

# The coastline of Vietnam - annual dynamics derived from 35 years of Earth Observation data

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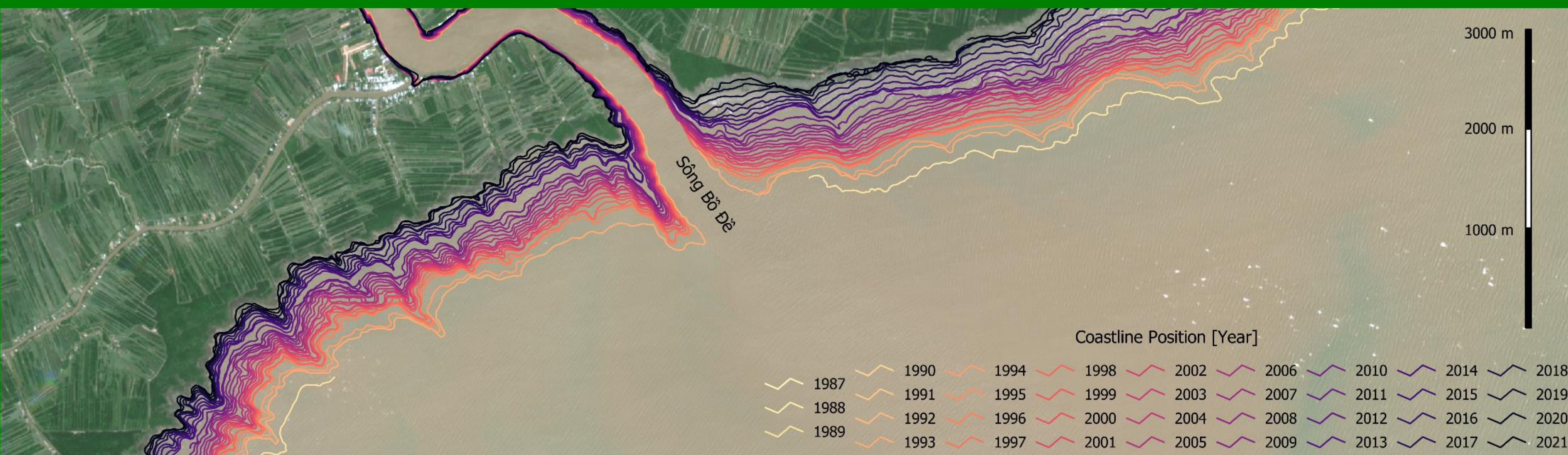


## Objective

Understanding the intricate interplay between alterations in sedimentation patterns and the rising sea levels is of critical significance, particularly for coastal regions at large and, notably, for the vulnerable Mekong Delta. Among the myriad drivers of coastline changes, the repercussions of reservoirs, channel construction, and dredging remain inadequately explored. The construction of reservoirs upstream can drastically alter the sediment flow downstream, reducing the sediment load reaching the delta. Altering natural channels and extensive dredging for navigation and industrial purposes can disrupt sedimentation patterns. Moreover, while the impact of coastal erosion on flooding has been established, it also represents an area of research that remains underexplored. Therefore, the monitoring the coastline of the Mekong Delta is of paramount importance.

## Approach

Coastline change analysis for Vietnam was conducted for a Landsat time series from 1984 to 2021 employing a cloud-based processing strategy. The analysis is based on Landsat-derived annual 75th percentile Modified Normalized Difference Water Index (MNDWI) composites, representing the mean high-water level and was executed for the entire shoreline of Vietnam. Contours were extracted on sub-pixel level. Linear regressions were calculated along shore-normal transects for quantifying coastline change rates. The coastline extraction method was validated using very high-resolution imagery and local sea level data.



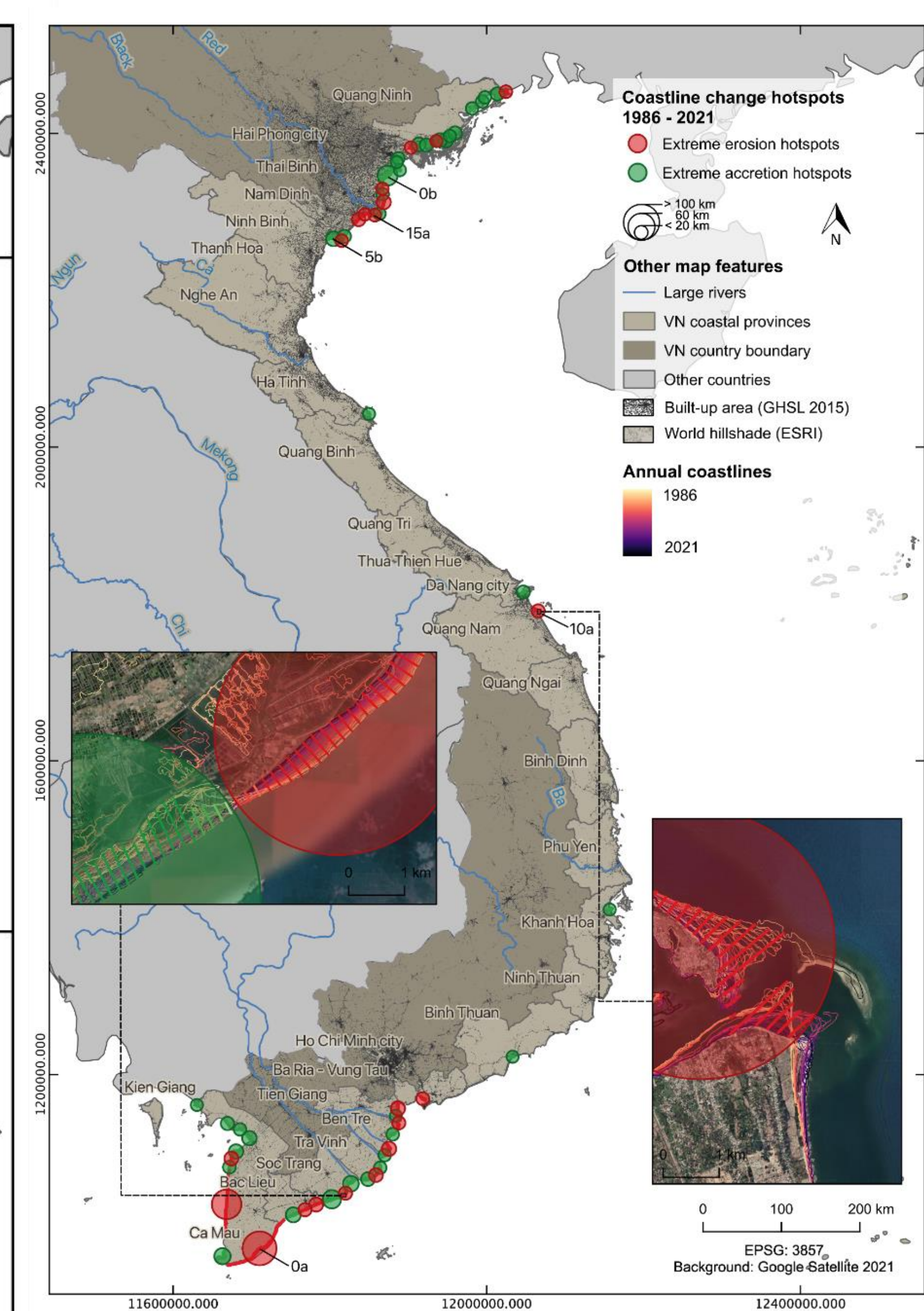
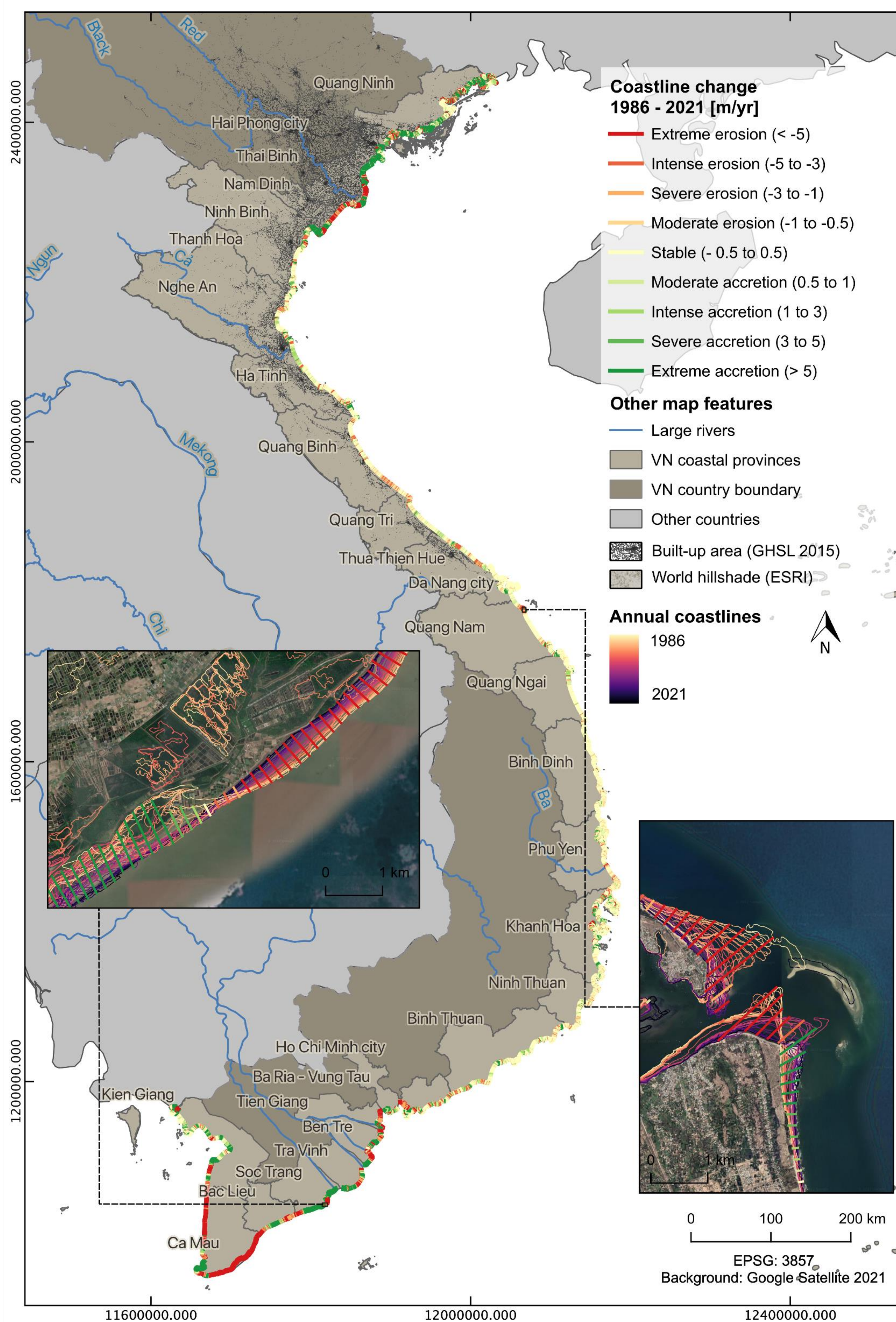
## Results and Conclusions

The results of the country-wide analysis show that the erosion and accretion patterns are varying to a large extent. Erosion hotspots are located mainly at the coasts of the Mekong Delta (e.g. Cau Mau, Tien Giang, Bac Lieu) and the Red River Delta (see maps).

Coastline change can impact flooding by altering the coastal landscape, natural buffers, and hydrological processes. Understanding these interactions is crucial for effective coastal management and flood risk mitigation

The monitoring of the coastline of the Mekong Delta is crucial for understanding and addressing the complex and interconnected challenges facing this vital region. Changes in sedimentation patterns, often influenced by upstream activities, have far-reaching consequences on agriculture, infrastructure, biodiversity, and the livelihoods of millions of people.

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The overall aim of the research project FloodAdaptVN is to close knowledge gaps in the rapidly urbanizing, flood-prone regions of VietNam to assist local authorities in the development of adequate DRR, risk transfer and adaptation responses. FloodAdaptVN is assessing current patterns, impacts and future scenarios of flood risk, the potential of risk transfer and of ecosystem-based and hybrid DRR and adaptation options as complementary solutions to conventional, mostly structural, measures.

