

# TIME-SERIES FOREST CHANGE, LAND COVER / LAND USE CONVERSION AND SOCIO-ECONOMIC DRIVING FORCES IN THE PETÉN, GUATEMALA

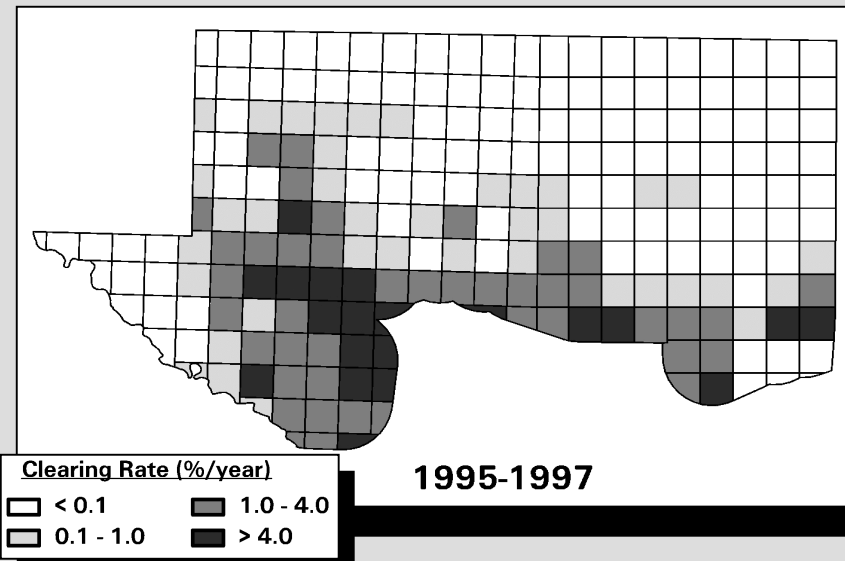
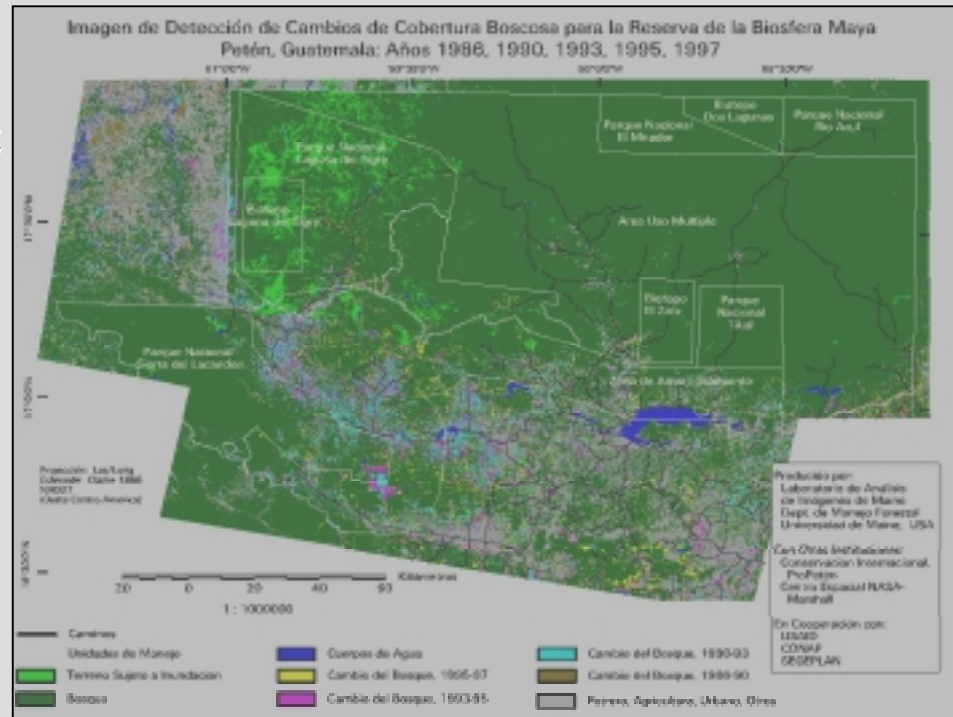
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## Objectives

1. The continued update of Maya Biosphere Reserve (MBR) Forest Change Maps for NGO conservation planning and policy development (now six dates from 1986 to 1999);
2. a proposed monitoring system for the MBR integrating Landsat-Thematic Mapper (TM) at level 1;
3. the development and testing of satellite forest change detection techniques for transfer of technology to NGO's;
4. the development and analysis of a forest clearing and regrowth database;
5. analyzing the effects of landscape variables on forest clearing; and
6. the linking of community-level socio-economic data to the land cover / land use change analysis.

## Approach

- Developed an accurate and efficient procedure for extracting land cover change data from time-series Landsat imagery;
- Assembled a forest conversion history database from 7 dates of Landsat imagery, spanning 1974 to 1997;
- Modeled landscape effects on forest clearing over time for a portion of the Maya Biosphere Reserve; and
- Linked land cover data derived from the satellite image database to household survey data at the community level.



### Significant Results

- The baseline survey and establishment of the UTM grid monitoring network identified deforestation “hotspots” and provides a framework for future satellite-based forest inventory and monitoring of the MBR;
- Accuracy assessment and comparison of three change detection methods provided justification for further use of the best techniques, and the RGB-NDVI classification method was preferred for its simplicity, ease in interpretation, and potential for technology transfer to local participants.
- The development of the time-series database from the satellite imagery allowed for the analysis of various dynamics of forest clearing over time, such as clearing rates, patch statistics, clearing to regrowth ratios, clearing and distance from access, and clearing by forest cover type.
- Landscape-level analysis combined with socio-economic data helped to explain land cover change and its driving forces; preference for clearing high forest over fallow fields as well as preference for pasture development were variable among four forest concession communities with different ethnic and religious backgrounds.

### Policy Connection

- This research has a strong cooperative component with government agencies as well as international and local non-governmental organizations, including Conservation International, CONAP, and USAID.
- Methods have been developed to facilitate technology transfer of satellite-based forest monitoring to local participants, and workshops and training have been provided.
- The regularly updated forest change detection maps are considered by CI and USAID to be their “most powerful monitoring tool” and a key component of CI’s forest monitoring and evaluation program.
- The UTM grid network developed in this research has been proposed by CI as the first level in a multi-level ecological monitoring scheme for the MBR and other conservation programs in Latin America.

