Twenty-five years of community forestry: Mapping tree dynamics in Nepal

Jefferson Fox (PI)  
Sumeet Saksena (Co-I)  
Kaspar Hurni (Co-I)  
Jamon Van Den Hoek (Co-I)  
Alex Smith (PhD student)  
Ram Chhetri (Co-I)  
Pitamber Sharma (Co-I)  
Naya Sharma Paudel

East-West Center  
Universitat Bern  
Oregon State University  
Resources Himalaya Foundation  
ForestAction, Nepal
Forests account for upwards of 40% of Nepal’s national land area (5.5 m ha).

In 1988 the Department of Forests (DoF) identified 61% of the nation’s forest that could be transferred to local communities for management.

Today, Community Forests occupy near 23% of Nepal’s total forest area and involve over 19,361 CF user groups.

Hence force, I will speak of tree cover because the remote sensing does not separate fallow trees growing on private land and tree plantations from forest.
In Nepal, out-migration from rural areas for improved economic opportunities is frequently cited as a driver of socioeconomic change.

Today there are about four million migrants – one-third of the working male population – and foreign remittances constitute a quarter of the income of all households.

In 2016, 32% of the GDP was drawn from remittances, a figure that does not include remittances from India and undocumented or informal sources.
Socioeconomic Hypotheses

- Tree-cover regeneration will be positively associated with CF
- Tree-cover regeneration will be positively associated with out-migration
% VDC land under Community Forests
Hypotheses

- Tree-cover regeneration will be associated with socioeconomic variables including income, source of income, number of people per household, education, gender, number of livestock, etc.
- Tree-cover regeneration will be associated with biophysical and spatial variables including aspect, slope, elevation, distance from markets, etc.
Problem Statement

• The spatially-explicit impacts of this hypothesized transition in tree cover (forest transient) have not been documented in part because of the difficulty of mapping tree cover in mountainous environments.

• Topographic effects, e.g., shading, presence of clouds, snow, and ice, and inaccessibility for ground truth data collection.
Project Objectives

Specific research objectives include:

• Build comprehensive database of changes in tree cover in the Nepal since 1990, and produce maps of these changes (disturbance and recovery) at district and Village Development Committee (VDC) scales.

• Integrate tree-cover dynamics data with demographic and socioeconomic data from the Central Bureau of Statistics to identify physiographic and socioeconomic variables associated with tree-cover dynamics at district and VDC scales.

• Quantify how the geographic distribution of economic migration and remittances are correlated with spatially-explicit tree-cover dynamics.
At the local scale, specific research objectives include:

• Identify a sample of sites mapped as showing forest regrowth or stagnation through this period for more intensive study.

• Conduct focus group discussions and household interviews in these sample sites to examine how forest management practices, economic migration, and remittances have changed.


Methodological Work Flow

OBJECTIVE 1
Middle Hills level
30m SRTM
Landsat 5, 7, and 8 surface reflectance time-series available in Google Earth Engine

OBJECTIVE 2
District & VDC levels

Population & agricultural census data
Significant predictors of forest cover change
Individual and group interviews

Assemble socioeconomic variables
Assemble physiographic variables
Build regression forest model
Assemble forest cover change variables
Apply regression forest model

High residual districts & VDCs

Village & roadway location data
Terrain illumination correction
Intra-annual image compositing
LandTrendr

Forest cover gain & loss across Middle Hills

Accuracy assessment

Legend
Theoretical background
Input data
Data analysis
Output
Pre-processing
Validation
Ground truthing

Very high resolution imagery interpretation
Thank You!

Dr. Ram Chhetri, Co-I
Resources Himalaya

foxj@eastwestcenter.org
In February 1996, the Unified Community Party of Nepal (Maoist) started a bid to replace the parliamentary monarchy with a people's new democratic republic, through a Maoist revolutionary strategy.

In 2008, the monarchy was formally abolished; by 2012, fighting had ceased and Maoist military units were integrated into the Nepali army.

In the post-Maoist period elections for local governments were not held until 2018. During this period the VDCs were forced to rely heavily on their Government-appointed secretaries.


Methodological Work Flow