

TREES FALL AND NO ONE LISTENS

A vulnerability assessment of deforestation in the Madre de Dios region of the Western Peruvian Amazon

Introduction

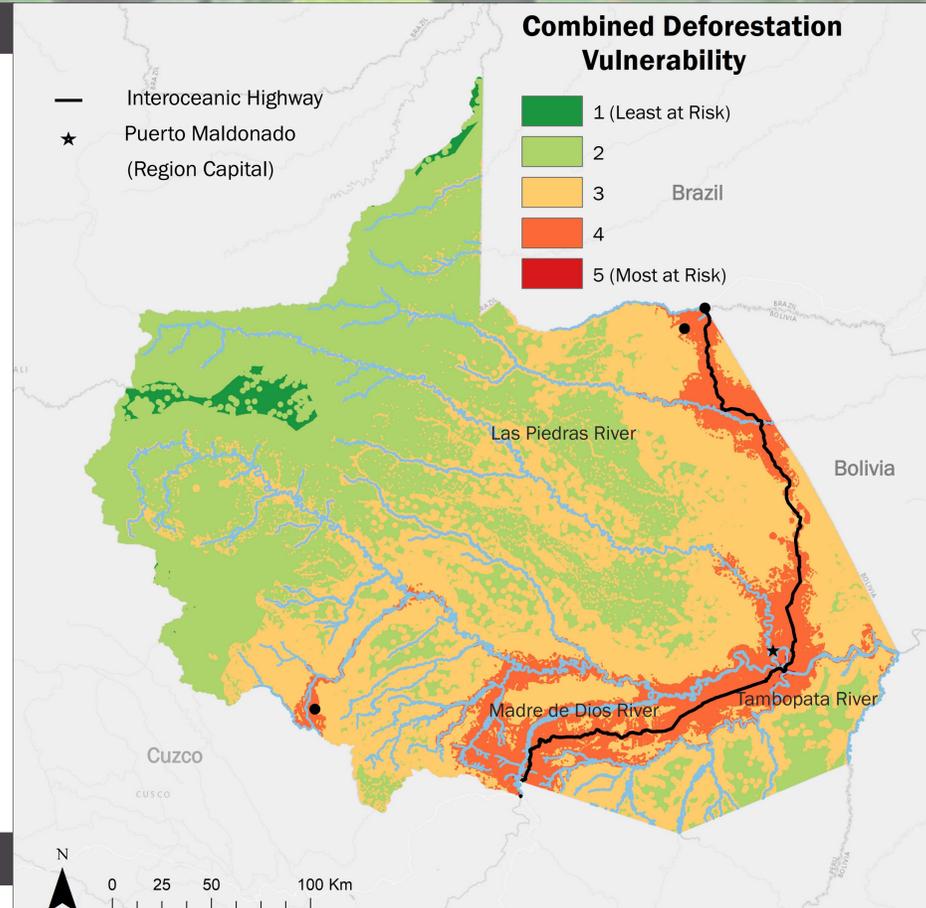
The Amazon Rainforest is currently being threatened by deforestation, primarily from the mining, agricultural and logging industries. Increase accessibility to the region by roads and highways have given path for both legal and illegal extraction activities. After the construction of the controversial Interoceanic Highway (between 2006-2011 in Peru), which connects the Pacific and Atlantic Oceans through Peru and Brazil, access to the region increased exponentially and allowed commerce through previously untraveled areas. The region in Peru most affected by the road was Madre de Dios, located in the Western Amazonian basin in the Peruvian border with Brazil and Peru. For this reason Madre de Dios was chosen as the study area.

This project aims to conduct a vulnerability assessment of deforestation in Madre de Dios based on five different risk factors: Distance from existing deforestation; Distance from populated areas; Distance from the Interoceanic highway; Distance from rivers; and type of protected area. These factors all pose different levels of risk. Studies have shown that 97% of all deforestation in the Amazon Basin occurs within a 5km distance of the highway, areas within that radius are at most risk of deforestation. Similarly, being near already deforested land, river access and populated areas increase the vulnerability of a specific area to deforestation.

Primary forests are those that have been mostly untouched by development – they still have key primary forest species of flora and fauna (such as Mahogany and Brazil-Nut trees, spider monkeys) and there is no active mass-scale deforestation happening. It is estimated that Peru still has about 87% of primary forest land cover, however only 48% of that falls under some sort of government protection area. It is vital to predict and understand the risk of further development in the region. Peru has grown due to its extractive resources and will continue to do so over the next decades, this however comes at a clear environmental and cultural cost to the Amazonian region.

Methodology

Data was gathered from various Peruvian institutions and online sources, all layers were clipped to the extent of the study area (Madre de Dios). Five risk factors (deforestation drivers) were chosen for this analysis using existing literature on deforestation and the consequences for development on the rainforest. Risk factors were assigned from 1-5, from least to most risk, based on type of protected area or distance from factors (as seen below). The Euclidean distance tool was run on the factors and depending on the factor a risk level of 1-5 was assigned to a scale of distances (as seen in each factor). Raster files were reclassified to only display the risk level of 1-5. Finally all raster files were merged using the raster calculator.



Sources

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 DIVA - GIS (interoceanic Highway, Navigable Rivers)
 Finer M, Mamani N (2018) Deforestation in the Andean Amazon (Trends, Hotspots, Drivers). MAAP Synthesis #3.
 Geoservidor del Ministerio del Ambiente Peru (Forest Cover and Forest Change)
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 Instituto Nacional Estadísticas e Informatica del Peru (Centros Poblados)

Results and Discussion

The future impact of development and growth in the region of Madre de Dios is clear in the final vulnerability map. This map shows that almost 5 million hectares are at significant risk of deforestation (levels 3-5), this constitutes over half of the total area of the region. Deforestation has already reached significantly isolated areas. Such as those in the Northwest region of the map (within the Alto Purus National Park) in which an estimated 15,000 people live in voluntary isolation. In those areas deforestation usually comes through illegal extraction of timber, illegal coca plantations – although access is extremely limited and difficult (it would take 4 days by boat to get from Puerto Maldonado to Alto Purus through the Las Piedras River).

Unlike other regions of Peru, Madre de Dios is yet to be targeted for large-scale events of deforestation – like those for agriculture of palm oil. Most of the deforestation in the region is due to small-scale events, these however are numerous and the consequences of creating deforested patches of rainforest are still not completely understood. Patches of forest with no long-living hardwood trees are being created, limiting the amount of fauna in the area – which will further limit the dispersal of seeds. In the future we may see drastically different forest structures, in which the current ecological niches will likely not be able to exist. Development of the region is going to continue and it is imminent to understand the risk that different drivers pose to forest cover change.

Limitations of the Study

This study was significantly limited by several factors – primarily related to time and access of data for the project. The data that shows the current forest extent and forest loss in the last 15 years is from 2016, so it does not show the most updated forest extent in the region. Forest cover is very quickly changing. The extent of this project is quite limited, only encompassing one region of the Amazon in Peru. Additionally, the variables were considered only within that extent – ignoring what was happening across the border in Brazil or in the adjacent regions of Peru. Including data from Brazil, Cuzco and Ucayali would've changed the data along the borders. Furthermore, I only analyzed 5 factors – there are many more factors that would increase or decrease the risk of deforestation (such as forest type, designation of land use, tree density, access to logging roads). However, this was outside the scope of the study due to time and skill constraints.

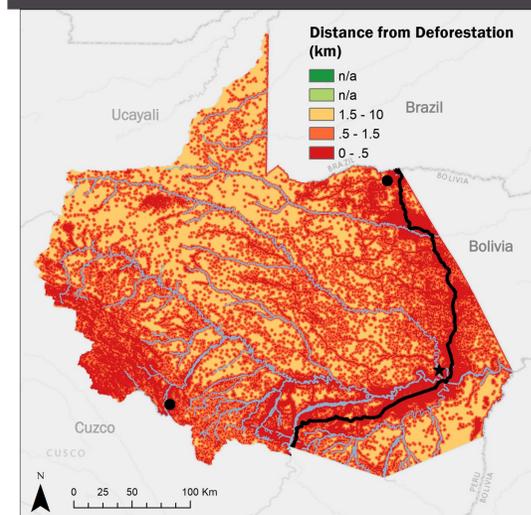
Acknowledgments: Thank you Cris for your patience with this project; Uku and Eliana for your endless help and encouragement.

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 GIS 101 Fall 2018

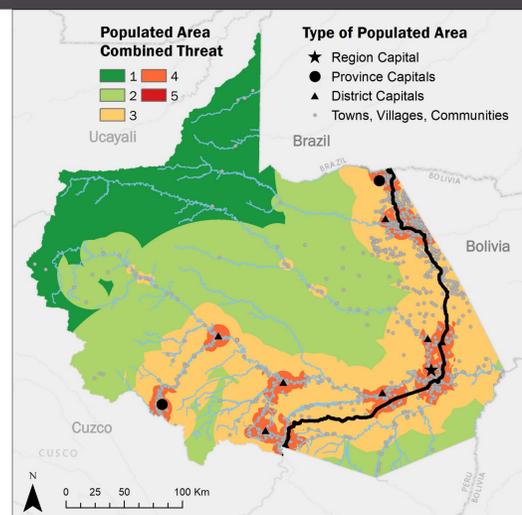
Projection: WGS_1984_UTM_Zone_18S



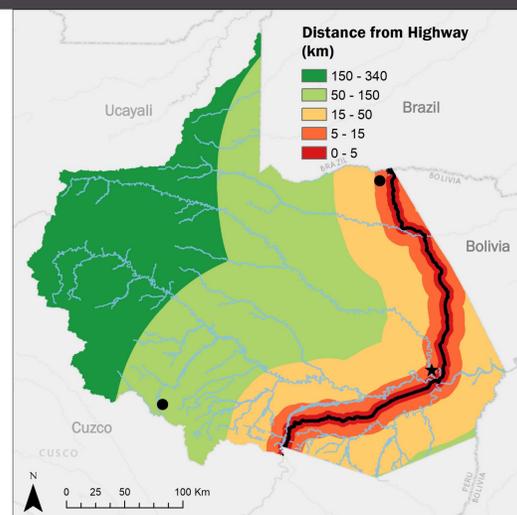
Deforestation Drivers



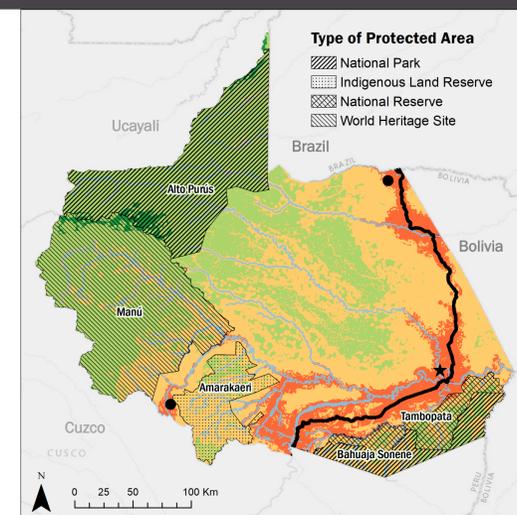
Pre-existing deforestation is an important factor when analyzing the vulnerability of a specific area to future deforestation. As seen in this map pre-existing deforestation is so far stretched through the region that at any point you can be within a maximum of 220 km from existing deforestation.



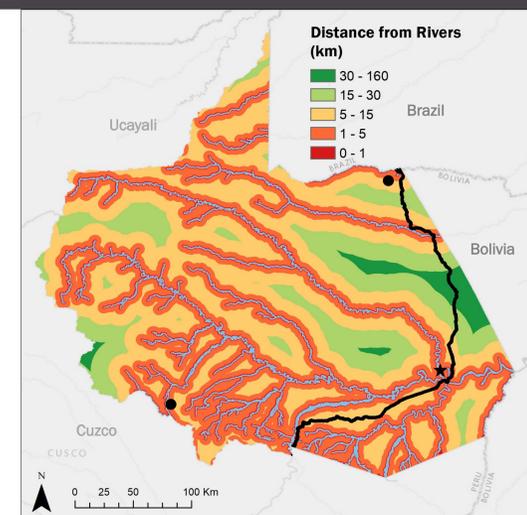
Urbanization and people are also drivers to deforestation. To produce this map populated areas were classified in three ways: big cities, towns with schools and towns with no school. Each type of populated area had different risk areas attached to it. This Map is showing the combined risk of different populated areas



One of the main drivers of deforestation in the area was the construction of the Interoceanic Highway, which gave unprecedented accessibility to the region. Data shows that 95% of all deforestation occurs within 5km from roads. Euclidean distance was used to map different levels of risk.



This map did not use Euclidean distance, risk levels were assigned based on type of area. Research has shown that although protected areas are less prone to deforestation, they are still at risk. In similar areas in Brazil, 10.9% of all deforestation occurred within protected areas. The Tambopata reserve is at risk of illegal mining



River access is also an important driver to deforestation. As with road access, most of the deforestation occurs within 5km of any navigable river. This map shows all the navigable rivers of the region. Euclidean distance was used to map different levels of risk.