SPATIOTEMPORAL CHANGES OF THE YANCHENG COASTAL WETLANDS

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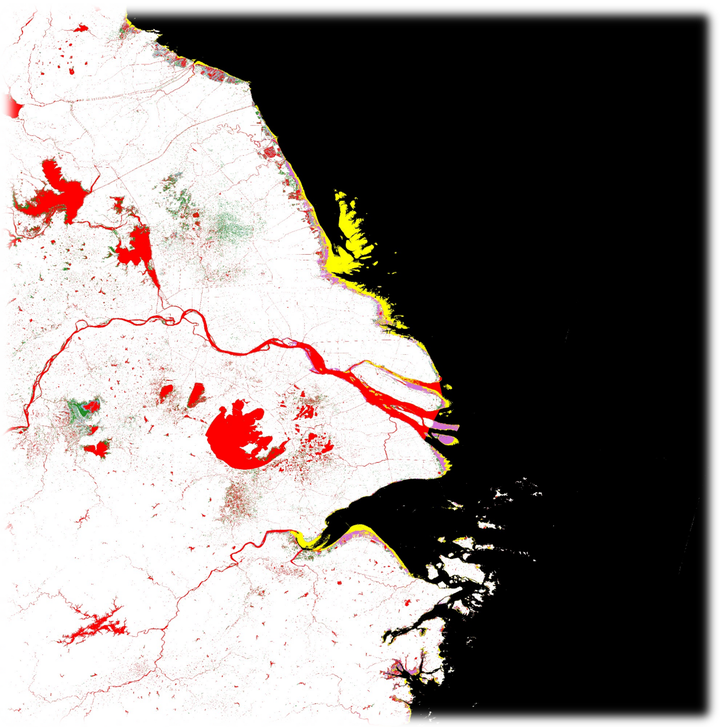
Introduction

Coastal wetlands are vital for protecting shorelines and supporting biodiversity, yet they are rapidly changing under human and environmental pressures. Our study examines the Yancheng Coastal Wetlands to answer:

- How have their spatial patterns and vegetation dynamics evolved over the past two decades?

We hypothesize that the invasive *Spartina alterniflora*, together with targeted conservation policies, has driven a decline in tidal flats while promoting the expansion of marsh areas.

Methods



Data Sources: We combined high-resolution wetland classification data (GWL_FCS30) with Landsat-based NDVI time-series from 2000–2022.

Tools & Analysis: Using Python and Google Earth Engine, we extracted land-cover changes, computed vegetation indices, and tracked invasive Spartina alterniflora spread.

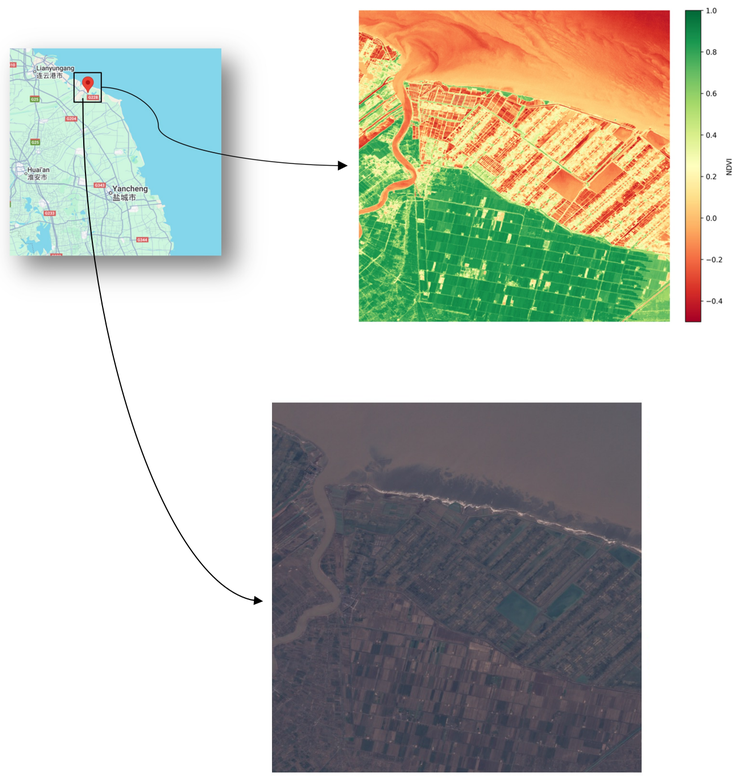


Figure 1. Yancheng Coastal Wetlands Landsat Image + NDVI values

Results

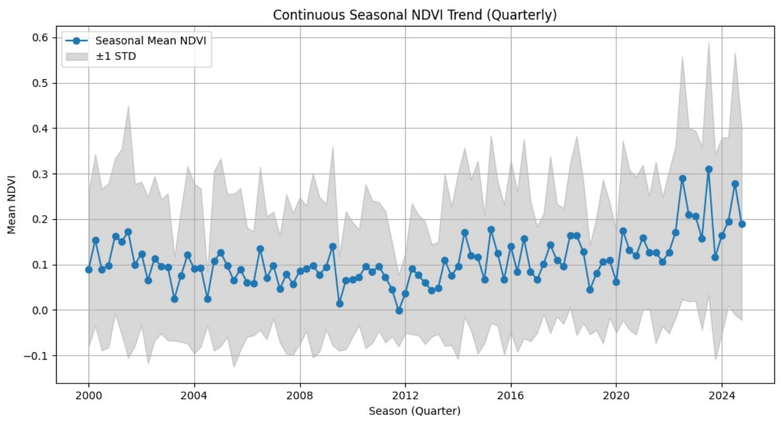


Figure 2. Seasonal Mean NDVI Values in Yancheng Coastal Wetlands

The NDVI graph indicates generally stable vegetation levels from 2000 to 2010, followed by a dip in 2011 and a steady increase through 2025.

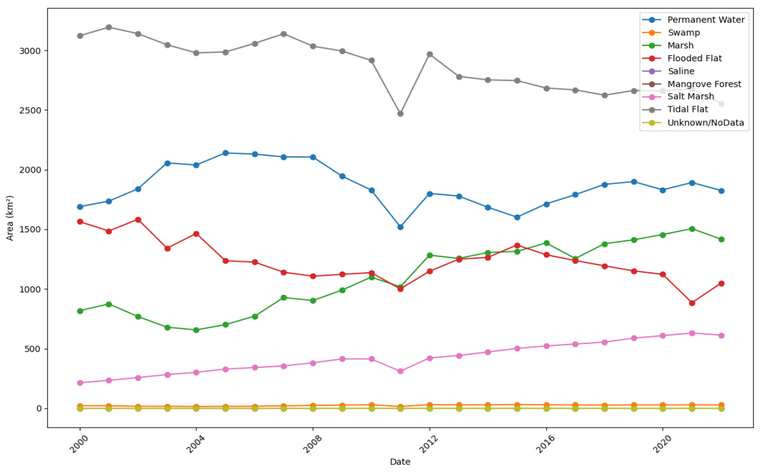
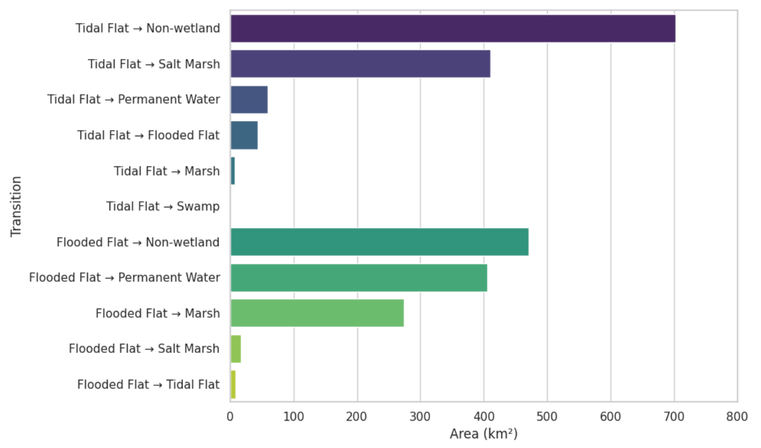
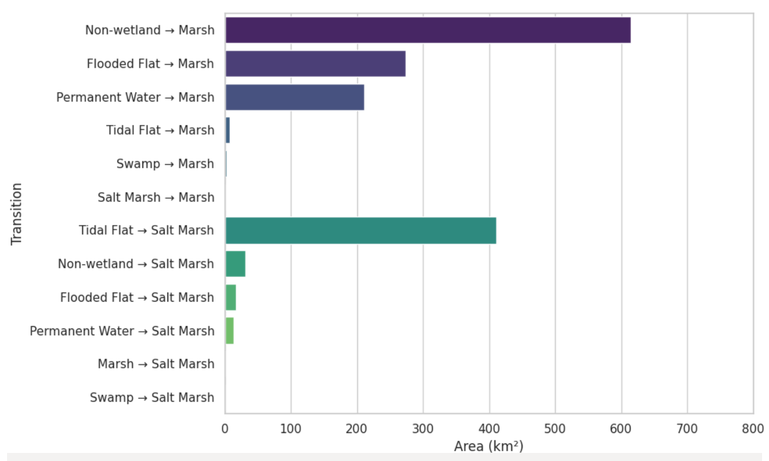


Figure 3. Land Cover Areas in Yancheng Coastal Wetlands (2000 - 2022)

Tidal flats showed a marked decrease around 2011 but partially stabilized afterward. Marsh and salt marsh categories both expanded, pointing to the combined effects of invasive species and targeted restoration.



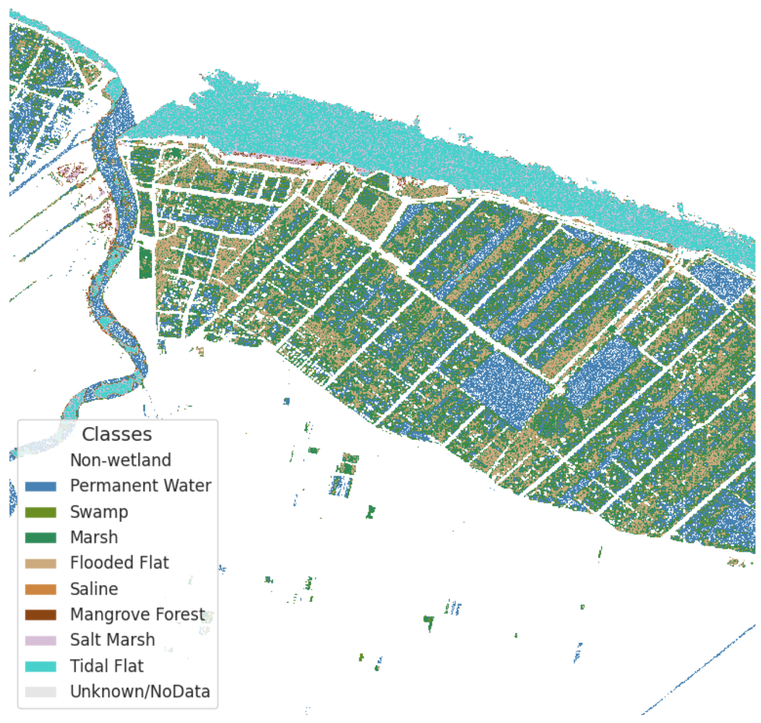
We observe large-scale conversions from tidal flats to non-wetland, and a shift from tidal flats to salt mars.



Notably, non-wetland areas have also transitioned into marsh, suggesting conservation gains.

Figure 4. Spatial distribution of Yancheng land shifts from 2000 to 2022

Discussion



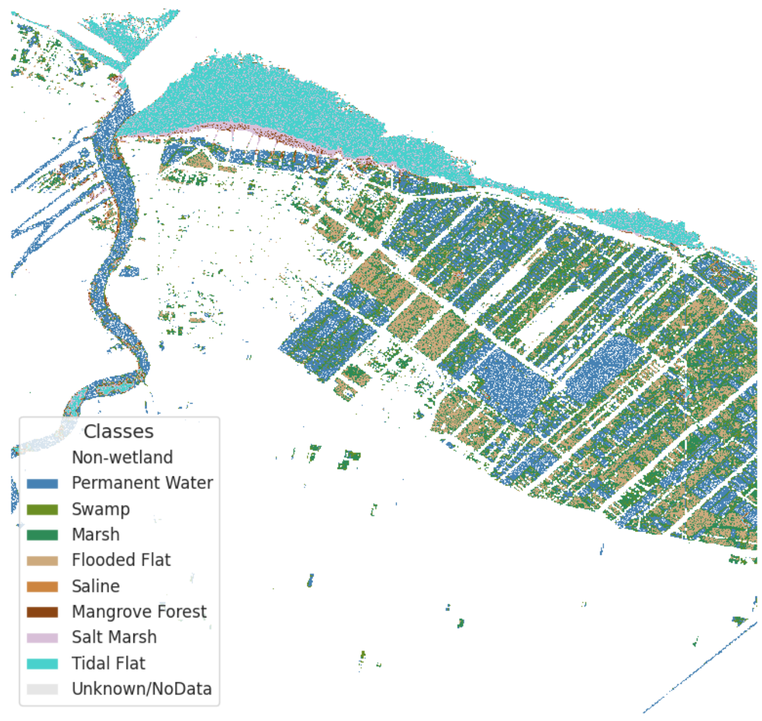


Figure 5. Land Cover Changes in Yancheng Coastal Wetlands in 2000 and 2022.

In our analysis, we found a marked decline in tidal flats from 2000 to 2022, driven by:

- ❑ Human reclamation
- ❑ Spread of Spartina alterniflora

While marsh expansion can enhance sediment stabilization, it also:

- ❑ Reduces native biodiversity
- ❑ Compromises essential ecosystem services

These findings underscore the need for balanced management that integrates ecological restoration with sustainable development.

Conclusions

Tidal & flooded flats declined while marshes and salt marsh areas expanded, driven by coastal reclamation and invasive Spartina alterniflora

The total wetland extent remains stable due to natural regeneration

Policy interventions (e.g., World Heritage designation) helped mitigate further loss

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