Land cover change analysis
Pico Bonito National Park, Honduras

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Source: USGS Global Visualization Viewer
Landsat 7 & Landsat 4-5

Description

The study examined the rate of deforestation and land cover change in Pico Bonito National Park (and buffer zone) in North Central Honduras. Using a supervised classification method, land uses were identified and calculated from 1993 and 2003 Landsat imagery. The results have identified the success and failures in conservation at Pico Bonito.

Study Area

Description: Located in the heart of the Nombre de Dios mountain range, the park, and its buffer zone, boasts several 2,000+ meter peaks and are home to one of the most biodiverse could forests in the country.

Location: Atlántida and Yoro departments, Honduras
Park Area: 578 km^2
Buffer Zone Area: 562 km^2
Founded: 1987

Methodology & Data

The data used for analysis was taken from two sources, both satellite images were found using USGS Global Visualization Viewer (GLOVIS) while the boundary of the park and its buffer zone were taken from the International Union for Conservation of Nature (IUCN) and World Database on Protected Areas (WDPA) data center.

The 1993 Landsat 4-5 enhanced thematic mapper image (30 meter resolution) was taken on February 22. The second dataset used is a Landsat 7 (SLC-On) (30 meter resolution) image taken March 6 2003. Both the boundary for the park and its buffer zone are basic vector shapefiles from the World Database for Protected Areas.
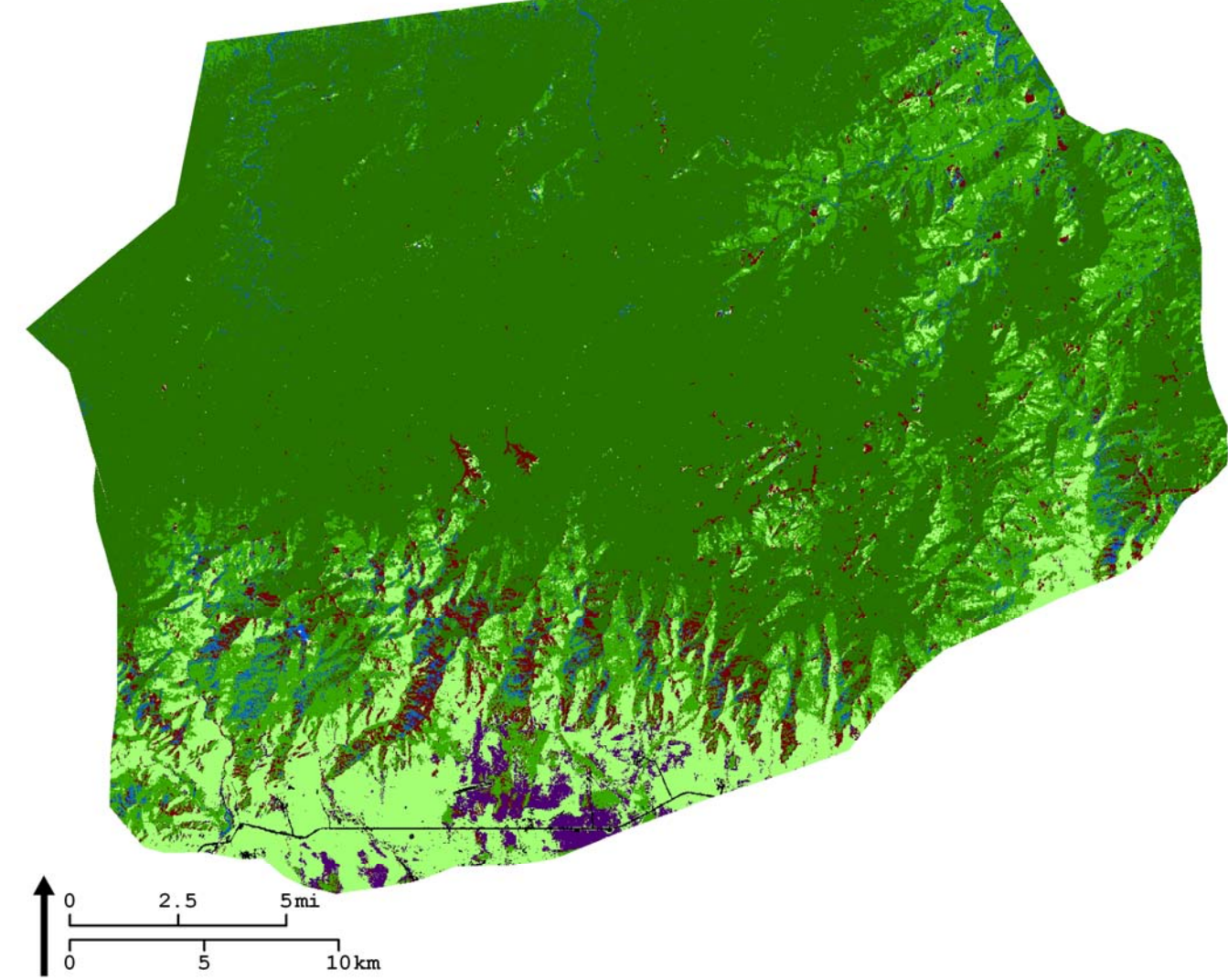
Original image
Landsat 4-5
22 February 1993

Original image
Landsat 7 (SLC-off)
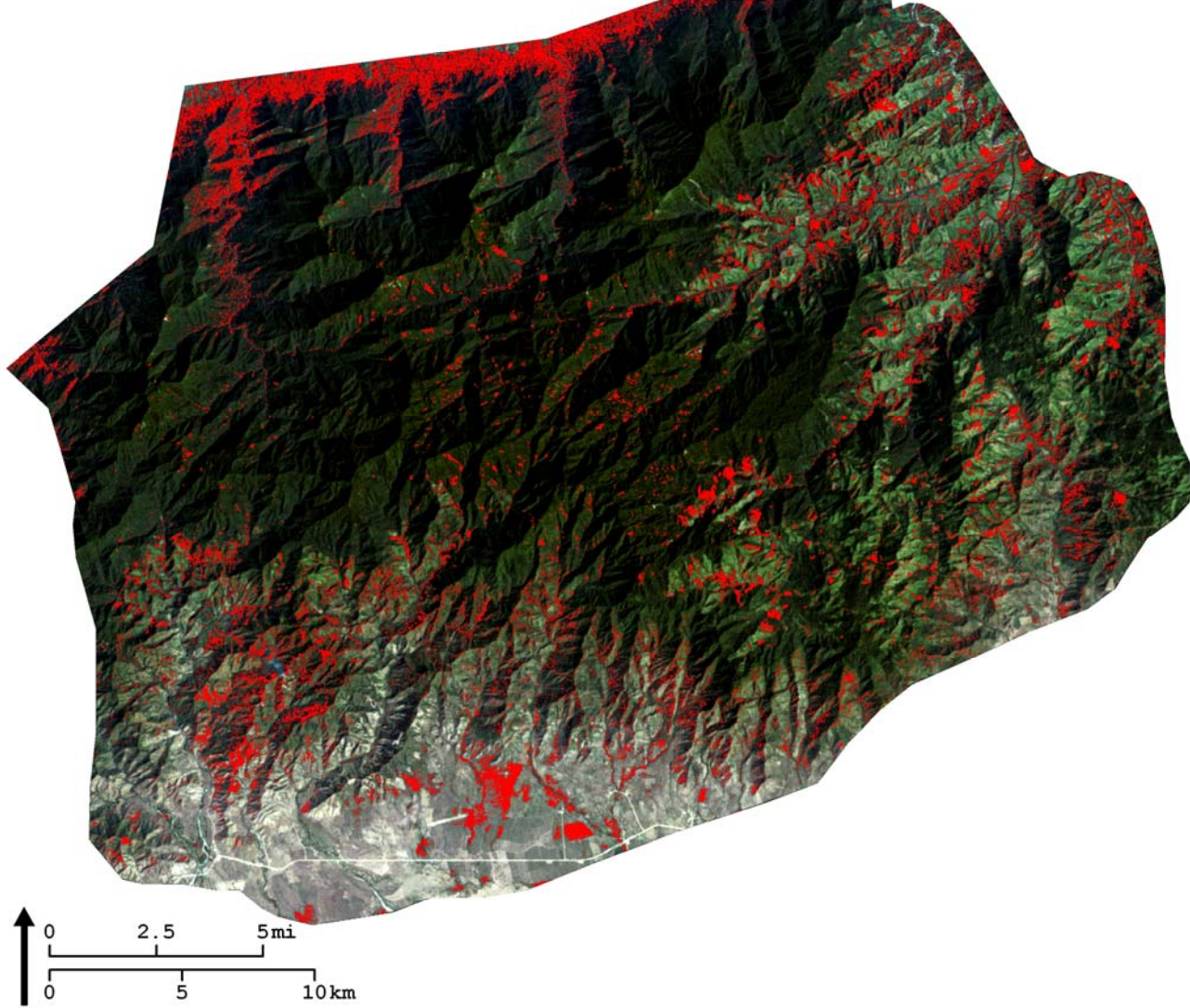6 March 2003
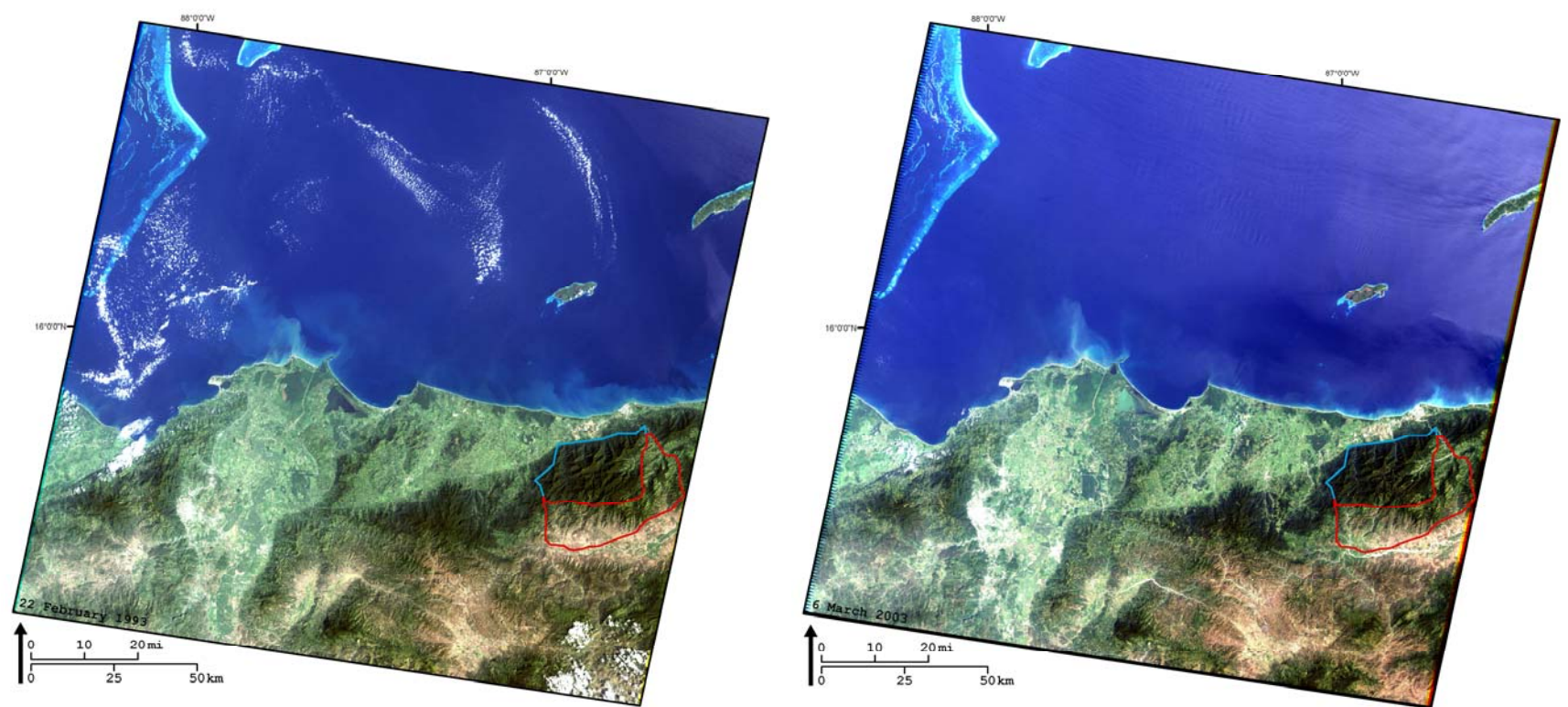
Park and buffer zone
22 February 1993   Landsat bands 4, 3, 2

Park and buffer zone
6 March 2003   Landsat bands 4, 3, 2
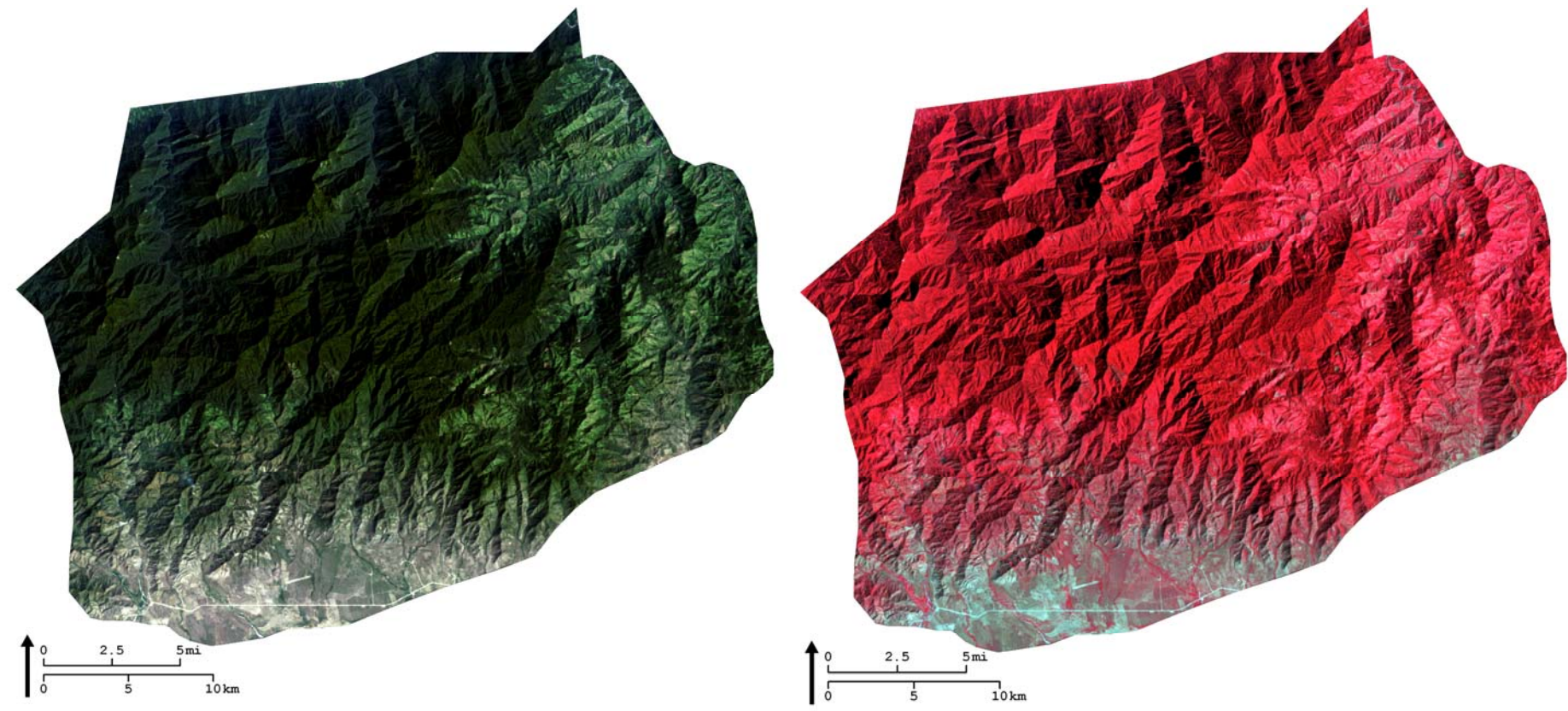
Land use
22 February 1993

Land use
6 March 2003

Land Use

- Agriculture
- Bare Soil
- Dense Forest
- Light Vegetation
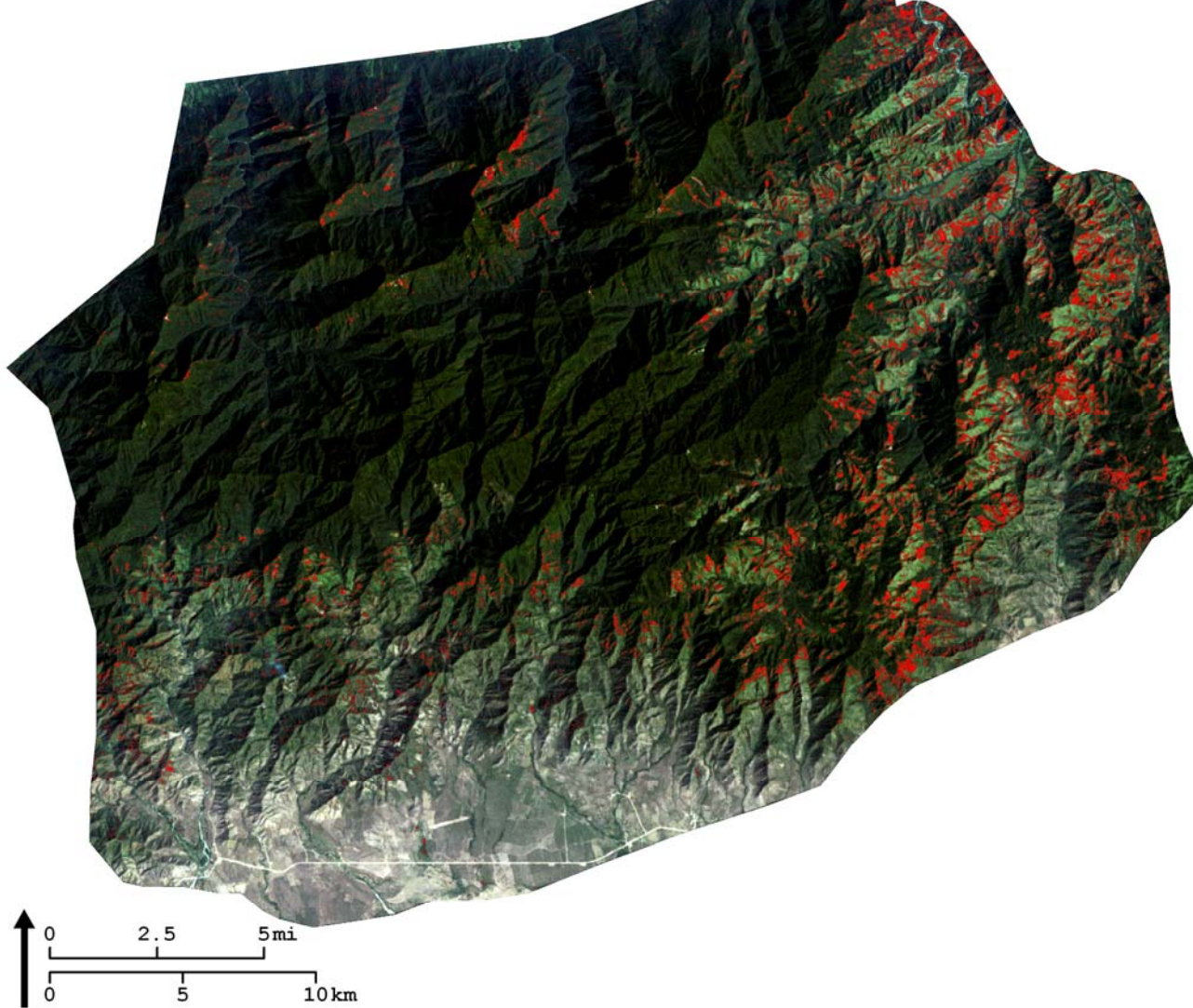- Road
- Sparse Forest
- Water

Forest loss

Deforestation

The analysis demonstrates that between February 1993 and March 2003, approximately 108 km^2 of sparse and dense forest was lost to other land cover.

The analysis also shows that agricultural land use is encroaching on the park through the buffer zone. As a result, 37 km^2 of total vegetation (sparse & dense forest and light vegetation*) was lost to agriculture or bare soil land uses.

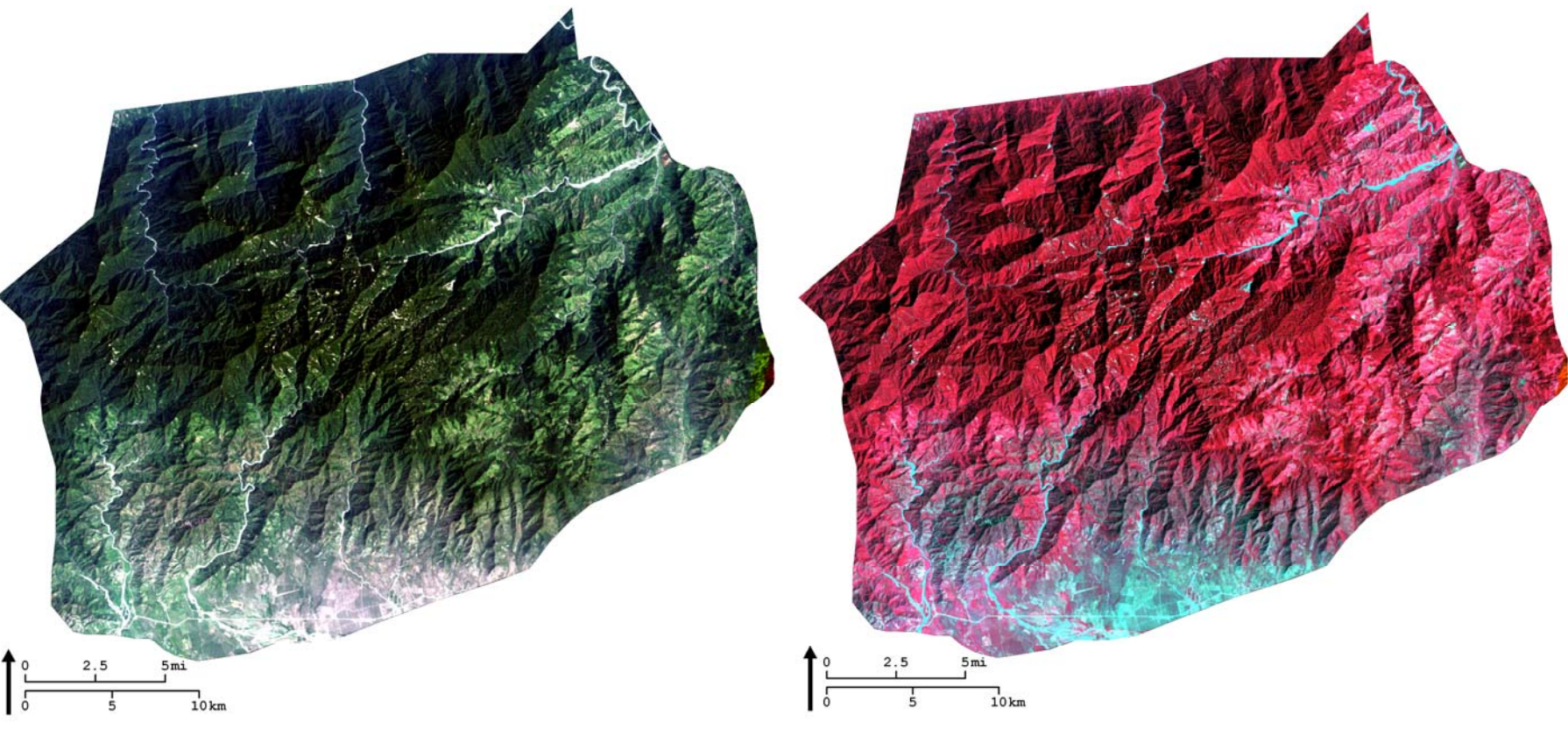*May be partially misclassified. The light vegetation class could be partially agricultural.

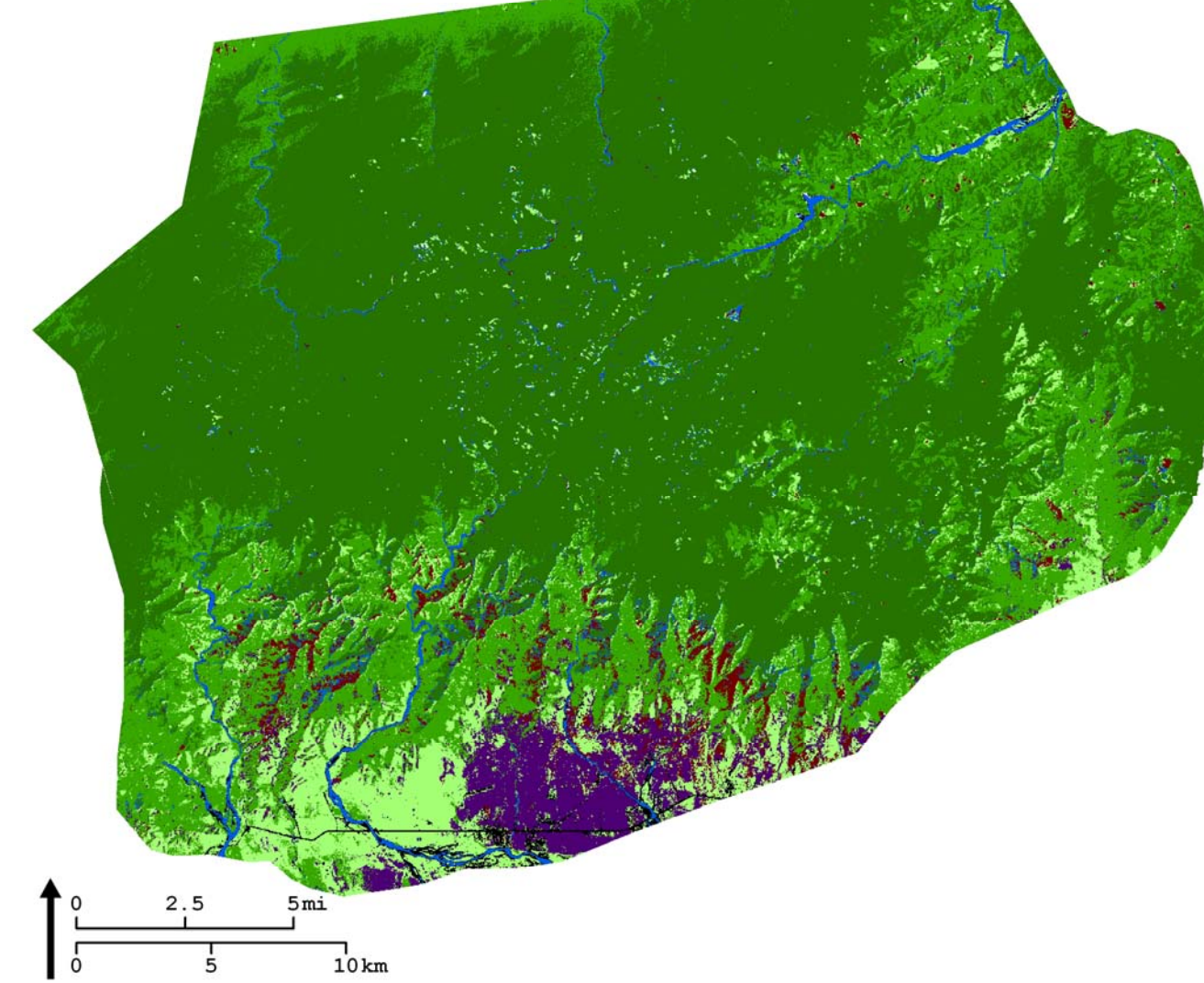**Total vegetation loss to agriculture and bare soil**

Sparse to dense forest

Afforestation

According to the analysis, Pico Bonito National Park gained approximately 40 km^2 of dense forest from sparse forest cover. During the same time, 46 km^2 of light vegetation converted to either dense or sparse forest. While this is an encouraging sign for the management and well being of the park, it also means that the park netted a total loss of 22 km^2 of forest.
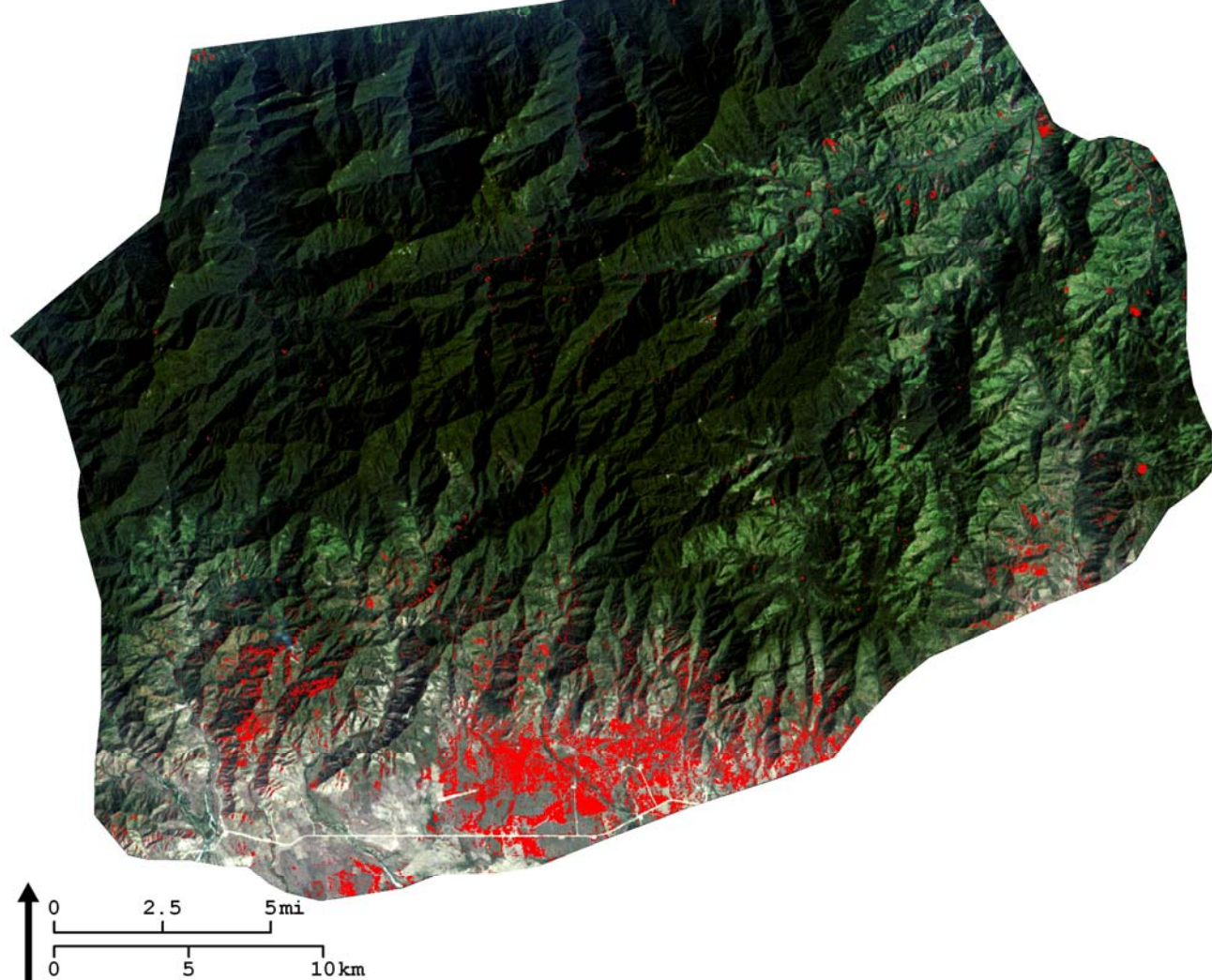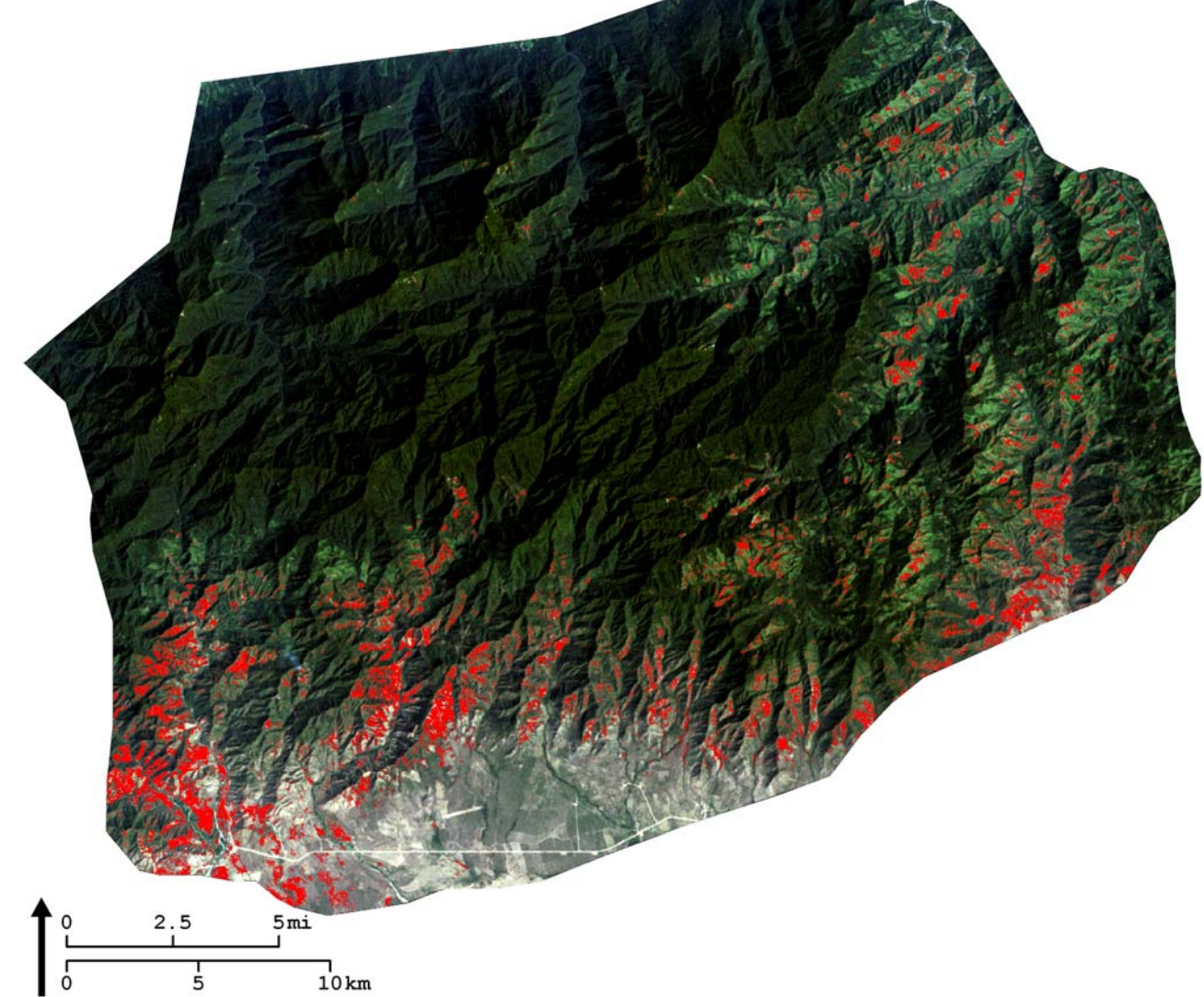
Light vegetation to forest

Results & Analysis

The analysis of the land cover in Pico Bonito show very interesting results. The discouraging outcomes point to the total amount of deforested area during the ten year period. With 108 km^2 of forest loss, Pico Bonito had 11% of its dense forest and 18% of its sparse forest lost. One positive aspect is the percent change of bare soil to the two forest types. With nearly 60% of its 83% change in the form of forest, regeneration of previously denuded land seems to have progressed since the park's creation. However, the total area change only equals 26 km^2, whereas a total of approximately 30 km^2 of sparse forest changed to light vegetation, road, agriculture and bare soil. This is an important statistic to note since the percent change is only informational if it is compared with the total area change. An 11% decrease in dense forest may not seem like much, but that is equal to nearly 75 square kilometers, whereas 83% change in bare soil is only 36 square kilometers. These changes are important to recognize to give an accurate representation of the data analysis.

In addition to these findings, an analysis of potential causes for land use change should be explored in order to limit the rate of deforestation in the future. A comprehensive survey of timber use and extraction, use should be conducted in order to pinpoint the main effects. The likeliest of candidates for timber use is fuel wood. To combat excessive fuel wood use, various strategies should be employed and made available to local communities. One such example would be providing or building more fuel efficient stoves so that fuel wood is not excessively used. Additionally, alternative fuel sources and ovens could be used in the area such as natural gas/propane and solar cookers. Each have their drawbacks, but implemented slowly over time, they may be able to help slow the overall rate of deforestation in the park and buffer zone.

The study unearths some useful figures for land cover change analysis and conservation at Pico Bonito National Park. However, the findings would be more telling of the success of the park in limiting deforestation if they were compared to earlier images from the 1980s and 1970s. Further analysis is required to determine whether deforestation has slowed or increased within the park and its boundary.

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