

An evaluation of the impact of conservation strategies on land cover/land use change at a transboundary site in Mesoamerica

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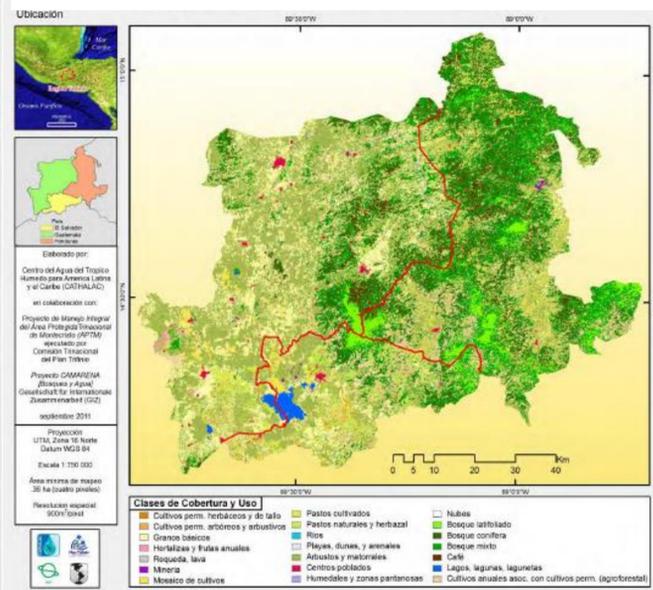
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Background

Transboundary governance and management are increasingly promoted for biodiversity and water resources conservation. The impact of conservation approaches, such as protected areas, agricultural extension, and direct incentives, on land cover changes and ecosystem services, however, are poorly understood. *Our overarching goal is to use temporal and spatial variation at a tri-border region to study the impact of a transboundary conservation area on LCLUC and ecosystem services.*

Figure 1. Land cover and use in Trifinio in 2010



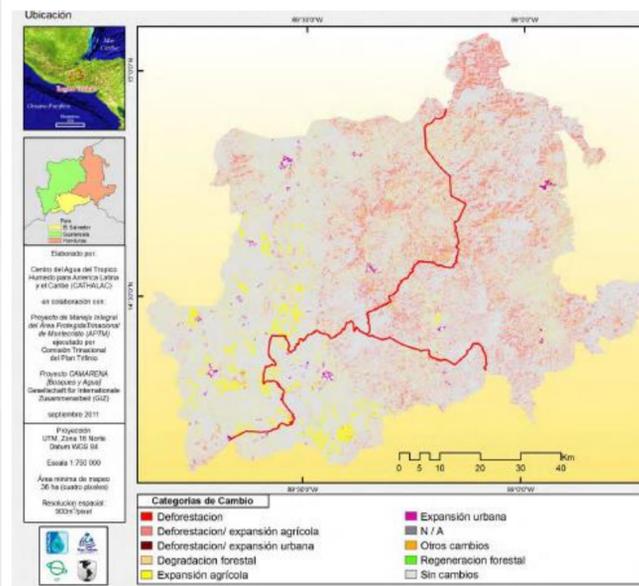
Study Area

The Trifinio Region spans three countries: Guatemala, Honduras, and El Salvador (Fig. 1). The area is of great importance to regional water supply and biodiversity. A transboundary biosphere reserve was created in 1987 and a tri-border management plan was signed in 1988.

A number of international initiatives are focused on promoting sustainable agricultural practices and maintaining tree cover. The region is characterized by high rates of poverty and weak institutional capacity.

Despite more than 25 years of activity, illegal logging remains high and deforestation continues in both the core and buffer zones of the reserve (Fig. 2 & 3). At the same time, permanent tree crops and coffee production have increased significantly.

Figure 2. Land cover change in Trifinio 1986-2010



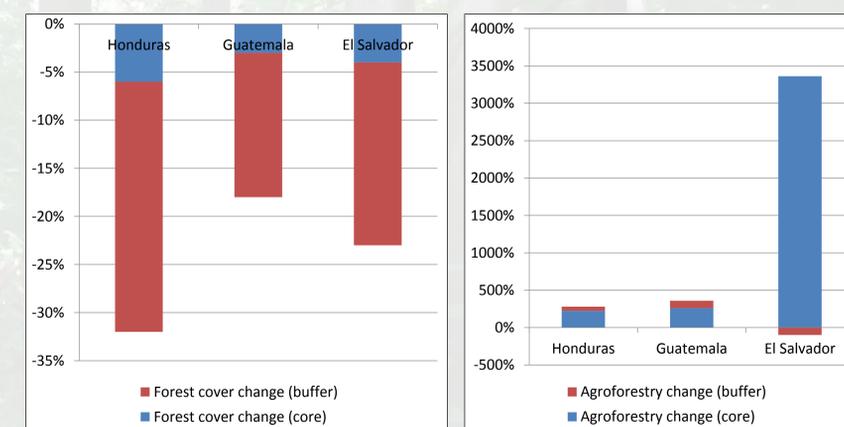
Research Objectives

- Map changes in forest cover, agroforestry, and agricultural systems using medium-scale (i.e., Landsat) imagery over 30 years and fine-scale (e.g., RapidEye, IKONOS) imagery over 10 years.
- Link land use and land cover changes to observed changes in water supply over 10 years.
- Use program evaluation methods (e.g., matching, difference-in-difference) and satellite imagery to estimate the impact of conservation approaches on LCLUC across borders and over time.
- Use social science methods (e.g., interviews, surveys) to examine the impact of institutional capacity across borders on LCLUC and the impact of conservation approaches on socioeconomic outcomes.
- Evaluate the impact of fine- versus medium-scale resolution imagery on land cover-water supply linkages and program evaluation results.
- Compare outcomes of conservation approaches at a transboundary site (i.e., Trifinio Region) to conservation areas within the individual countries.
- Advance Earth Observation capacity by fusing data and products derived from the solar and microwave spectral regions.

Expected Significance

- Advance remote sensing application for LCLUC analyses in the tropics by adapting techniques for analyzing image stacks from temperate regions to the tropics.
- Incorporate fine scale data into mapping land cover changes to capture forest degradation and tree crops.
- Link land cover changes to hydrological ecosystem services in the tropics.
- Improve knowledge of effectiveness of conservation approaches by combining program evaluation methods with medium- and fine-scale imagery and utilizing temporal and spatial variations at political borders.
- Provide empirical evidence on outcomes across transboundary conservation approaches versus country-specific initiatives.

Figure 3. Land cover changes by country 1986-2010



Collaborators

- Juan Robalino, Center for Tropical Research and Education in Agriculture (CATIE)
- Fabrice DeClerck, Bioversity International
- Margaret Holland, University of Maryland Baltimore County
- Steve Sesnie, U.S. Fish and Wildlife Service
- Armond Joyce, University of New Orleans

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