

# Utilizing NASA Earth Observations to Develop a Forest Change Detection Tool for Land Conservation in Honduras



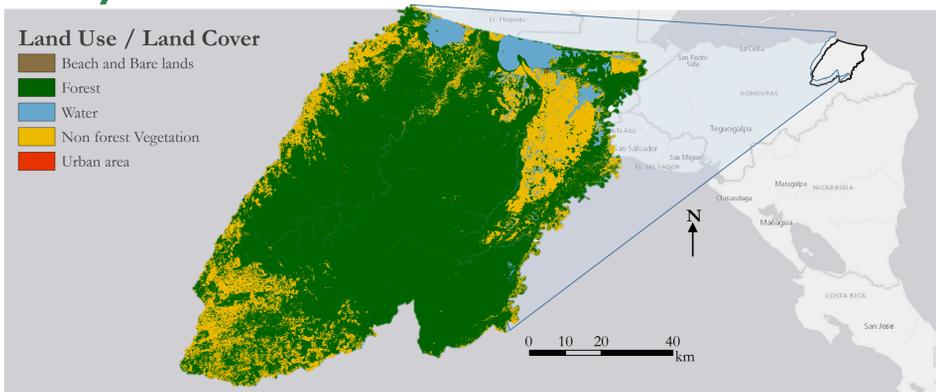
## Abstract

The Instituto de Conservación Forestal (ICF) in Honduras is in charge of managing and conserving millions of acres of public and privately-owned forest, including the pristine Río Plátano Biosphere Reserve. Although one of ICF's main goals is forest conservation, illegal deforestation in Río Plátano accounts for 11% of the total Honduran deforestation. These changes are devastating for the delicate ecosystem, endangered species, and to the indigenous population. The ICF currently has limited resources and staff to continuously monitor and assess forest change and local disturbances. NASA DEVELOP partnered with ICF to create a user-friendly Forest Change Detection Tool in Google Earth Engine API. The team analyzed various data sets, like Landsat 8 Operational Land Imager (OLI), Sentinel-2 Multispectral Instrument (MSI), and Terra Moderate Resolution Imaging Spectroradiometer (MODIS), and methods to detect small to moderate forest disturbances. Additionally, the team used *in situ* data provided by ICF to cross-reference pre-existing forest changes. The Google Earth Engine API user interface displays changes in the Normalized Difference Vegetation Index (NDVI), Relative Greenness, and the Enhanced Vegetation Index (EVI) to detect the area with a high probability of deforestation. This tool will create a low cloud cover image mosaic used to produce a map of deforestation across the area. The tool creates monthly results that can be used by ICF scientists to aid in conservation and mitigation efforts.

## Objectives

- ▶ **Develop** a methodology for timely detection of forest change in RPBR using remote sensing data
- ▶ **Assess** various data sources (Landsat, Sentinel, MODIS) to determine most effective data set to produce short term detection of forest disturbance
- ▶ **Create** a user-friendly Forest Change Detection Tool in Google Earth Engine that will allow ICF to detect forest change
- ▶ **Refine** the tool and methodology so that it could work on more complex terrain or for related objectives

## Study Area



## Project Partners

Instituto de Conservación Forestal (Honduras)

Zamorano University

## Team Members



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## Acknowledgements

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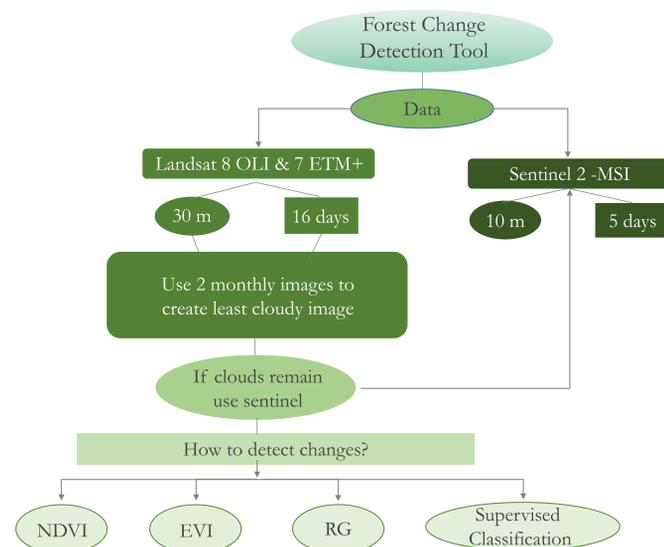
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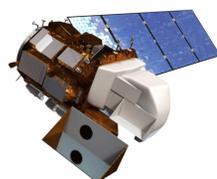
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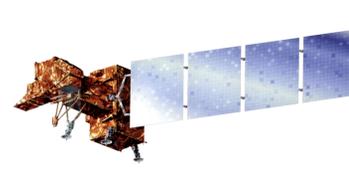
## Methodology



## Earth Observations



Landsat 8 OLI

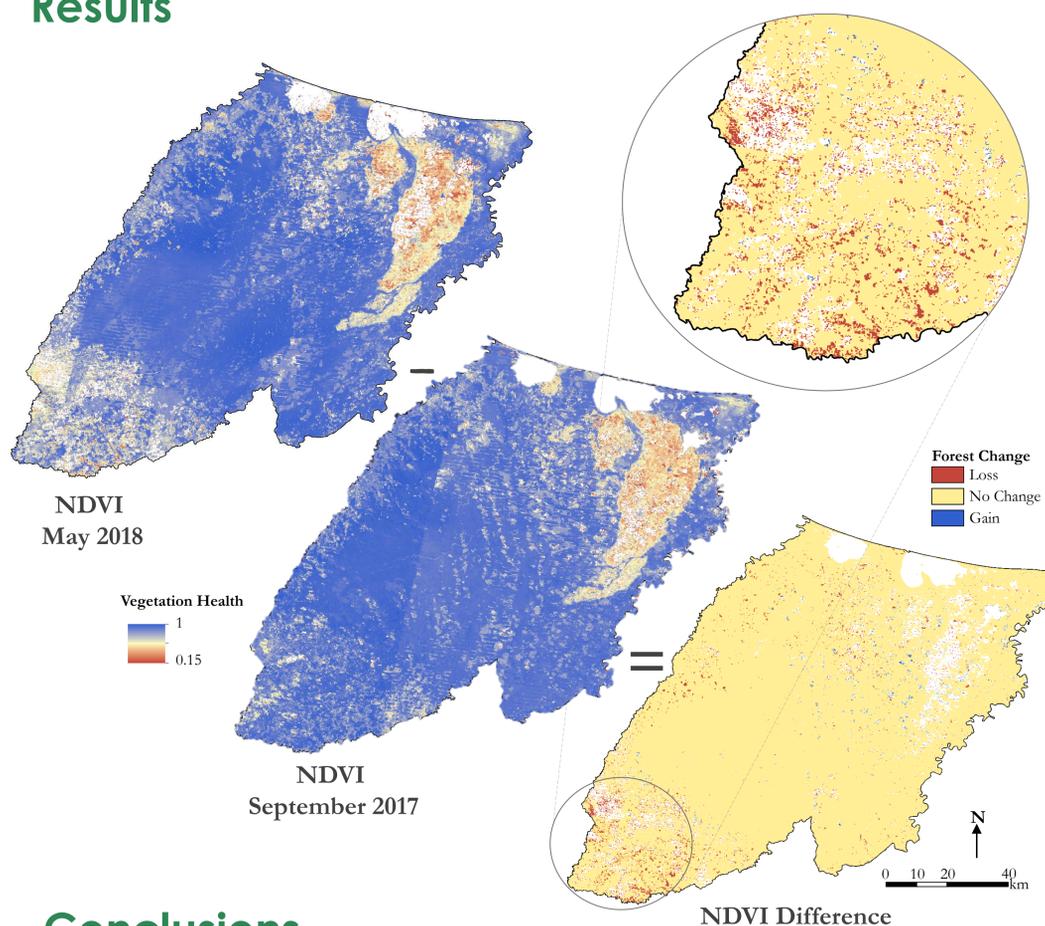


Landsat 7 ETM+



Sentinel-2 MSI

## Results



## Conclusions

- ▶ Landsat 7 and Landsat 8 data at a 30m spatial resolution can adequately detect medium to large scale forest disturbances in Río Plátano.
- ▶ The Forest Change Detection Tool can identify regions threatened by deforestation by calculating differences in NDVI through multiple time periods.
- ▶ Within the past 9 months ~ 65% of the total 2% forest disturbance occurred in the buffer zone highlighted above.
- ▶ ICF will use this tool to enhance their management strategies and aid in mitigation efforts.

