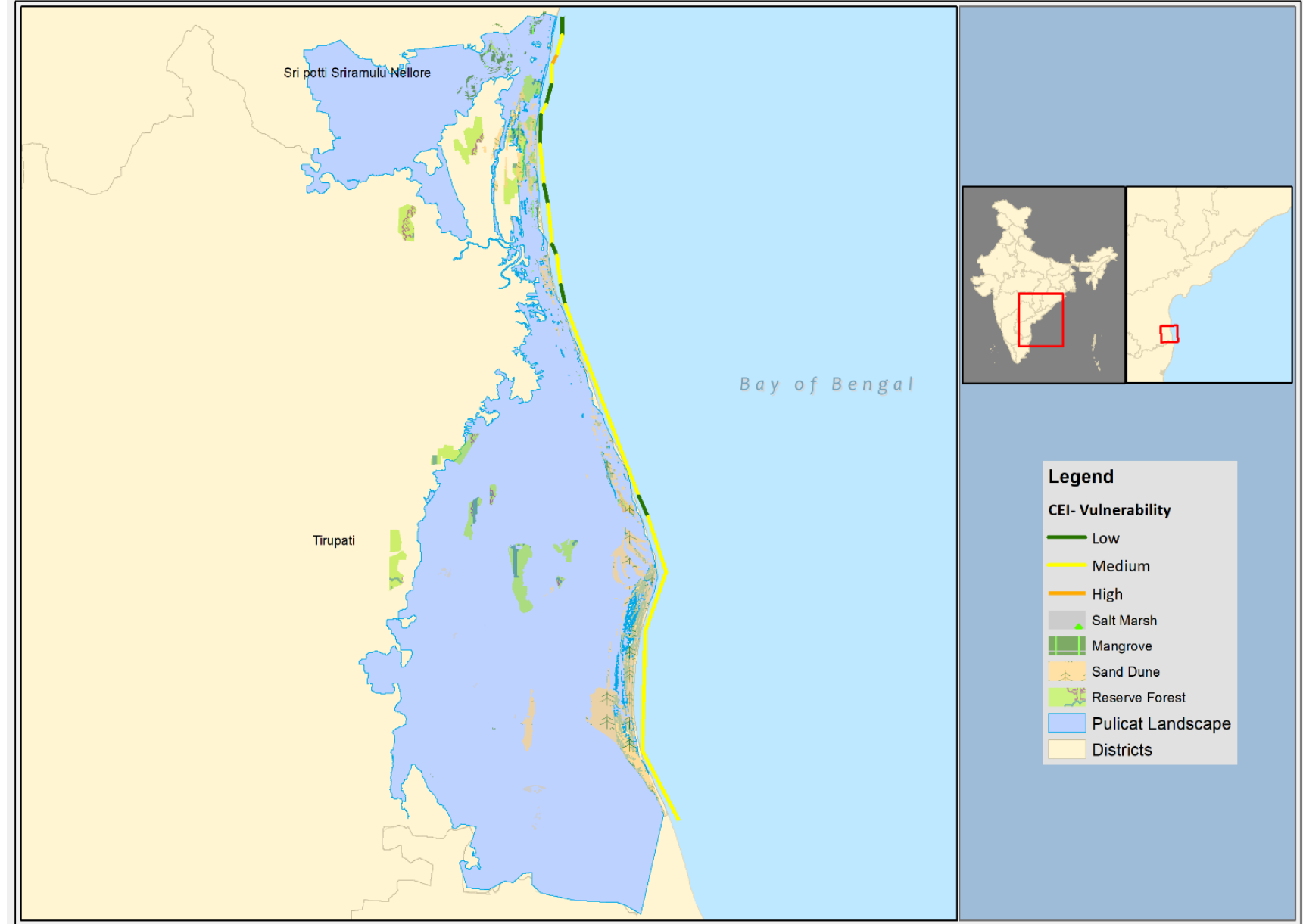
Pulicat Landscape

Andagundala	Kudiri Thippa Khandrika
Atakanithippa	Kummarapalem
Damaraya	Mallayapalem
Degalapalem	Mannemutheri
Graddagunta	Meezuru
Irakam	Pallepalem
Jangalapalle	Pambali
K.C.Narasimhunigunta	Pantrangam
Kadapatra	Reddipalem Bit - I
Karijatha	Reddipalem Bit - II
Kesavareddipalem	Vagarru @ Tupilipalem
Konduru	Vatambedu
Koridi	Venadu
Kudiri	



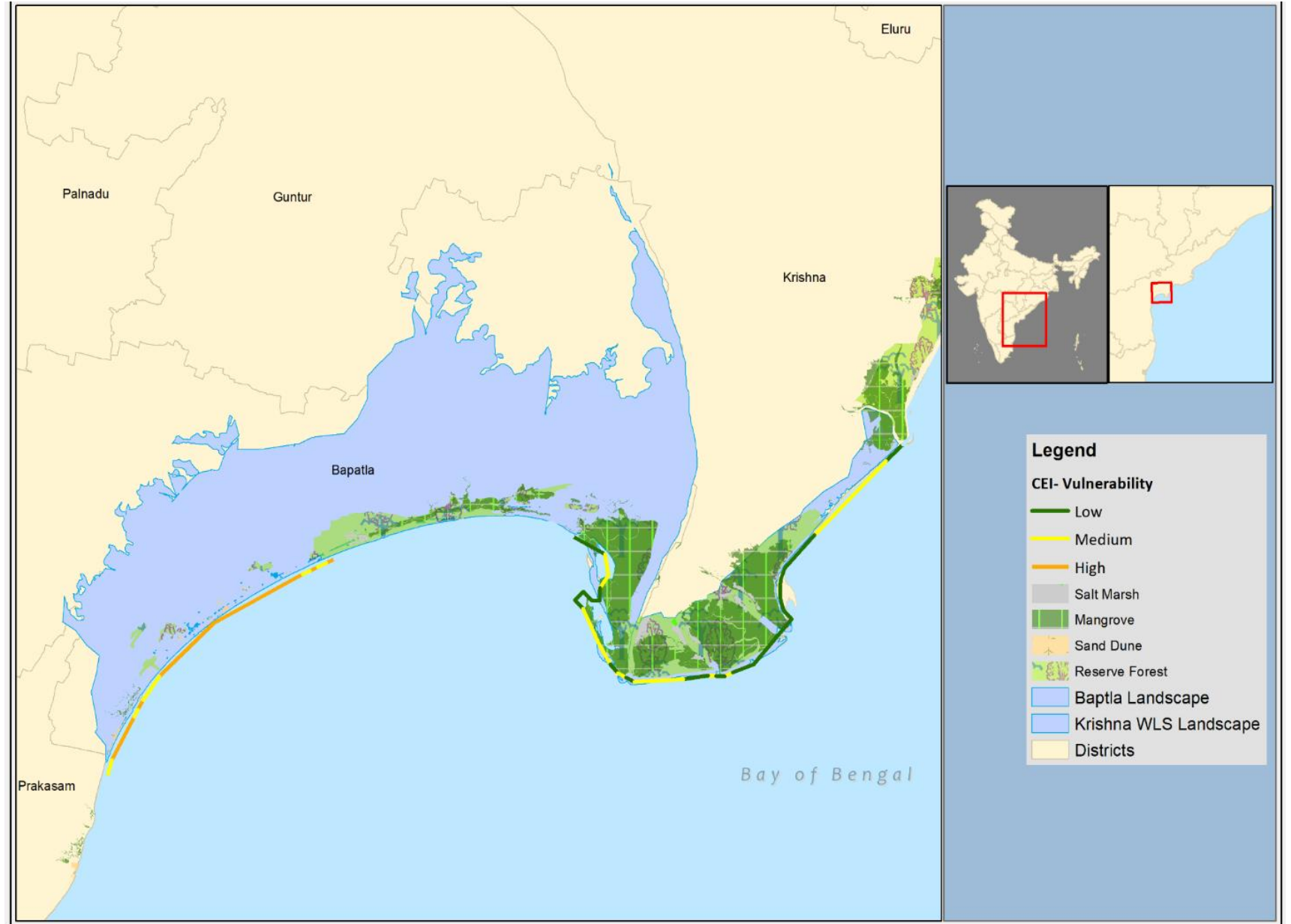
Coastal Vulnerability Index map with Natural Habitats

Pulicat Lagoon Landscape



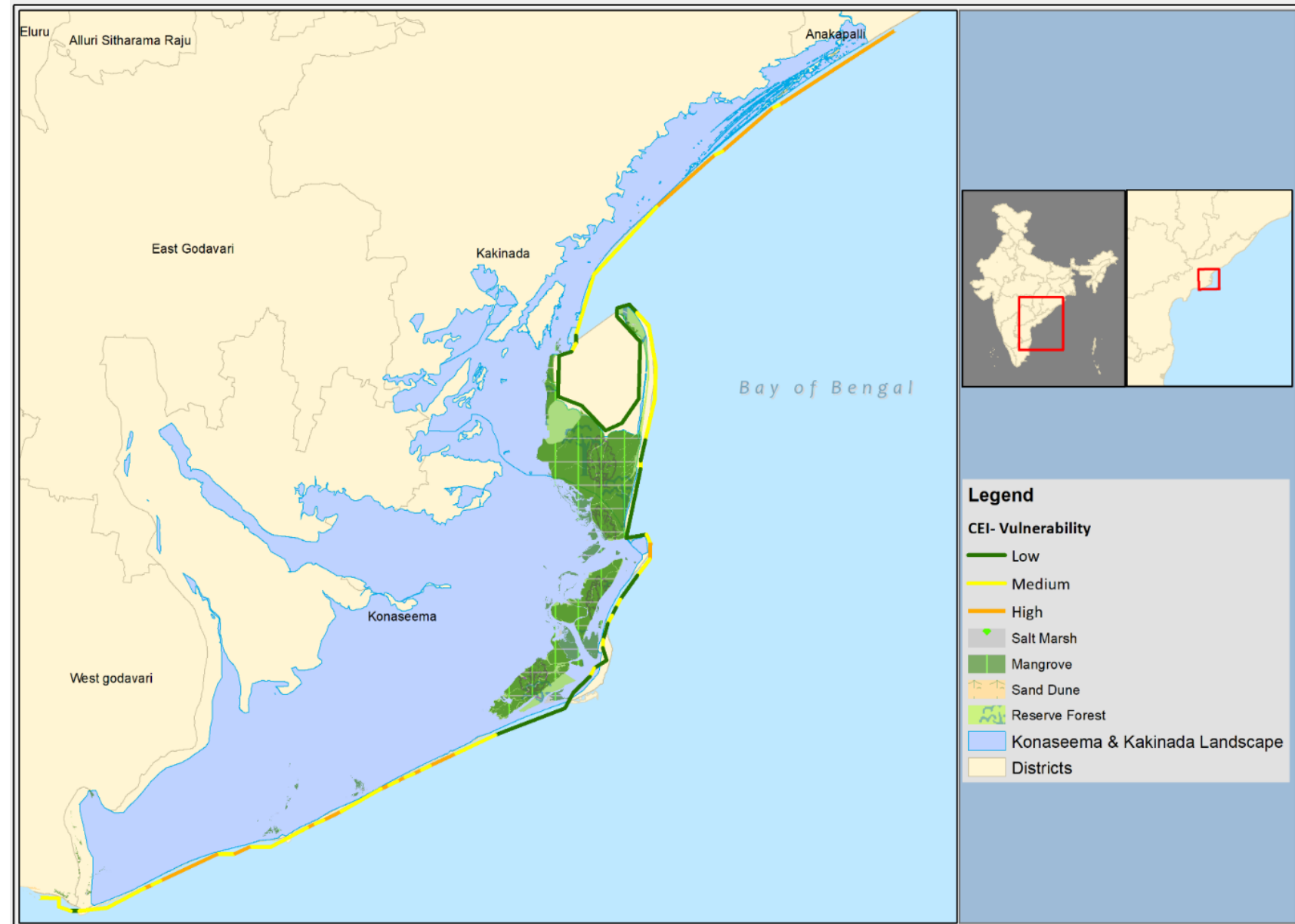
Coastal Vulnerability Index map with Natural Habitats

Bapatla and Krishna Landscapes



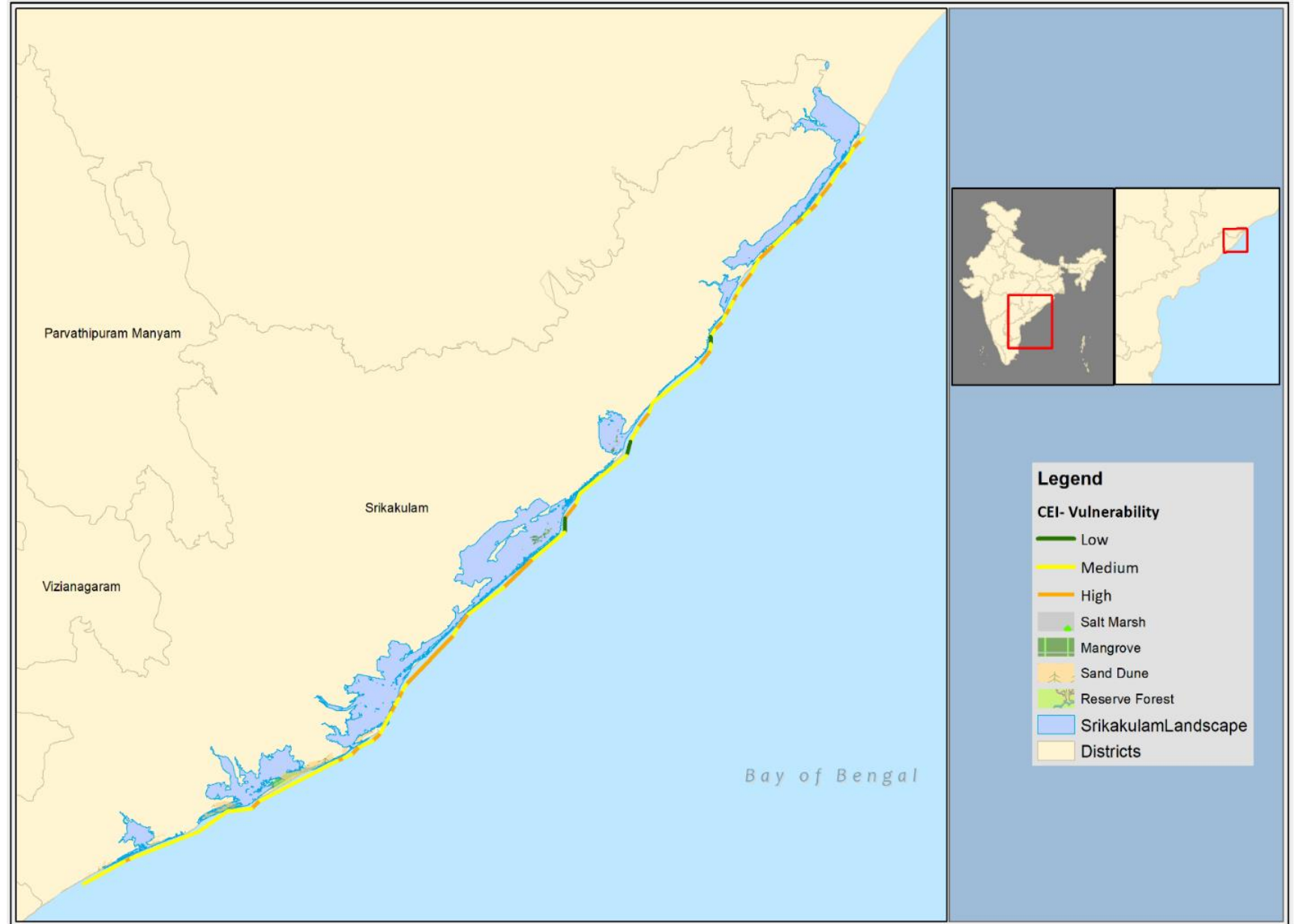
Coastal Vulnerability Index map with Natural Habitats

Konaseema and Kakinada Landscapes



Coastal Vulnerability Index map with Natural Habitats

Srikakulam Landscape





Questions?

deepak@ncscm.res.in
deepak.s.ocean@gmail.com