

Trees No More

Tracking Vegetation Change in Central Nepal Using LANDSAT 6 data

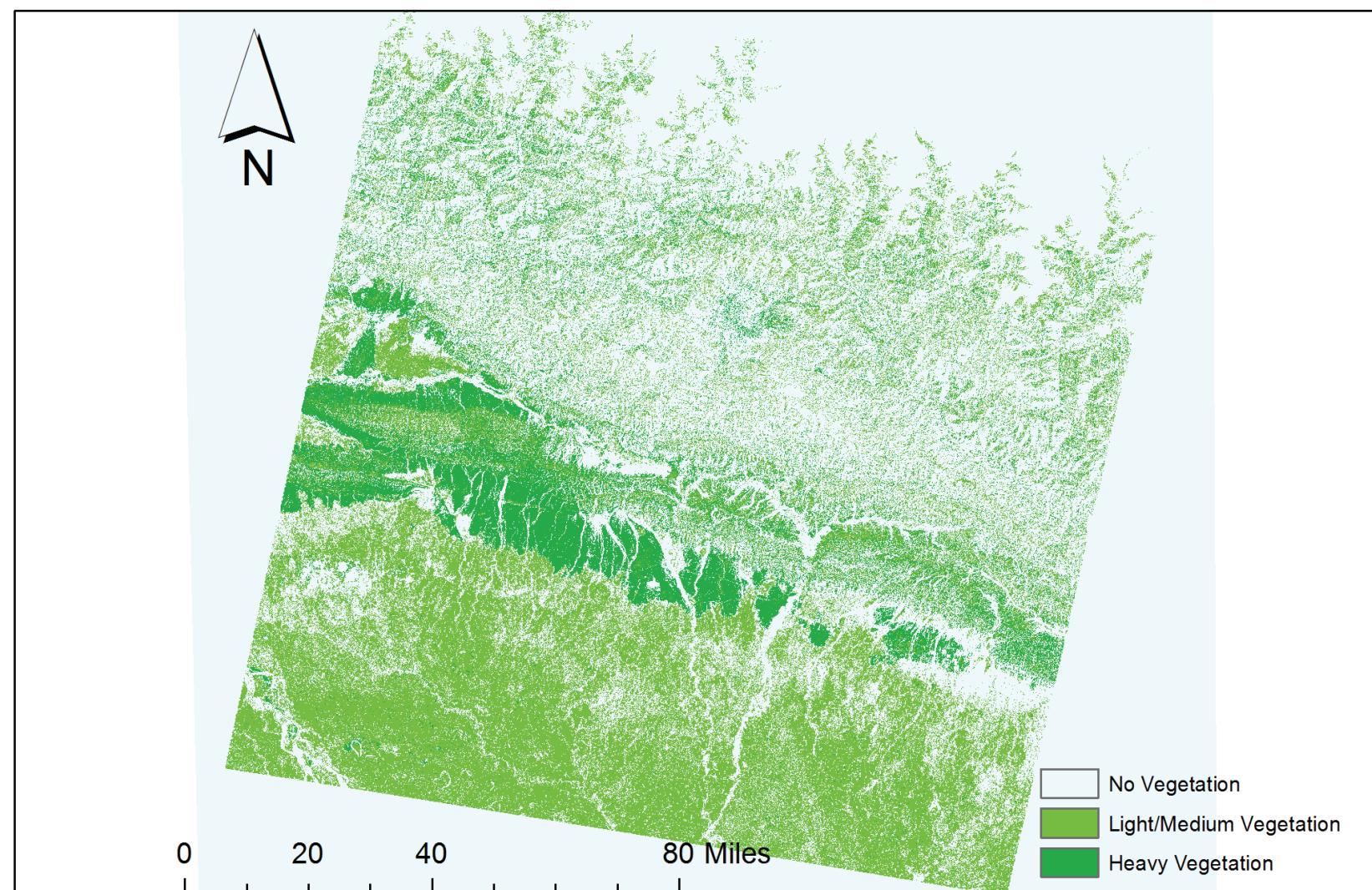
The Nepali media has reported rapidly escalating unauthorized deforestation and increased illegal logging in recent years. It has been attributed to the political protection provided to illegal logging and poaching by political parties and their lack of accountability — there are currently no elected local bodies. It is argued that often-changing central gov-

ernments —weak, and unsure of themselves in the political vacuum created after the declaration of republic in 2006, — have been unable (or unwilling) to support agencies tasked with protecting the forests.

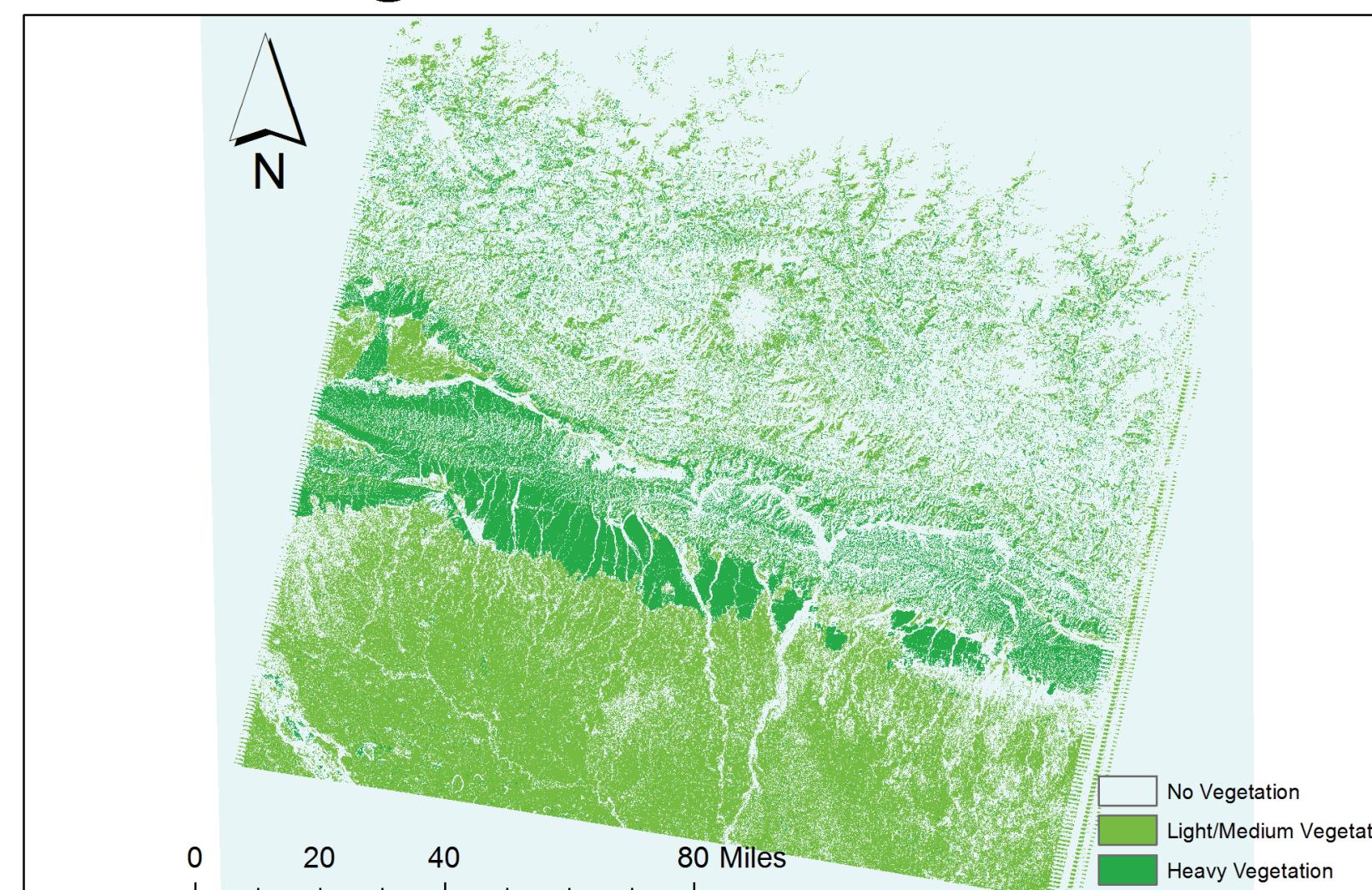
This project will verify if Nepal's forests (and vegetation in general) are decreasing, and if at a rate as significant as it is commonly made to be. LANDSAT 6 7-band

sensor data over successive years can be used to test the claim. By comparing the vegetation change between 2001 and 2005, and 2005 and 2010, we can test if the change in vegetation in the recent years is a part of the large trend, or if there really has been a rapid escalation in deforestation as claimed.

Vegetation in 2001



Vegetation in 2005

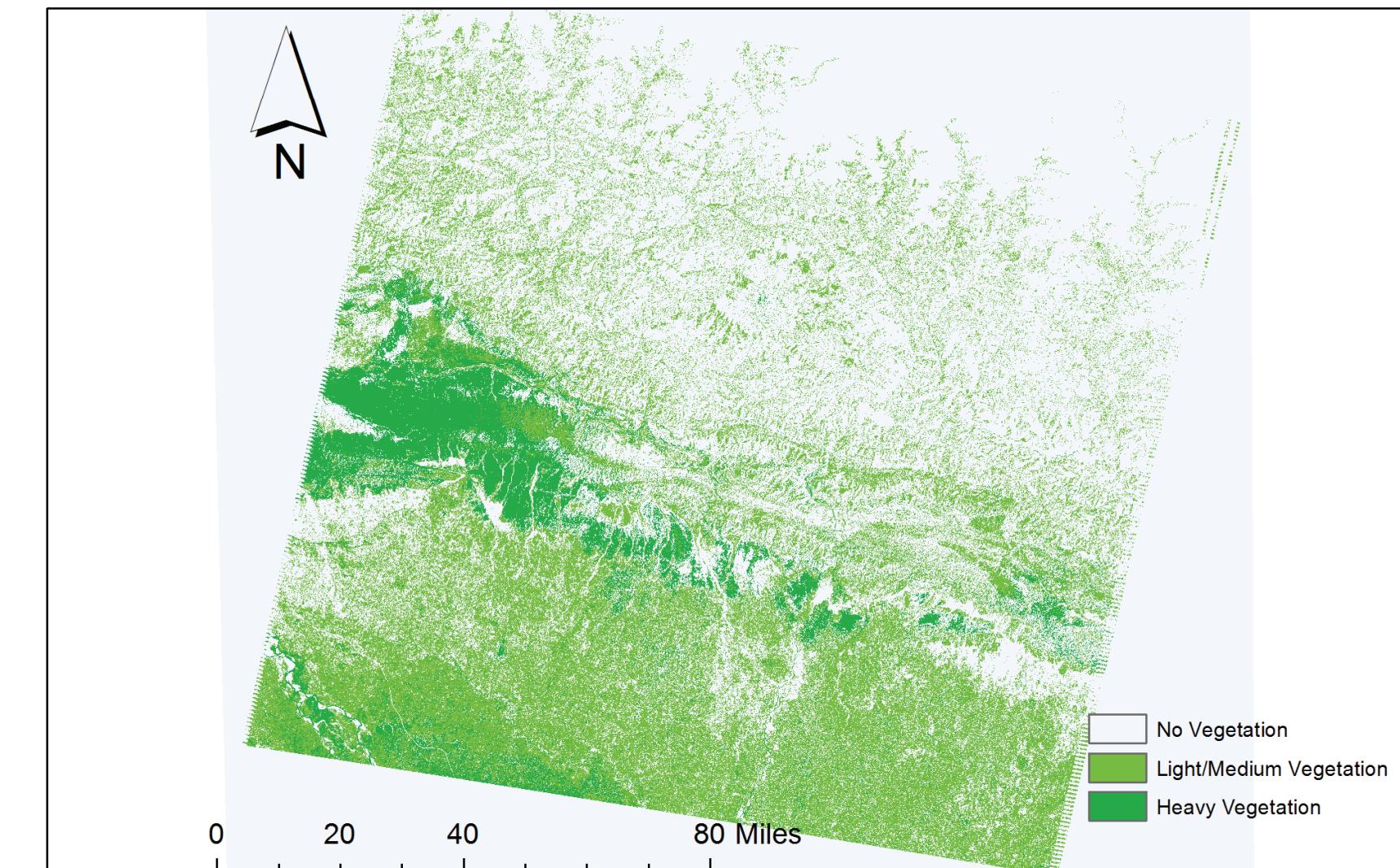


Scope

To keep the analysis manageable and verifiable, the geographical scope of the analysis was limited to the central region of Nepal. This is the region that has the capital – Kathmandu – and also vast tracts of protected forests in the southern region. With a mix of big cities and an abundance of original forest cover, this region makes it easy to check for a contrast caused by vegetation change over the years.



Vegetation in 2010



Methodology

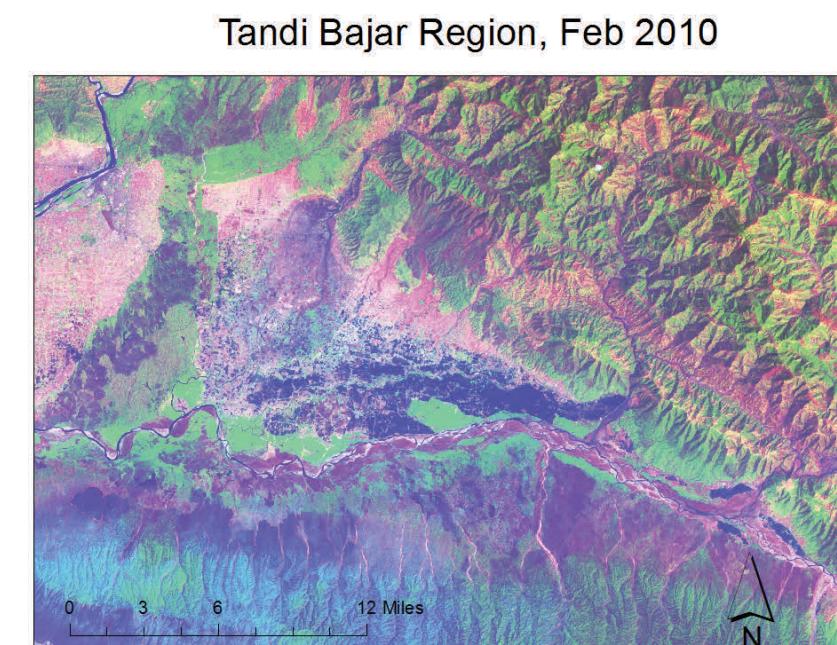
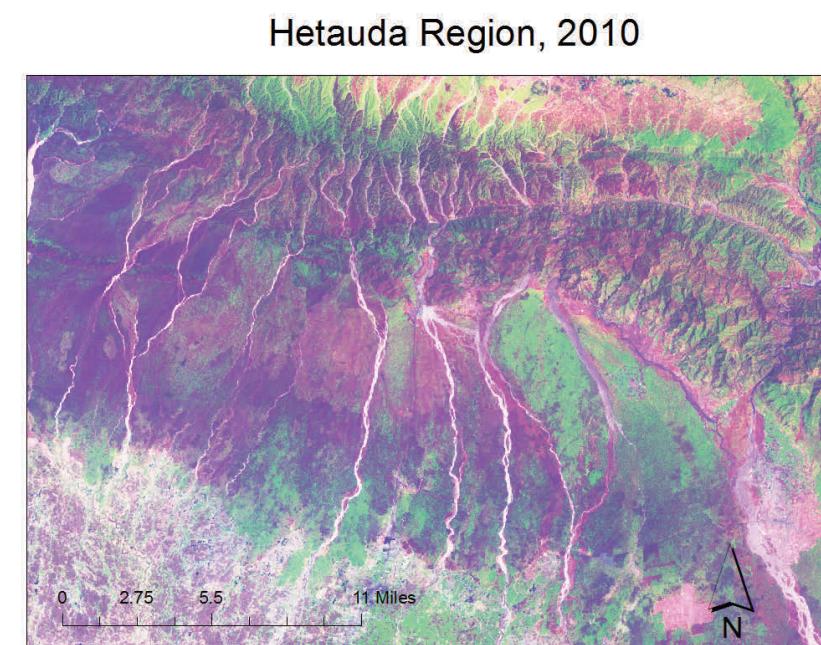
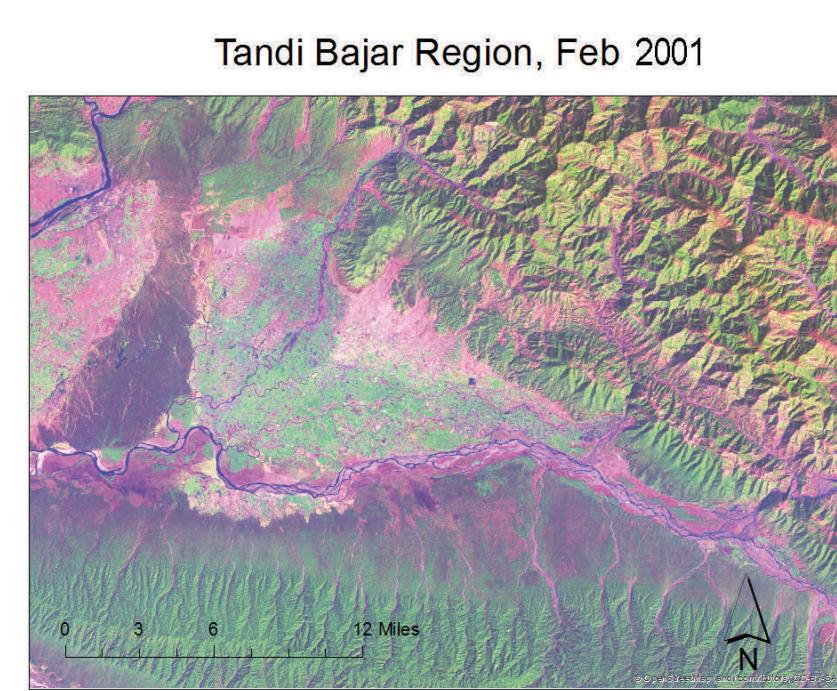
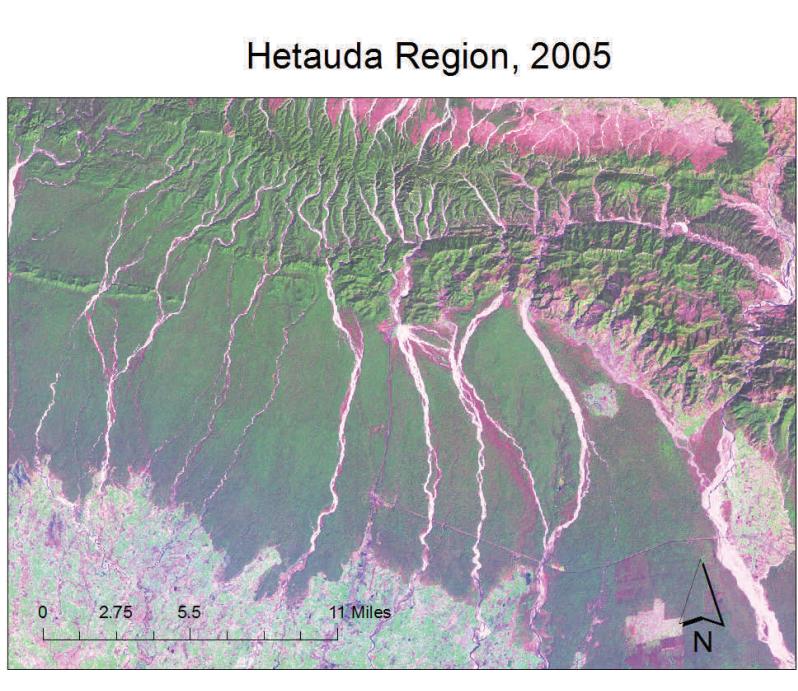
LANDSAT 6 sensor data from 2001, 2005 and 2010 was used to do landcover analysis. To avoid errors resulting from seasonal changes in vegetation, all the layers used were taken from February of their respective years. To avoid errors caused by cloud cover, only those datasets with cloud-cover of less than 8 percent were chosen.

The classification was tested by checking against aerial images from Google maps and Bing maps. For regions where a geographic context was necessary, the OpenStreetMaps data layer in arcMap was used to provide the context.

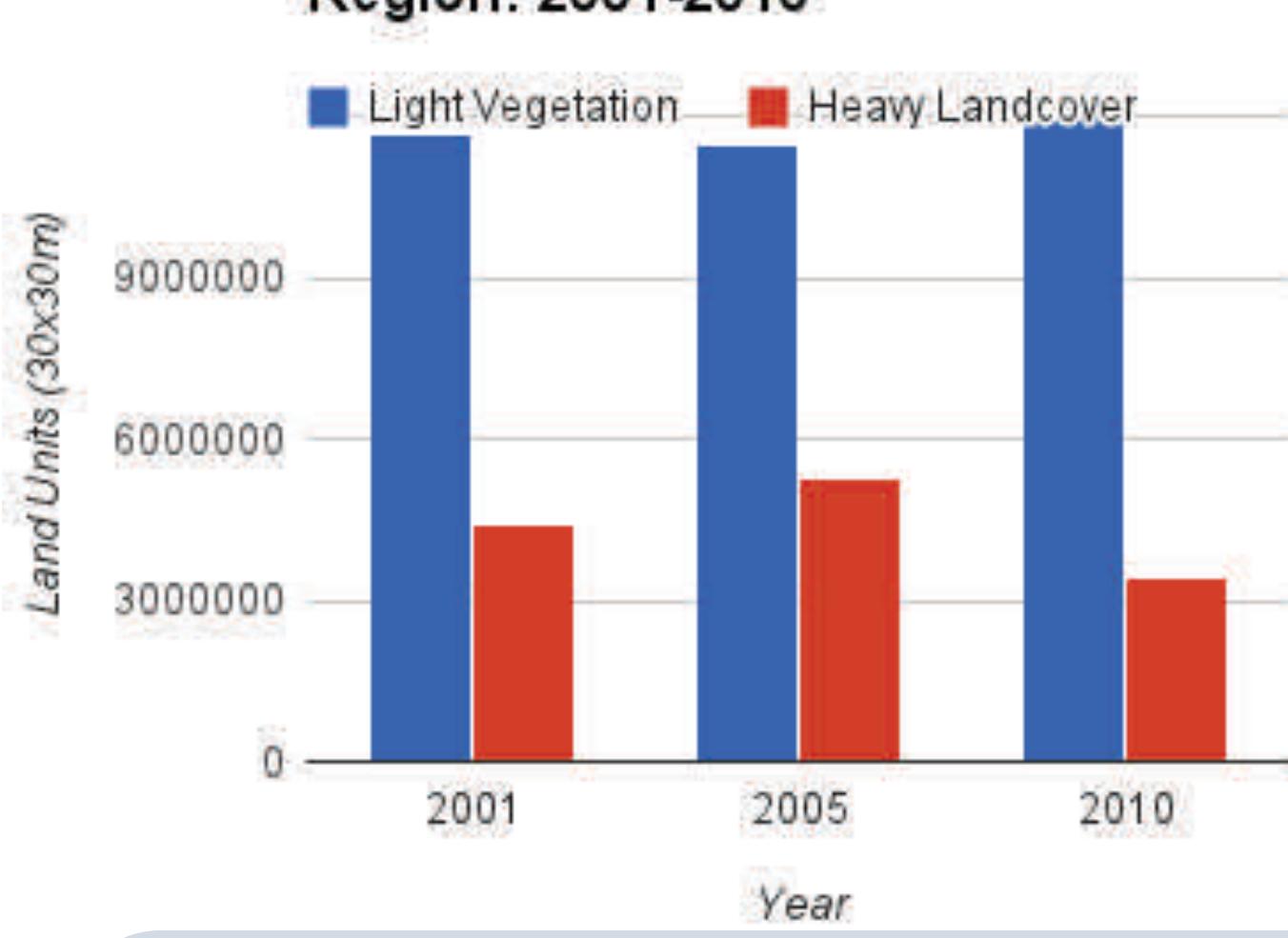
The bands are visualized according to bands 5-4-1 (rgb) to exaggerate vegetation in the maps. Green is vegetation, brown is soil and white-blue is moisture/water.

Findings

Above: The decrease in heavy vegetation (dark green) is hard to miss. Notice that heavy vegetation actually increased between 2001 and 2005 but has been decreasing drastically since. Below: (Right) The watershed near Tandi Bajar has eroded away and what was formerly forest is now exposed soil and water. (Left) Dense forest has been hacked away for farming, exposing the soil.

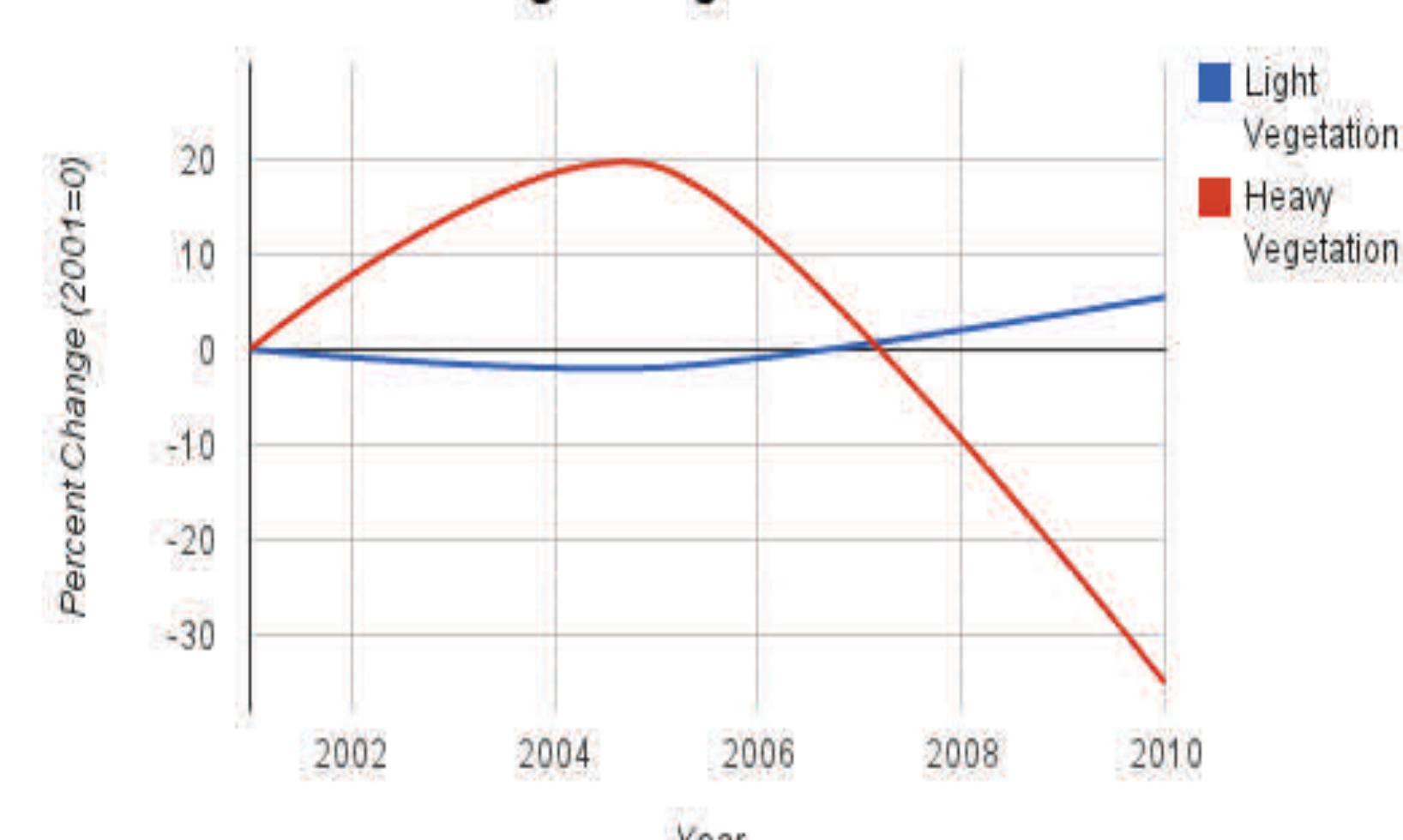


Vegetation Coverage in Central Region: 2001-2010



Light vegetation turned to heavy vegetation between 2001 and 2005, because of Maoist armed rebellion, which discouraged logging. However, the gain has more than been lost, as the bar graph on the left shows.

Percent Change in Vegetation 2001-2010



There was an increase in heavy vegetation between 2001 and 2005 and a slight decrease in light vegetation. However, between 2005 and 2010, there was a rapid decline in heavy vegetation cover, which was replaced by 'no vegetation' or light vegetation.

The southern region shows a particularly rapid decrease in heavy vegetation. Most of what was formerly heavy vegetation there has been turned to light vegetation. This is a tell-tale sign of increased human presence and logging.

There were some regions that saw a decrease in vegetation cover between 2001 and 2005, and then a rapid increase in the years following also, but they were in the minority.

Despite rare regions that saw net vegetation increase over, the general trend is hard to miss: there has been a significant decrease in vegetation level in the central region of Nepal between 2005 and 2010, at a rate far exceeding the change between 2001 and 2005. The newspapers were right. Nepal needs to act urgently.

Submission by Shirish Pokharel, Tufts University

Data Source: USGS, OpenStreetMaps. Accessed: April 2013

Projection: USGS 1984

Submitted on: April 29, 2013

