Where did that wet forest go? Identifying Mangroves Using Remote Sensing in Coastal Sierra Leone

Mangroves can be both large and remote, making getting accurate surveys challenging. Satellites have made this easier, but it is still difficult to separate mangroves from other types of vegetation. Mangroves provide a way to adapt to and even slow climate change by way of their carbon storage abilities while at the same time providing storm defense for coastal communities.

As such, it is important to be able to identify them, and track their growth and retreat. Here we attempt to apply the remote sensing techniques of Bayan Alsaaideh *et al* to the Scarcies Estuary of Sierra Leone.

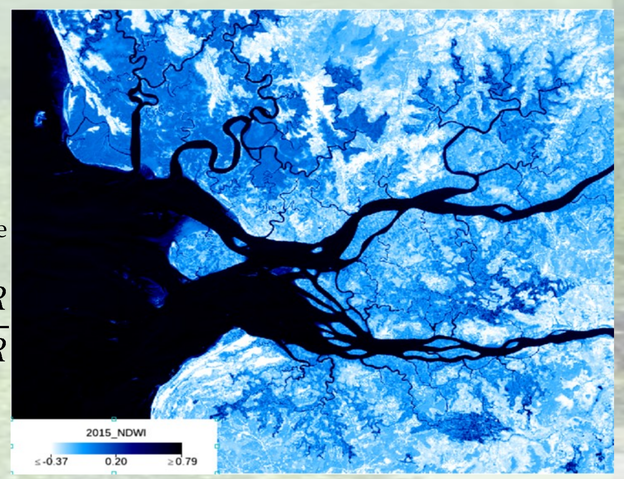
Method

LandSat 8 data in January (dry season) of 2015 and 2020 for Coastal Sierra Leone was used to create indices ending in a false color composite that highlights likely mangrove areas using bands 4, 5 and 6. The image processing steps are highlighted below.

1. Is the area

NDWI measures soil and vegetation moisture. In this image, the mangroves blend in with the river and ocean because of their high moisture content.

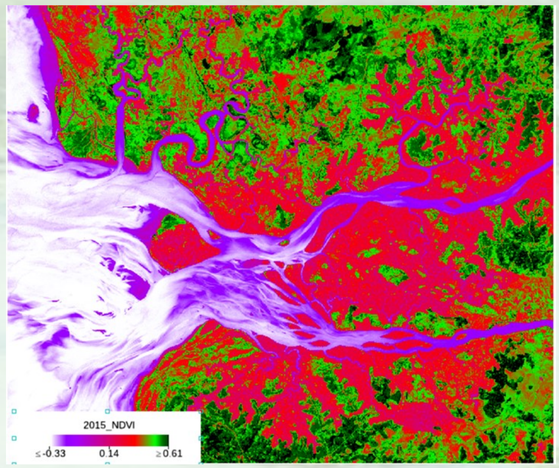
$$NDWI = \frac{NIR - SWIR}{NIR + SWIR}$$



2. Is the area vegetated?

NDVI is an index designed to highlight healthy vegetation. Sometimes called the green index. Healthy vegetation is green.

$$NDVI = \frac{NIR - red}{NIR + red}$$



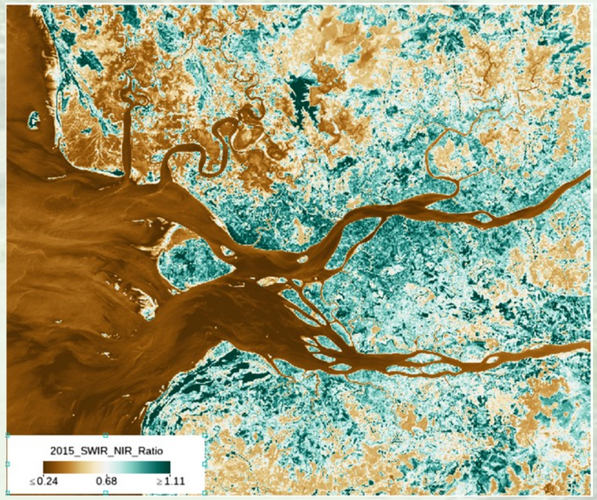
The final false-color composite below shows **Mangrove areas in dark blue.** The technique confirms their existence as well as the existence of intruding cleared areas (light blue), marsh (blue green) between the rivers, and upland forest (blue).

3. Does the vegetation have a high band ratio?

Mangroves reflect near infrared light less than other vegetation.

In this image the dark brown represents areas where the following ratio is large. These are the putative mangroves.

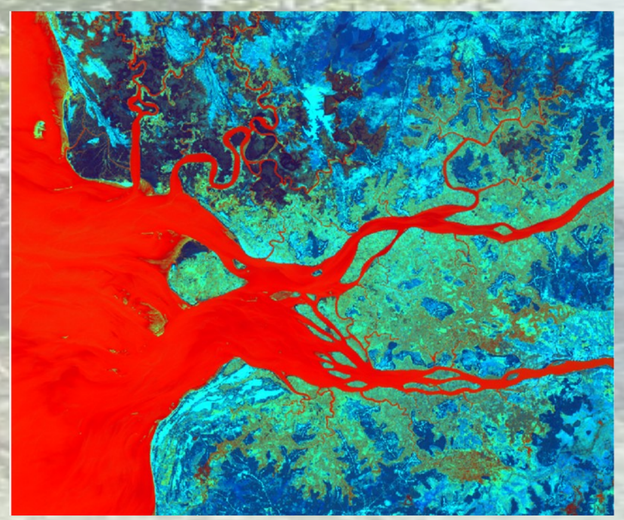
$$Band\ Ratio = \frac{SWIR}{NIR}$$

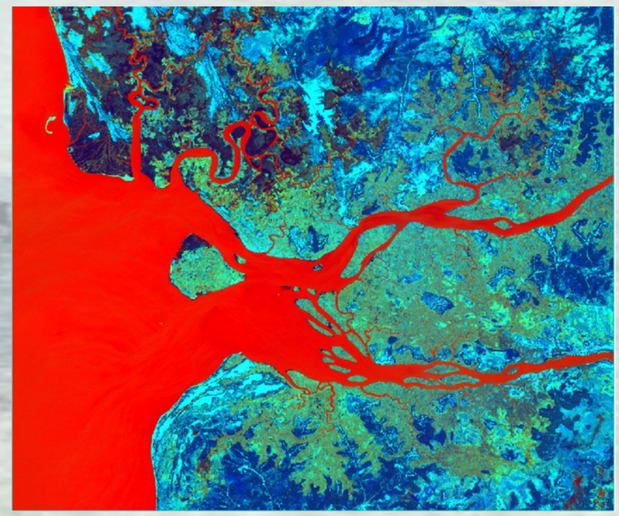


False Color Composite

Water	Mangrove	Forest	Marsh	Cleared Land

2015 **2020**





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