

Project Background

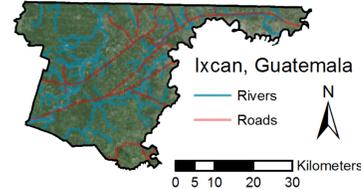
What is Agroforestry?



Agroforestry is a sustainable farming technique in which trees and shrubs are planted with crops to preserve soil quality and land longevity. It is an alternative to the “slash and burn” farming technique common to tropical rainforests, which is destructive to the environment and labor-intensive for farmers. Agroforestry can break the cycle of poverty and environmental degradation by rehabilitating forest ecosystems, improving agricultural sustainability, and increasing food security.

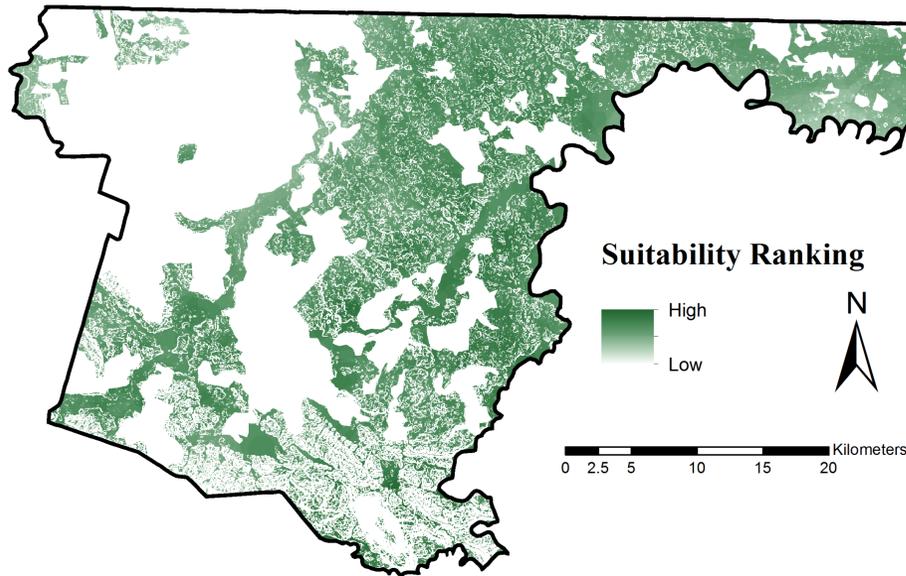
Why Ixcán, Guatemala?

Ixcán is a rural municipality in Quiché Province, Guatemala, near the Mexican border. The region is dominated by rainforest that is being rapidly deforested for agricultural purposes. Additionally, half a century of civil war has led to mass displacement and loss of community solidarity; many Ixcán communities are not working together strategically to preserve the health of the land they depend on.



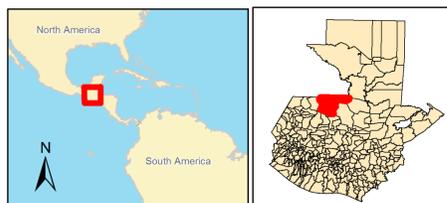
Who is The EcoLogic Development Fund?

EcoLogic, a Cambridge-based non-profit that empowers rural communities to preserve their local ecosystem, began an agroforestry program in Ixcán in 2002 to preserve the area’s rainforest and promote food security. They use community agroforestry strategies to preserve the region’s rainforests, promote food security, and . Because agroforestry is a multi-year farming process that discourages relocation, these agroforestry programs also build and strengthen social health and cohesion. EcoLogic is currently developing a 5-year plan for expanding their agroforestry program to more sites in Ixcán, and is therefore seeking information on potential sites for new programs.



Final Suitability Results

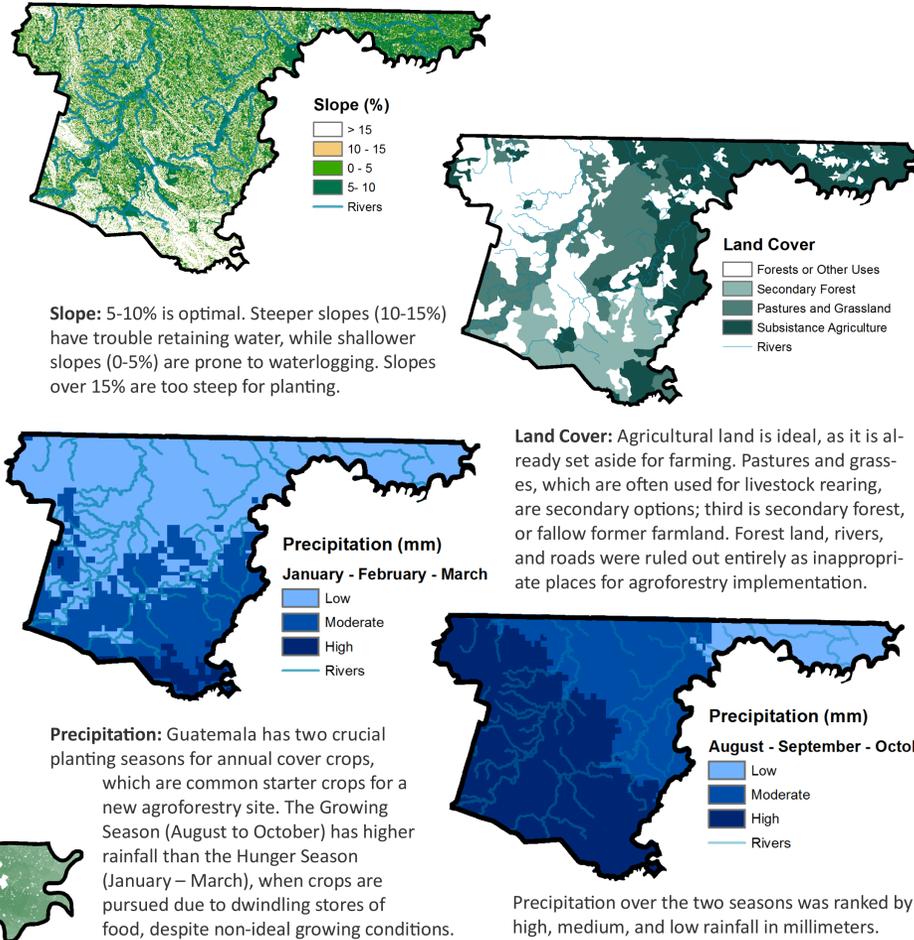
Ranking	Square Kilometers	Acres
3	6	0.0015
2	360,097	88,9819
1	378,550	93,5416
0	910,174	224,9085



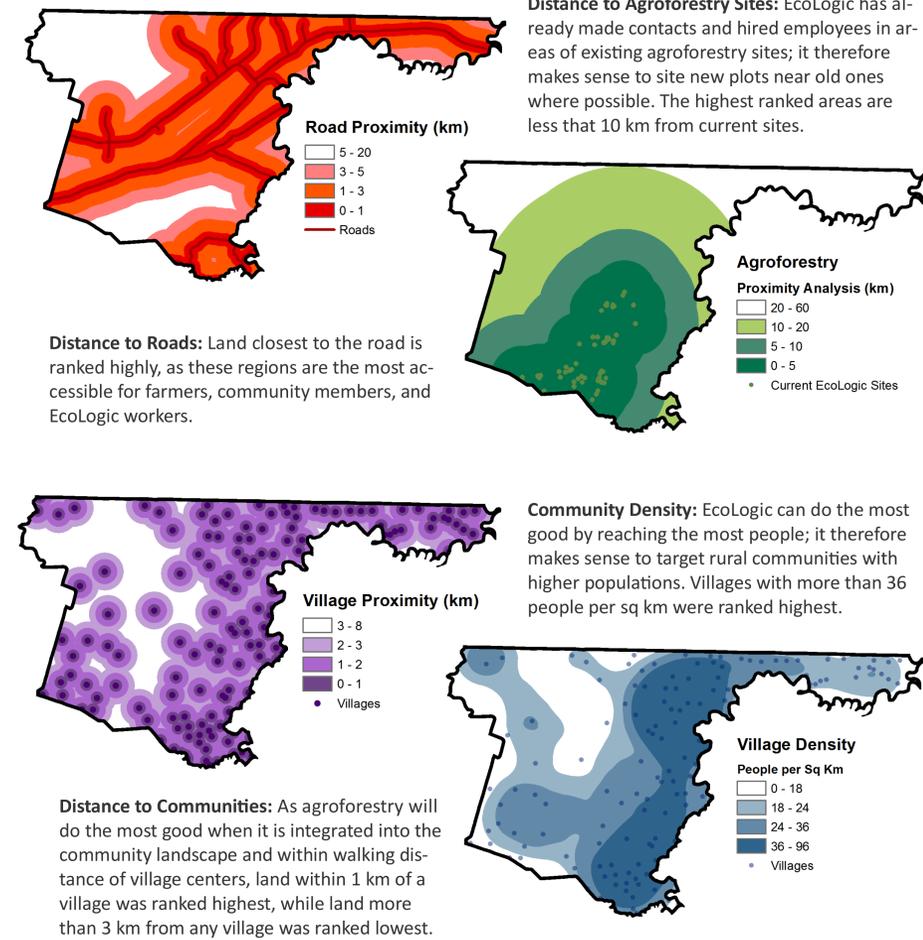
A Tree Grows in Guatemala

Assessing the Suitability of Land in Ixcán for Agroforestry Projects

Ecological Feasibility: Land Suitability Analysis



Social Need: Proximity & Density Analysis



Methodology

The goal of this project was to help EcoLogic explore opportunities for new agroforestry programs in Ixcán, Guatemala. To do this, I worked with EcoLogic to determine seven factors to consider in identifying agroforestry sites. Three of these factors related to ecological feasibility: **slope**, **precipitation** (across two growing seasons), and **land use suitability**. Four factors related to social needs: proximity to **roads**, current EcoLogic **agroforestry sites**, and **villages**, and **village population density**.

I obtained a dataset for each suitability factor and converted the data into raster files with optimal parameters ranked highest (3) and untenable factors ranked lowest (0). I then added these files together to create one final suitability analysis map. Untenable land (steep slopes and intact rainforest that need not be disturbed) was eliminated from the final map.

Ecological Feasibility Factors

Ranking	Slope	Hunger Season Precipitation	Growing Season Precipitation	Land Cover
3	5 - 10 %	335 - 516 mm	1451 - 1668 mm	Agriculture
2	0 - 5 %	279 - 335 mm	1279 - 1451 mm	Pastureland
1	10 - 15 %	231 - 279 mm	1054 - 1279 mm	Secondary Forest
0	15 % +	X	X	Forest or Other

Social Suitability Factors

Ranking	Distance to Roads (km)	Distance to Villages (km)	Distance to Agroforestry Plots (km)	Village Density (ppl per sq km)
3	0 - 1	0 - 1	0 - 10	36 - 96
2	1 - 3	1 - 2	10 - 20	24 - 36
1	3 - 5	2 - 3	20 - 30	18 - 24
0	5 - 20	3 - 8	30 - 60	0 - 18

Results & Next Steps

Of Ixcán’s 1575 km², 224 km² are unsuitable for agroforestry due to steep slopes or the presence of rainforests that should not be disturbed for agricultural projects. While very little land achieved the highest overall suitability ranking, more than half the municipality’s land is at least somewhat suitable enough for agroforestry. These areas should be investigated further.

This study was limited in scope, as there are likely other factors worthy of consideration in the identification of agroforestry plots for which GIS data was not available. Because each agroforestry site is unique, it is difficult to assign accurate agroforestry suitability parameters to the whole region. Furthermore, limited metadata and high-resolution data may limit the accuracy of the study.

For reasons of population, land access, and environmental suitability, EcoLogic should consider the eastern area of Ixcán for future agroforestry program expansion. It is my hope that this preliminary data will assist EcoLogic in the early stages of developing their 5-year plan for additional agroforestry projects in Ixcán, Guatemala.

Cartographer: Elise Simons
Date: May 2016
Class: UEP 232 Intro to GIS
Map Projection: WGS_1984_UTM_Zone_16N



Data Sources:
 The EcoLogic Development Fund, Cambridge, MA (2015)
 Guatemala National Geographic Institute (IGN) (2014)
 Guatemala Ministry of Planning and Programming of the Presidency (SEGEPLAN) (2006)
 National Renewable Energy Laboratory (2011)
 Worldclim Global Climate Data (2000)