

Assessing Threats to River Water Quality and Mangrove Health Based on Watershed Land Use on the Osa Peninsula, Costa Rica



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Abstract

The Osa Peninsula, located in the southern region of Costa Rica's Pacific Coast, is one of the most biologically-diverse places on Earth and is a popular ecotourism destination. However, the area faces watershed degradation and loss of biodiversity due to deforestation, pollution from agriculture, and human settlement. The NASA DEVELOP National Program worked with Osa Conservation to analyze land use and land cover change in the Osa Peninsula to better understand threats to river water quality and mangrove health. This project used Landsat 5 Thematic Mapper (TM), Landsat 8 Operational Land Imager (OLI), and Terra Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) to create a land cover time series map from 1987 to 2017. These time series data were used to compare land use over time, as well as patterns in water quality, mangrove health, erosion, and deforestation. The time series also helped to identify the impact of the creation of protected areas and the 1996 Forest Law 7575, which aimed to support reforestation and riparian health. Osa Conservation will use and distribute results to the National System of Conservation Areas (SINAC), Ministry of Environment and Energy (MINAE), and local communities to inform land management decisions, policy enforcement, education and outreach initiatives, and watershed restoration and monitoring.

Project Partner

Osa Conservation

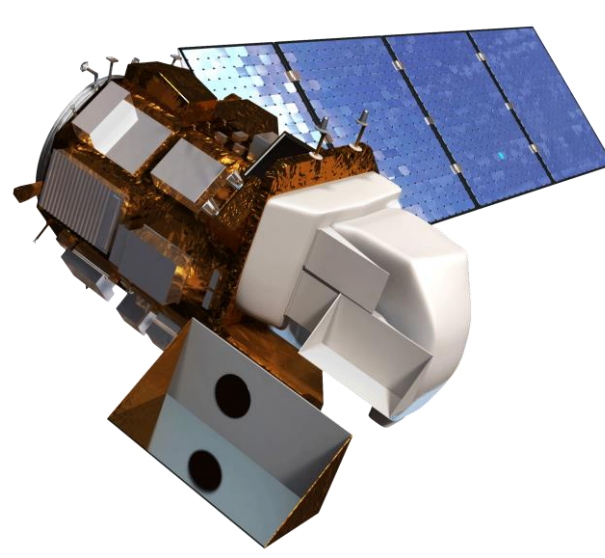
Study Area



Study area map. The Osa Peninsula is on Costa Rica's southern Pacific coast. The Rincon watershed is an important biological corridor.



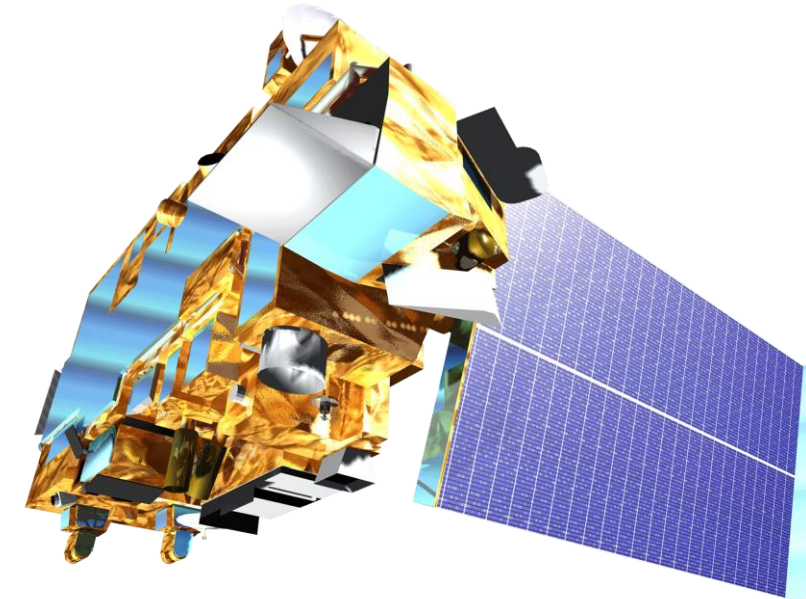
Earth Observations



Landsat 8 OLI



Landsat 5 TM

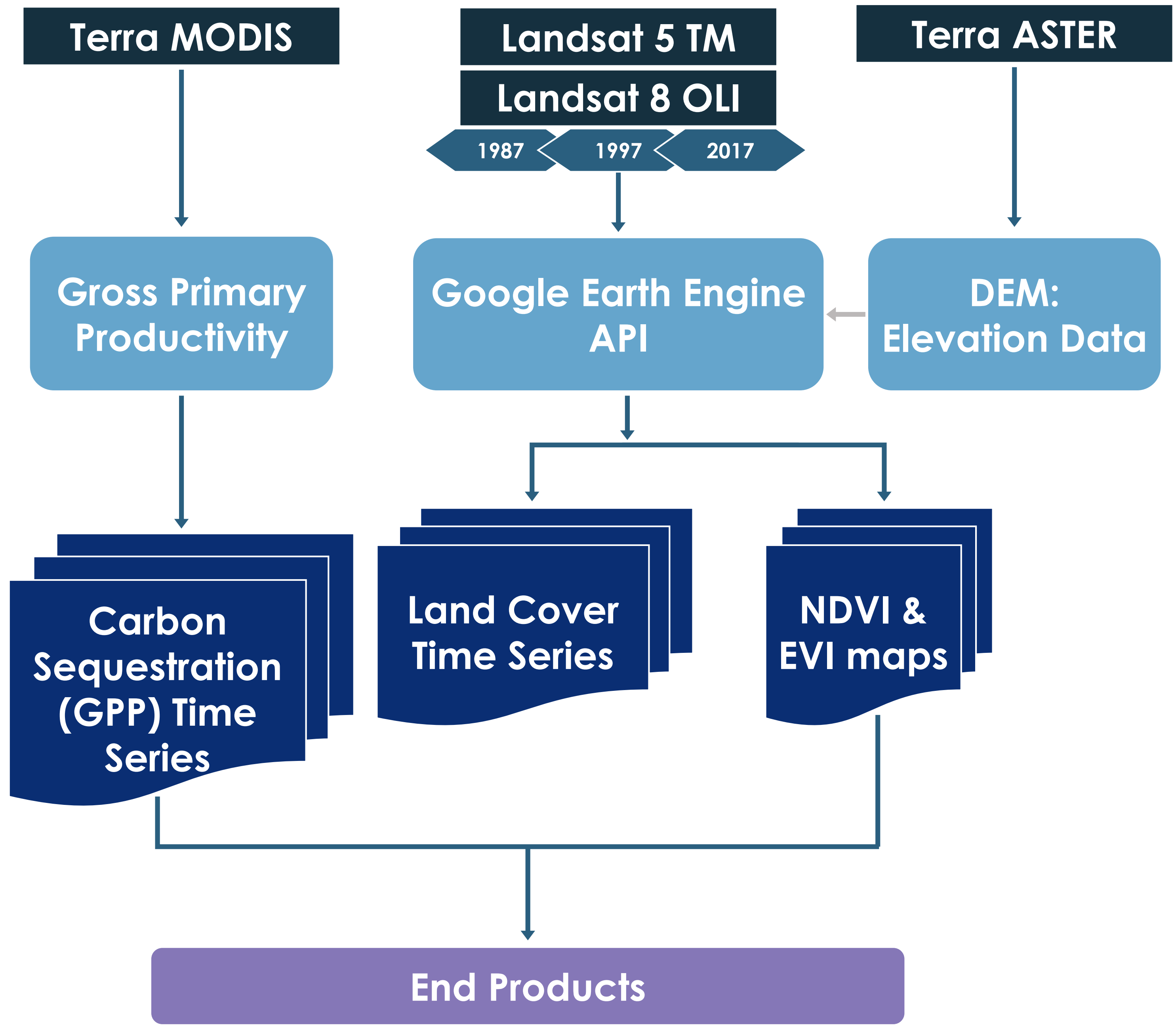


Terra ASTER

Objectives

- **Evaluate** the land use change in riparian zones of Osa Peninsula since 1987
- **Evaluate** land use and land cover change pre- and post-1996 Forest Law 7575
 - 1996 Forest Law: Protected riparian zones and established the current Payment for Environmental Services program (PES)
- **Assess** and predict watershed impacts in the Osa Peninsula region incorporating land cover and terrain data
- **Create** accessible public outreach materials to inform the local community on land use change and water quality impacts within the region

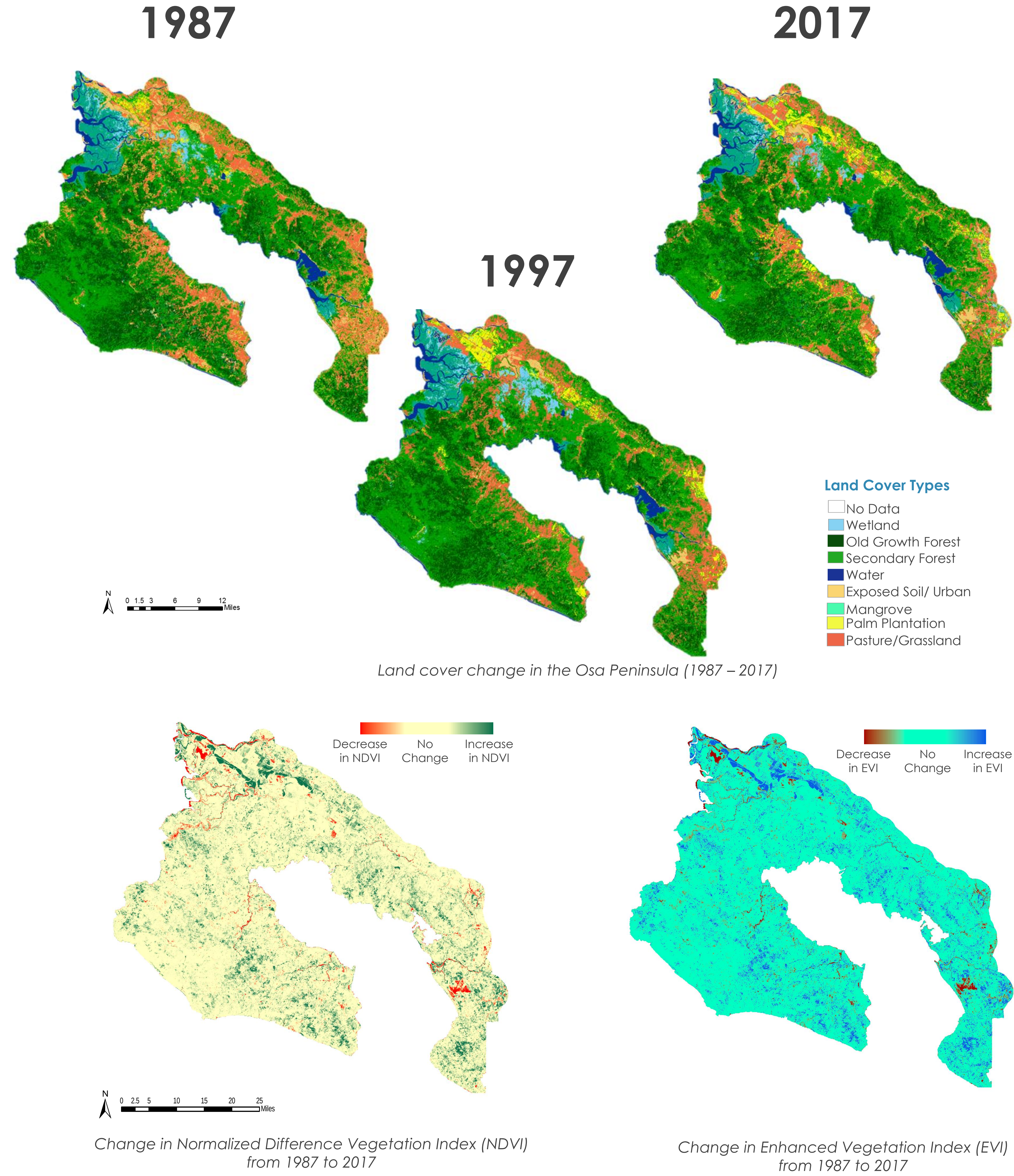
Methodology



Acknowledgements

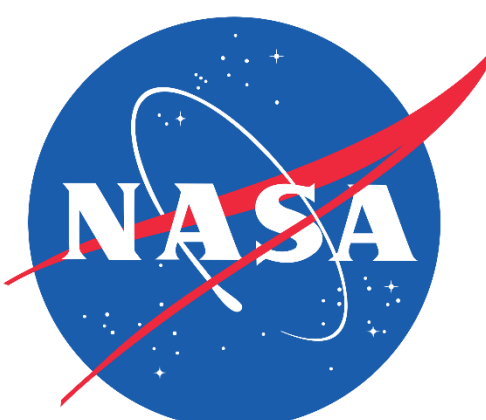
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Caren Remillard, Former Center Lead of Georgia – Athens node
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Results



Conclusions

- The NDVI and EVI maps indicate an overall growth in vegetation between 1987 and 2017.
- Land cover change between 1987 and 2017:
 - Palm plantations doubled in area – from ~100 sq. km to ~200 sq. km
 - Secondary forests increased by 10.4%
- The majority of the forest regeneration is taking place on grassland (64.15%).
- The GPP for protected areas is 3.06% higher than the unprotected areas between 2012 and 2017.



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Project Video



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#AGU18

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Questions?

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