The Pacuare Reserve Landscape: land cover change and implications for biodiversity Conservation in Costa Rica

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Background

- Habitat loss and fragmentation due to land use and land cover change (LUCC) are the main cause of global environmental change and biodiversity loss[1].

- The objective was to determine the effects of LUCC on habitat loss and fragmentation

- Where? In the surrounding landscape of the Pacuare Reserve (PR) in the Caribbean lowlands of Costa Rica.

Results

- Forest cover decreased at a rate of -4.8% per year during the period of 1992-1997 (Figure 1)

- Forest recovery was scatter and in small patches (Figure 2)

- A clear fragmentation pattern was observed

- Decreased in forest mean patch area and largest patch index and, increase in patch density (Figure 3)

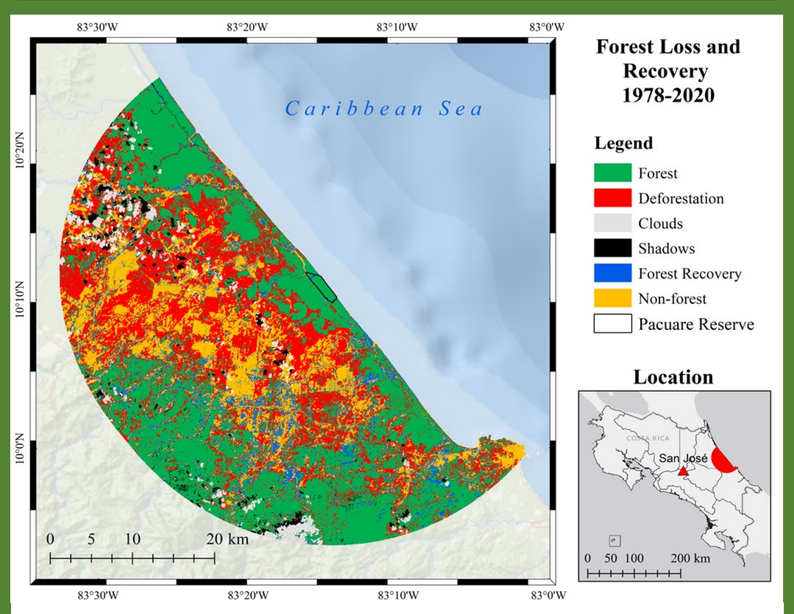

Figure 2. Forest cover loss and forest recovery from 1978 to 2020. Projection CRTM05 and Datum WGS 1984.

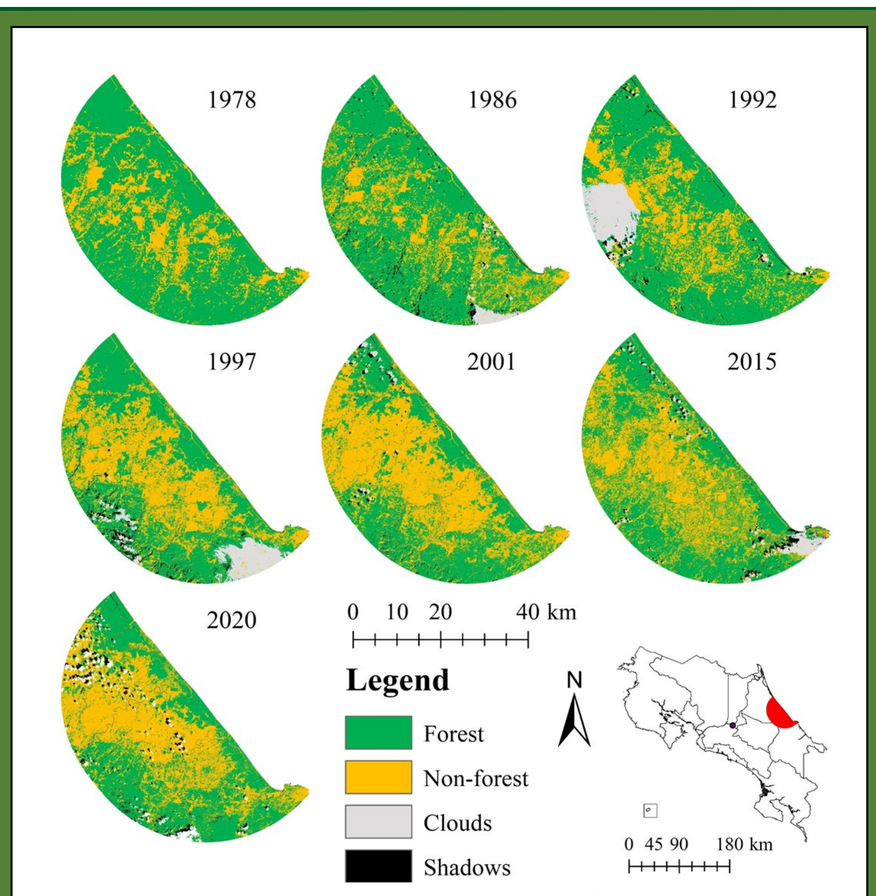

Figure 1. Land cover change for Forest and Non-forest cover types during the period 1978 to 2020.

Conclusions

- A clear fragmentation process was observed, along with habitat loss.
- Forest recovery happened in a spatially scattered manner, due to agricultural land abandonment.
- Connectivity maps showed the importance of forest fragments and already established biological corridors.
- It also evidenced the lack of connectivity to other protected areas and the need to promote reforestation projects.

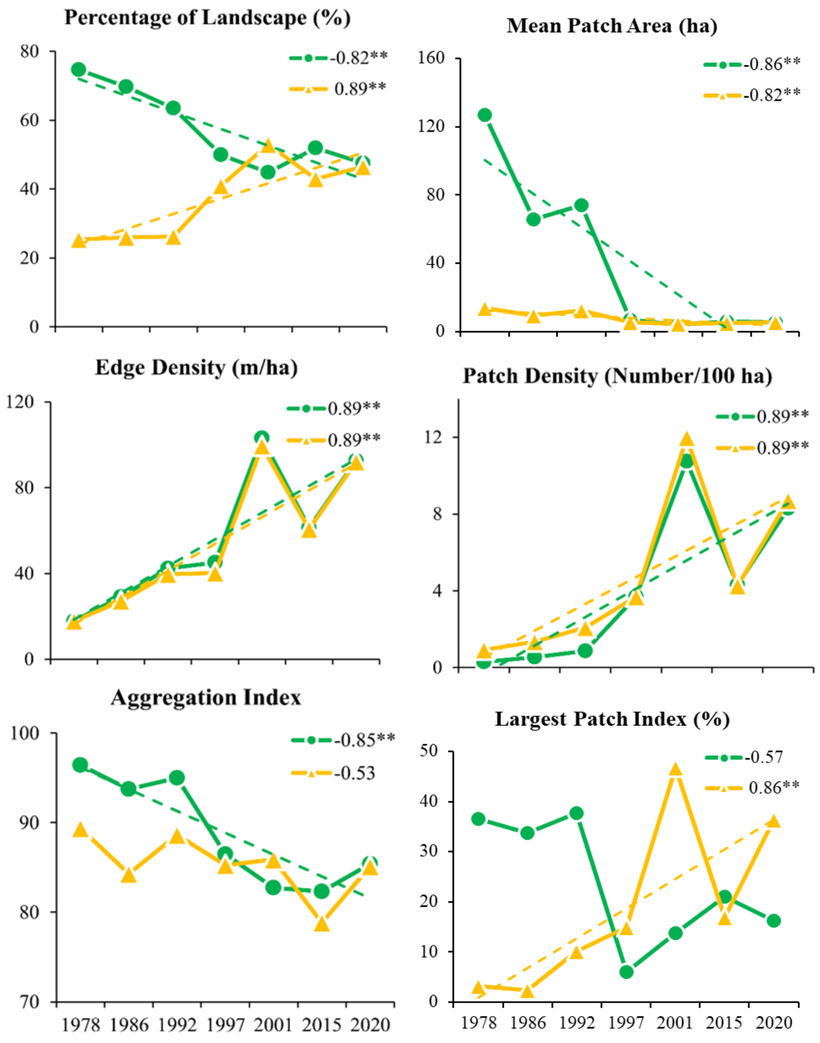

Figure 3. Fragmentation metrics for forest (green) and non-forest (yellow) land cover types from 1978 to 2020.

Methods

- Seven Landsat satellite images from 1978 to 2020
- Temporal analysis of LUCC with the Semi-automatic Classification Plugin (SCP) from QGIS[2].
- Landscape metrics were explored for each year using FRAGSTATS 4.1.
- New connectivity routes were drawn from the PR to other protected areas using the least cost path analysis (LCP).

Results

- Connectivity paths showed a network of 115.2 km
- 47 % were within already established biological corridors

- The buffer of 2 km around the paths covers an area of 38,441 ha of which 64 % correspond to forest cover (Figure 4)

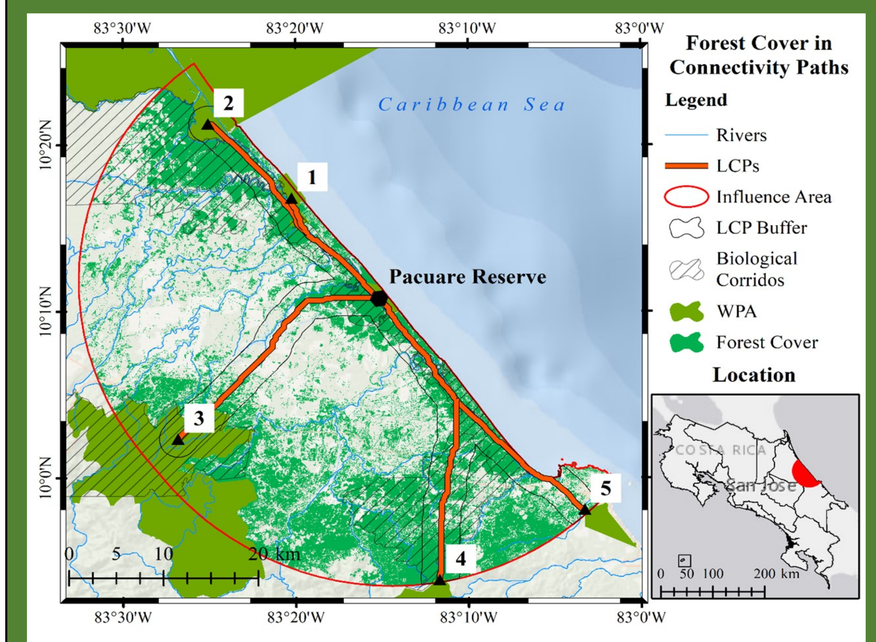

Figure 4. Land cover change for Forest and Non-forest cover types during the period 1978 to 2020. Projection CRTM05 and Datum WGS 1984.

References

[1]*IPBES, 2019. Global assessment report on biodiversity and ecosystem services. Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. IPBES secretariat, Bonn, Germany.*

[2]*Congedo, L., 2016. Semi-Automatic Classification Plugin Documentation.*

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