The Effects of Protected Forest Areas on Local Economic Development in Villages of Chiang Mai Province, Thailand

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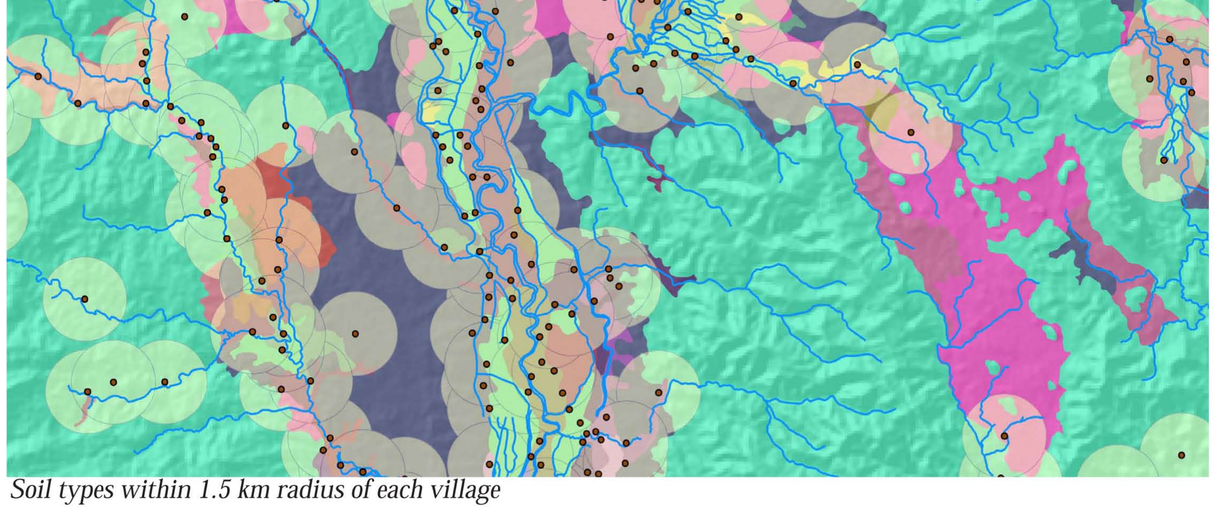
Introduction

In response to concerns about deforestation and habitat loss, many countries around the globe have set aside large tracts of land with special conservation status. However such lands often also contain existing human settlements, which face new legal restrictions on the use of land for agriculture or timber extraction. Is the economic development of communities inside protected areas harmed or helped by these environmental designations? Reasonable theoretical arguments point in both directions, but little is currently known about the sign or magnitude of the actual local effects of protected areas policies on a regional scale, particularly for communities in developing countries where most recent protected areas have been established.

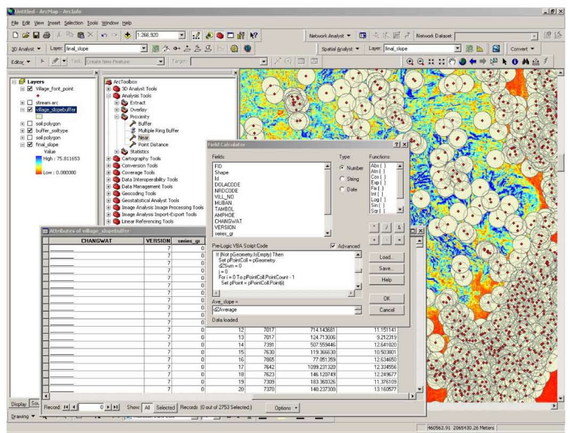


A bird's eye view of the topography of Chiang Mai Province, villages and conservation areas

Soil types within 1.5 km radius of each village

Methodology

In this project, I focus on the direction and magnitude of the effect of forest protection policies on economic growth in the context of Northern Thailand. I use data from the Thai Community Development Department from 1986 to 2005 and show that the growth of key household assets diverges in these years, with slower growth for villages inside of protected forest areas. To estimate the effects of protected forest policy on economic outcomes, I use a regression discontinuity approach that relies on an increase in the probability of designated status for villages above 500m in elevation that occurred because the initial designation of forest reserve boundaries was based largely on contour maps without careful verification of existing human settlements. By matching data from 2003 with GIS data on the locations of villages and a digital elevation model, I am able to instrument for protected forest status with indicators for being above or below 500 m of elevation and with slope variables. I estimate the difference in assets, employment, and school enrollment outcomes for a subset of villages where the instruments plausibly capture exogenous variation in protected status: villages between 400 and 600 m of elevation and with less than 10 degrees of average slope.



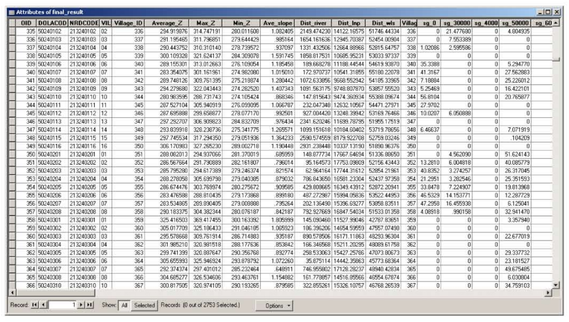
The project calculates five geographic data variables for roughly 1,500 villages in the Chiang Mai province. The data variables sought for each village are listed below:

1. Average elevation within 1.5 km radius
2. Average slope within 1.5 km radius
3. Soil type composition within 1.5 km radius
4. Distance to closest major river or perennial stream
5. Distance to border of nearest conservation area

The digital elevation model (DEM) used in this project is a mosaic of SRTM 90m resolution global elevation datasets. A lower resolution SRTM 300m elevation map is used to fill the NoData areas in the high-resolution datasets. The DEM is further calibrated according to the stream map acquired from local univeristy.

Many geospatial analyses are performed in ArcGIS to generate variables for this research, including proximity analysis, 3D analysis and spatial statistics.

The resulting dataset from GIS, as well as other social-economic datasets are imported into statistical models to find the "control" group and make comparison between villages.



Conclusions

The growth of key household assets shows a pattern of divergence in these years, with slower growth for villages inside of protected forest areas. To estimate policy effects, I use a regression discontinuity approach that relies on increases in the probability of designated status for villages above 500m in elevation. The results from this instrumental variables approach suggest that a decrease of around 20 percent in wealth may be attributable to forest reserve policies. However, the data is consistent with several possible mechanisms for the observed divergence in assets, including both direct restrictions on agricultural land use and indirect effects through reduced access to credit, higher travel costs, fewer educational opportunities, or selective out migration. Future work should focus on understanding the contribution of these possible policy mechanisms, in order to better understand how to overcome this possible tradeoff between conservation and development.