# Assessing Changes in Mangrove Forests in Africa: Quantifying Loss and Identifying Drivers of Change using Landsat-8 OLI

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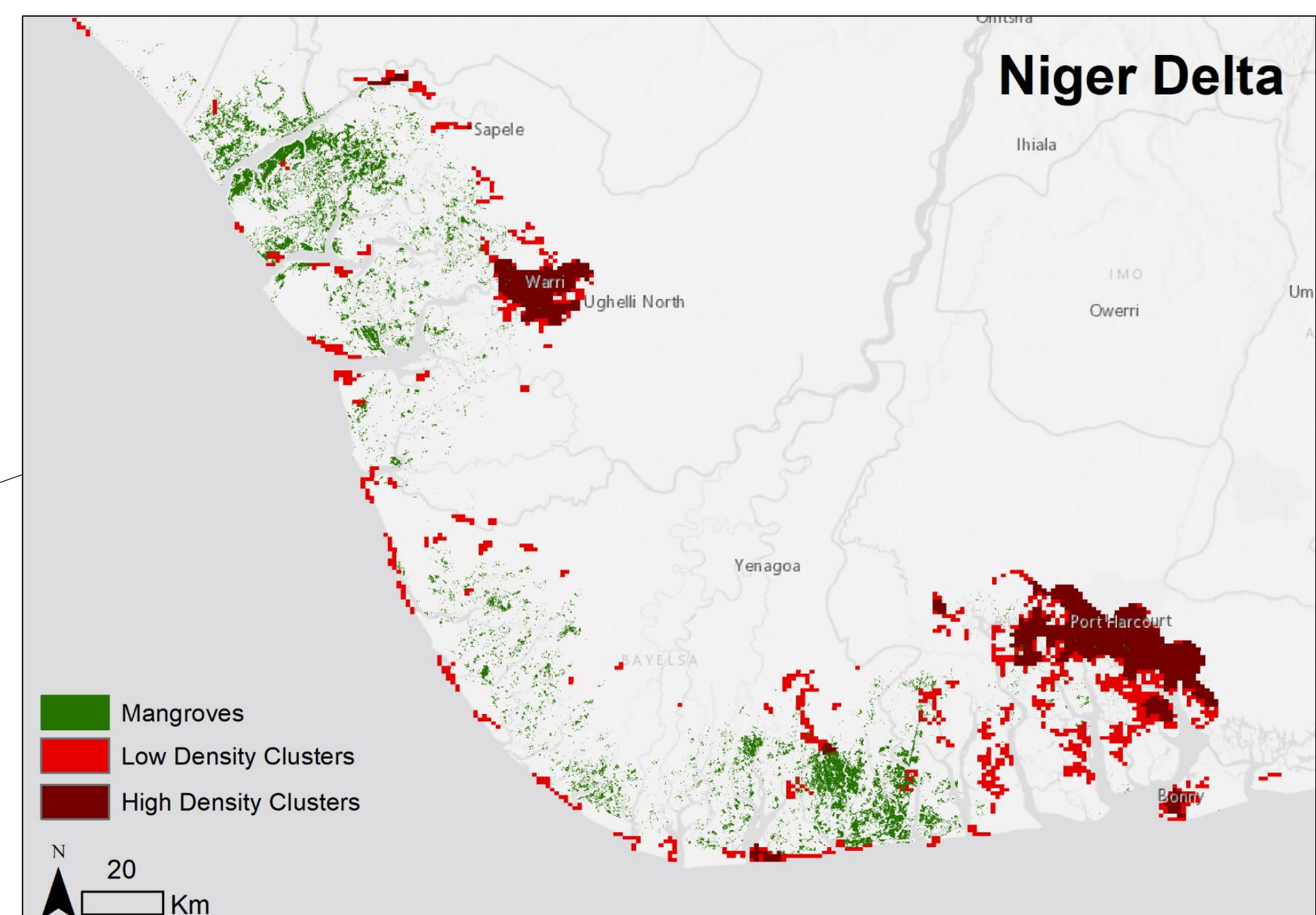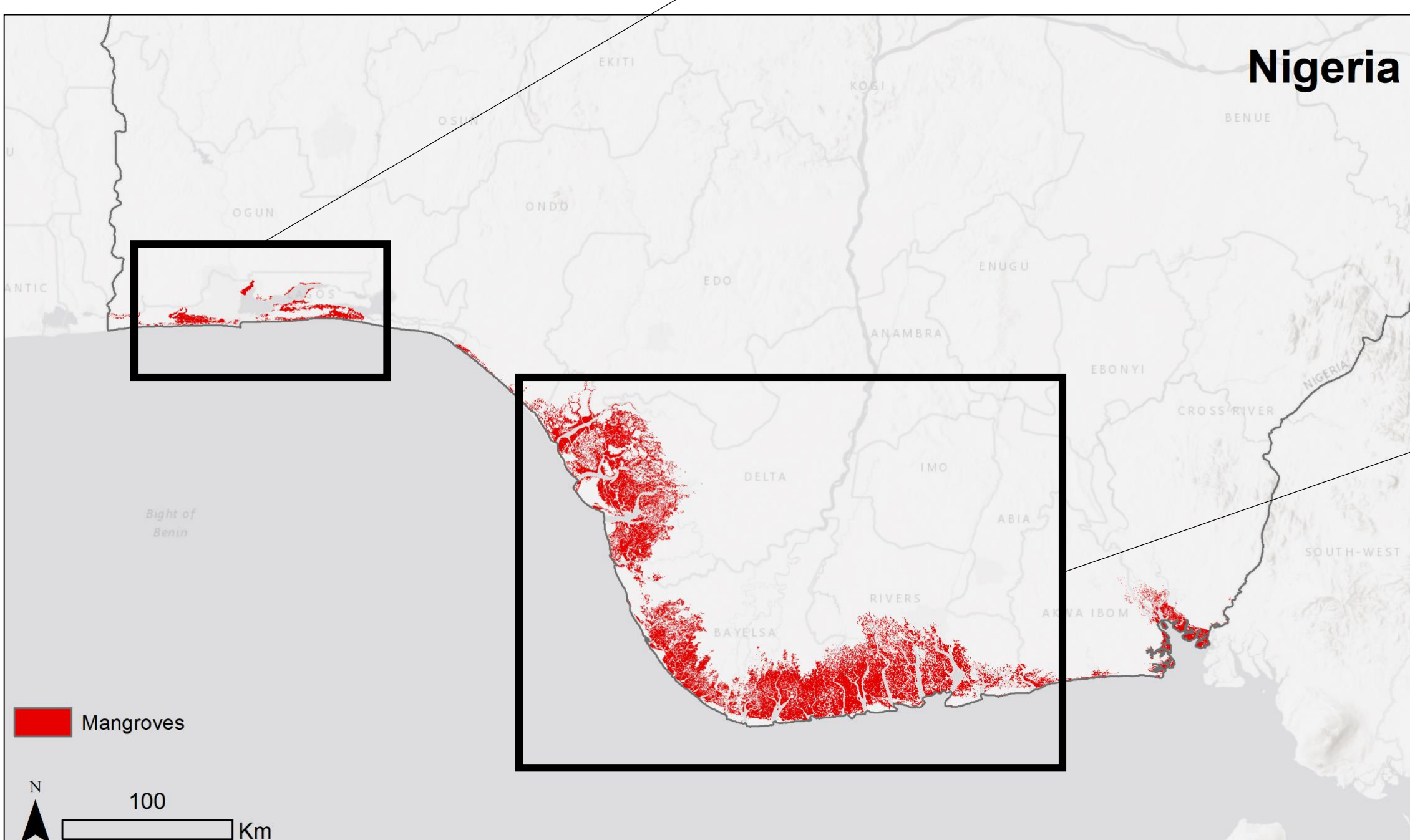
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Overview: The objective of this project is to quantify changes of mangrove extent in Madagascar and Nigeria from 2015-2018. Both countries contain a significant portion of the world's mangroves, and which are known to be deforested and degraded due to natural and anthropogenic factors. Change is estimated using multi-date Landsat-8 OLI data and cloud computational techniques. Findings show that mangroves in both countries have exhibited areal loss during the study period, but loss varies across space. Understanding the rate and magnitude of mangrove change can aid in identifying priority areas for forest regenerations, and can help construct sustainable management practices for the future.

Methodology

Landsat-8 OLI (NASA & USGS)

Study Areas
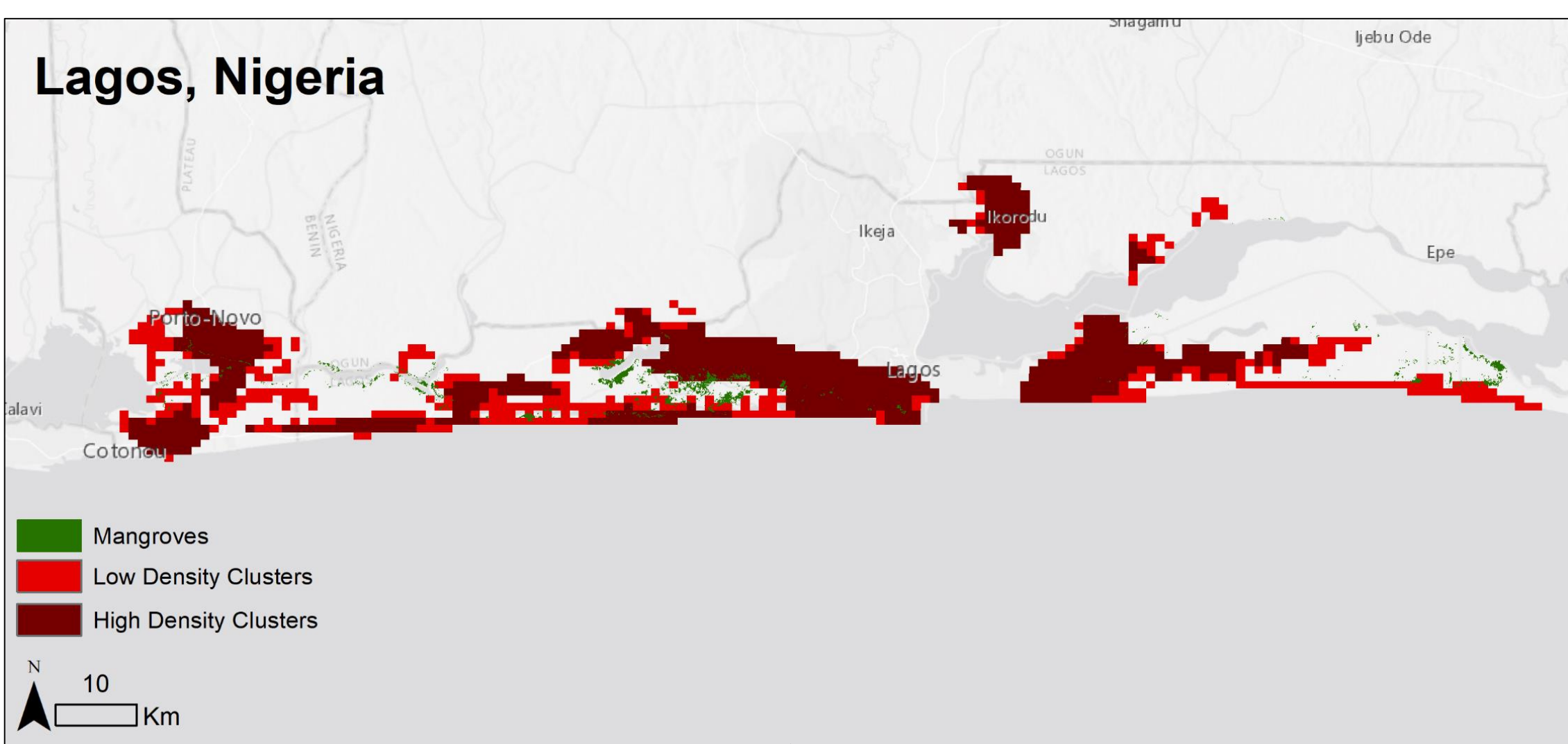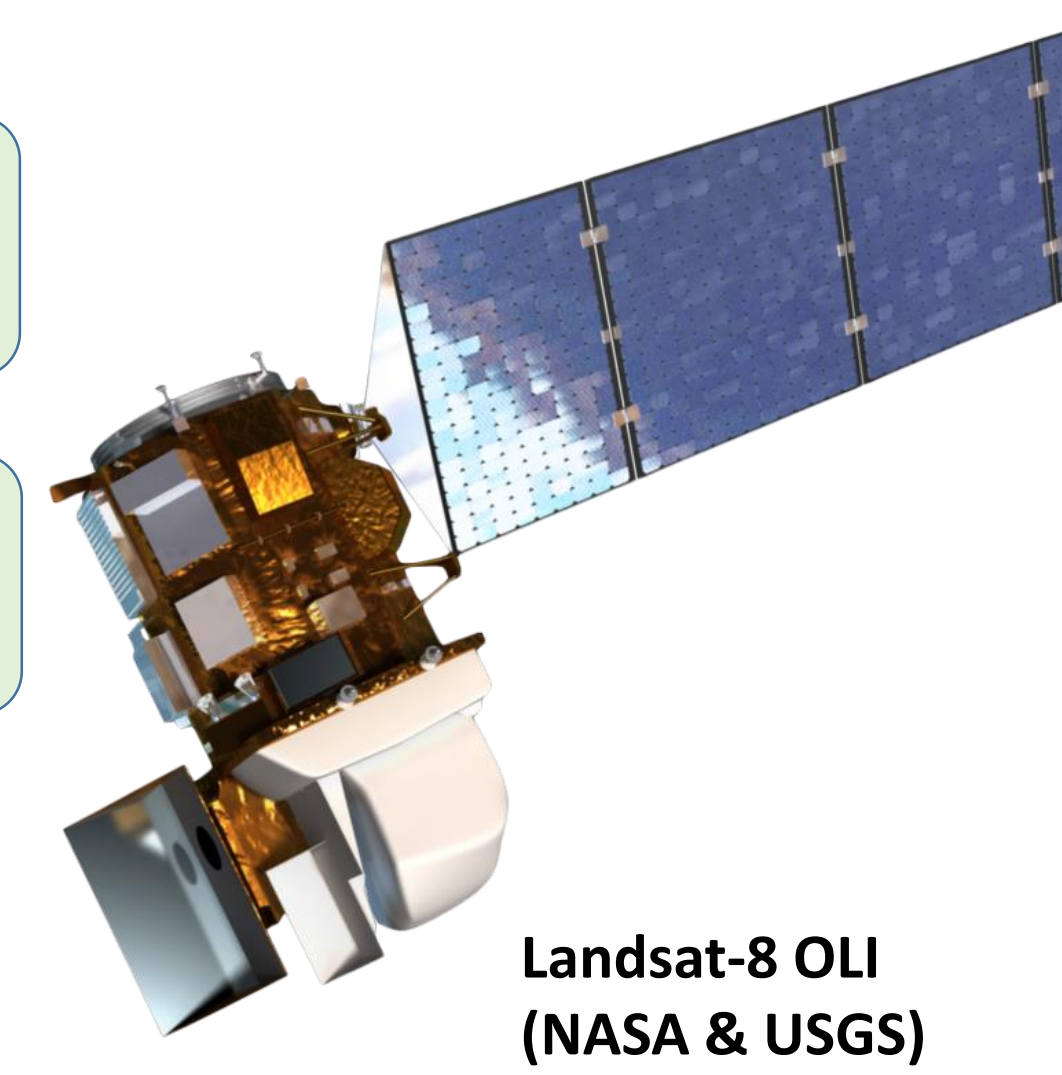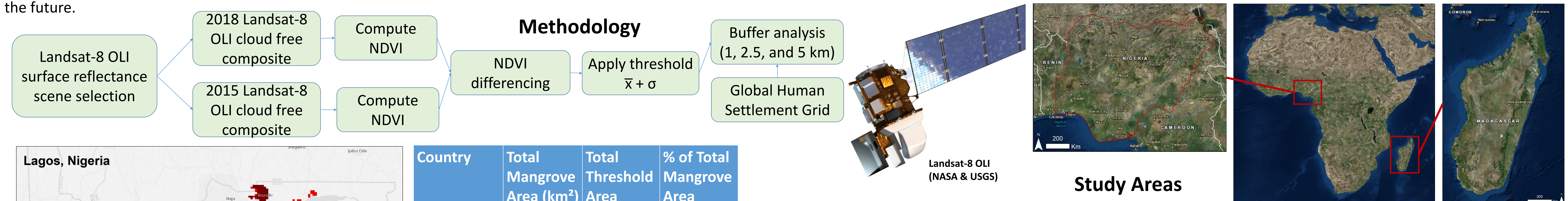
Country	Total Mangrove Area (km²)	Total Threshold Area (km²)	% of Total Mangrove Area
Madagascar	2950	233	8%
Nigeria	8188	1225	15%

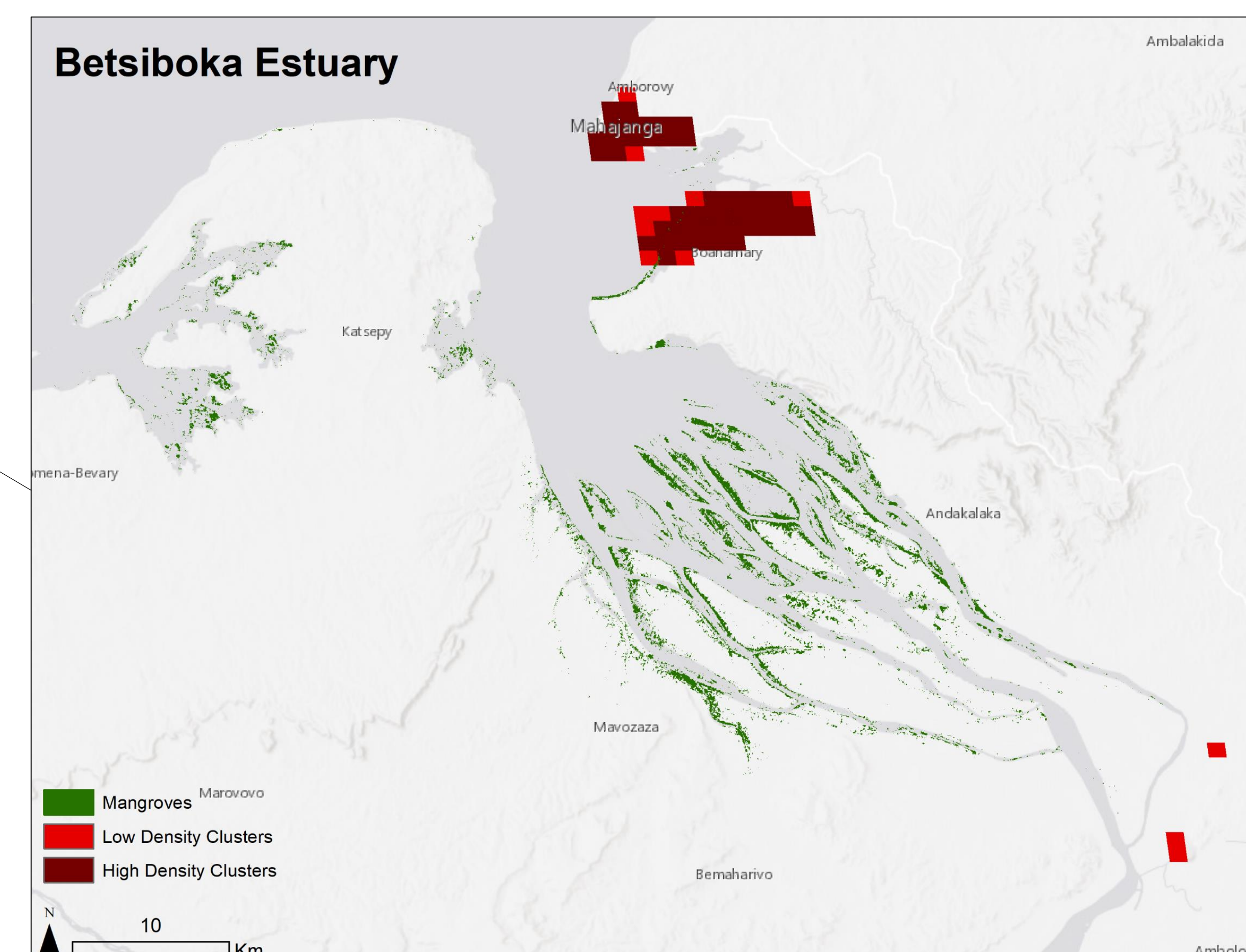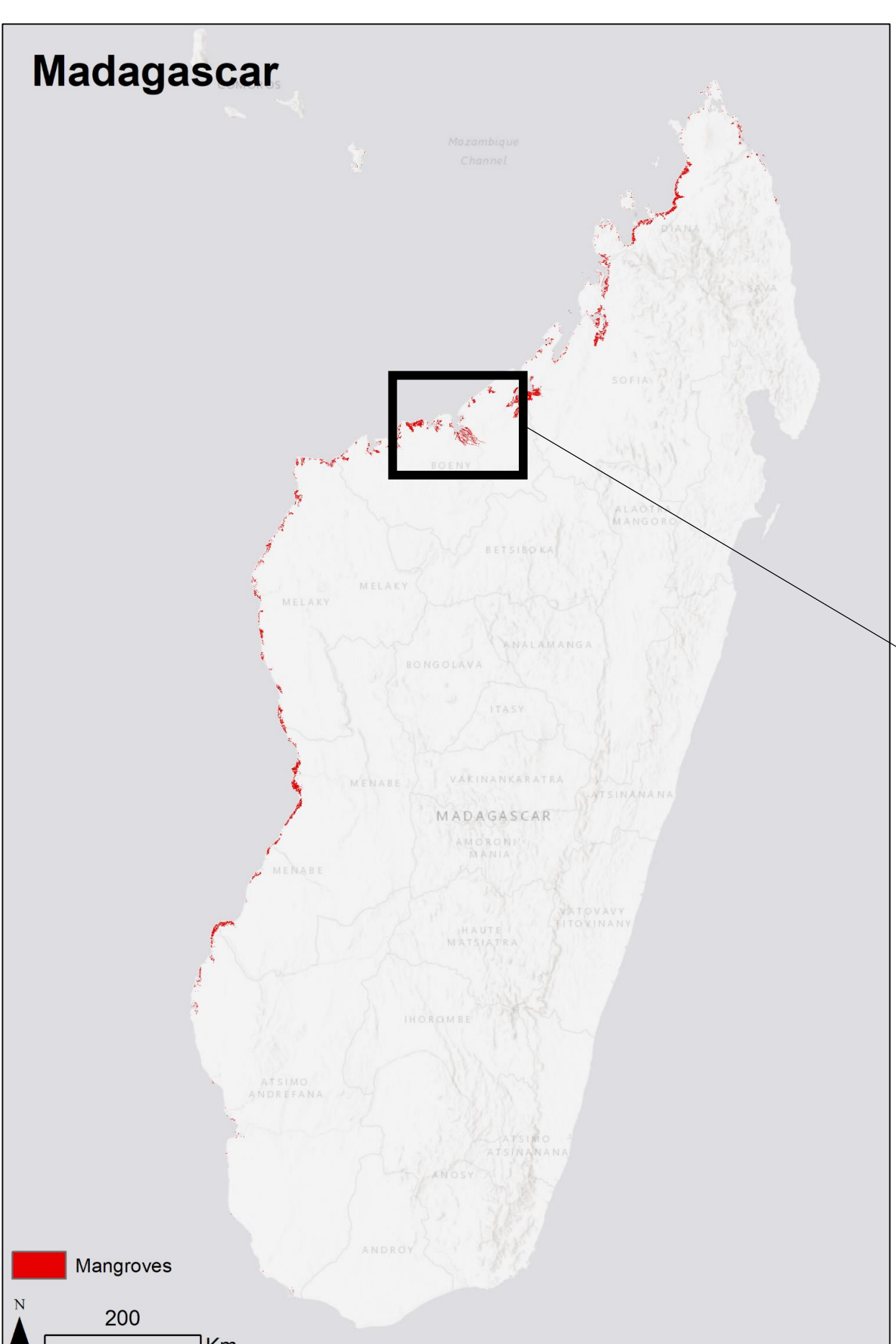| Madagascar	Total Buffer Area (km²)	Total Area- Low Density Clusters (km²)	Total Area- High Density Clusters (km²)	% of Total Buffer Area- Low Density Clusters	% of Total Area- High Density Clusters
1 km Buffer	6962	53	26	0.76%	0.37%
2.5 km Buffer	12758	77	54	0.60%	0.42%
5 km Buffer	21965	127	66	0.57%	0.30%

Nigeria	Total Buffer Area (km²)	Total Area- Low Density Clusters (km²)	Total Area- High Density Clusters (km²)	% of Total Buffer Area- Low Density Clusters	% of Total Buffer Area- High Density Clusters
1 km Buffer	12381	640	437	5.2%	3.5%
2.5 km Buffer	17970	1103	947	6.1%	5.3%
5 km Buffer	24458	1609	1619	6.6%	6.6%

Lagos, Nigeria

- Mangroves
- Low Density Clusters
- High Density Clusters

Nigeria

- Mangroves

Niger Delta

- Mangroves
- Low Density Clusters
- High Density Clusters

Madagascar

- Mangroves

Betsiboka Estuary

- Mangroves
- Low Density Clusters
- High Density Clusters

Results:

- 15% of mangroves in Nigeria and 8% of mangroves in Madagascar show a decrease in NDVI from 2015-2018
- Betsiboka Estuary, Madagascar's largest river, has large areas of mangrove forests (shown in green) that show a decrease of NDVI from 2015-2018
- Mangroves around Lagos (economic capitol of Nigeria) are located in and around high density settlements→ possible driver of change
- The Niger Delta in Nigeria hosts a large portion of the countries mangroves, many of which are located within 5 km of low or high density settlements
- Despite Nigeria having a smaller coast (853 km) compared to Madagascar (4828 km), Nigeria hosts larger mangrove forests

Conclusions:

- Buffer analysis shows that portions of mangrove forests in both countries fall within 1-5 km of urban settlements
- Urbanization and anthropogenic factors are likely drivers of mangrove degradation/deforestation in Madagascar and Nigeria