Assessing the Conservation Status of Neotropical Dry Forests using Geographical Information Systems and Remote Sensing

Carlos Portillo-Quintero, Arturo Sanchez-Azofeifa & Benoit Rivard.
Department of Earth & Atmospheric Sciences, University of Alberta, Canada.
Email contact: portillo@ualberta.ca, http://tropi-dry.eas.ualberta.ca

Introduction

The tropical dry forest ecosystem is the most threatened ecosystem in the tropics. However, the scientific community still lacks the basic information necessary to design and propose conservation priorities for this ecosystem. There is an immediate need to know how much of the ecosystem is left, where is it located, and what are the principal threats to the maintainance of its integrity. By using a suite of Geographic Information System (GIS) and remote sensing techniques we expect to contribute to answering these questions and fill important knowledge gaps in tropical dry forest ecology and management.

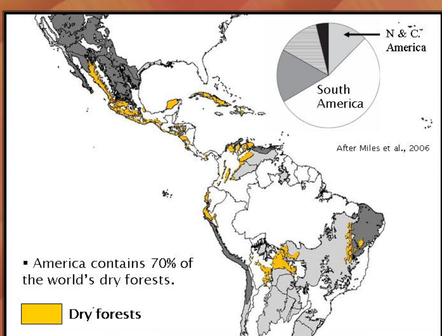

Fig 1. Distribution of tropical dry forest in the Americas.

Fig 2. Typical physiognomy of a Tropical Dry Forest (photo taken at Hato Pinero, Venezuela). TDF is a type of vegetation dominated by deciduous trees (at leat 50% of trees are drought deciduous), t otal mean annual precipitation between 700-2000 mm, >25° annual temperature and three or more dry months (precip. < 100 mm/mo).

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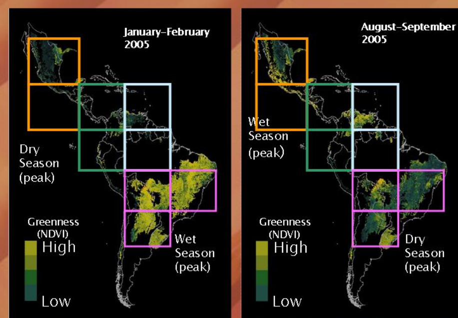
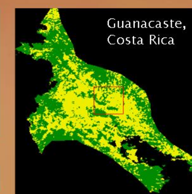
1.- Extent



Objective:

1) To estimate the extent and geographic distribution of TDF using remote sensing and GIS.



Imagery: MODIS (500-m)

Imagery selection accounted for latitudinal shifts in phenology

TDF Class-specific Supervised classification

- Implemented within potential distribution
- Detection of evergreen variants
- Country by country verification

2.- Deforestation pressure

Objective: To evaluate the potential use of satellite-detected fires as deforestation predictors

Fig 3.
We determined the number of Satellite-detected Active Fires from 2002-2004 in a 10x10 km grid over the Americas. Cells with high fire frequency (>25 fires) were identified as potential deforestation frontiers.

High Fire frequency cells/per country :

Bolivia	135
Brazil	49
Mexico	14
Venezuela	6
Nicaragua	2

Continental main drivers of change: Agriculture, cattle grazing

Insular main drivers of change: Introduction of exotic species, urban sprawl, Selective logging, Agriculture and Tourism development

3.- Edge influence

Objective: To estimate the magnitude of edge-to-core physical disturbances in tropical dry forest fragments

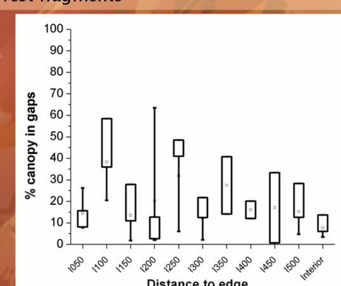


Fig 5. Percentage of Canopy interruptions (tree-fall gaps) vs. distance to forest edge. Edge Influence penetrates beyond 500-m. Light penetration increases between 100-400 m. (Hato Pinero, Venezuela , June 2007).

Can we detect edge influence using remote sensing?

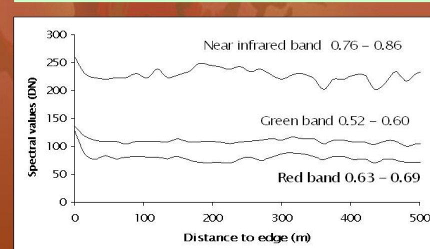


Fig 6. ASTER Spectral profile of a 500-m transect surveyed in the ground. Elevated values of NIR between 100-300 m represent high densities of understory biomass from higher light penetration.

Acknowledgements: Inter-American Institute of Global Change Research, USA.
University of Alberta, Canada.