The region of Lethem is located in the Upper Takutu Upper Essequibo Region of Guyana. It lies on the Takutu River which forms the border with Brazil, opposite the Brazilian town of Bonfim. The Takutu Bridge which connects Lethem and Bonfim officially opened on September 16, 2009. Construction of the bridge began in 2002.

Over three quarters of Guyana’s landmass is made up of forest and about sixty percent of the landmass is classified as primary forest.

**Project Objective**

To analyze and to quantify the extent of deforestation in the area by analyzing Landsat TM images for the years 1998 and 2005. The images were processed and analyzed using ENVI software. The analysis involved carrying out Normalized Difference Vegetation Index (NDVI), Density Slicing, Unsupervised Classification, Color Mapping, and Change Detection.

**Methodology**

Landsat TM images for the years 1998 and 2005.
False color composites were created by using bands R-4, G-3, B-2.
The images were converted from Digital Numbers to Reflectance.
Normalized Difference Vegetation Index (NDVI) was generated.
Density Slicing was generated by using the NDVI images.
Color Mapping to created white for nonvegetation and green for vegetation.
Unsupervised Classification using K-means was generated to created the water class.
Change Detection was generated using 1998_ref_clip_NDVI_dens image for the initial state, and 2005_ref_clip_NDVI_dens image for the final state.
The unsupervised classification of the water class was overlaid in the 1998 and 2005 NDVI_dens images

**Results**

**General Change Detection**
483.06 km² was the total vegetation area in 1998.
350.97 km² is the total vegetation area in 2005.
-132.09 km² means that between 1998 and 2005 the total area decreased from (483.06 km² - 350.97 km²).

**Change Detection in the Vegetation Class**
323.09 km² is the vegetation area that has not been changed between 1998 and 2005.
27.88 km² is the initial nonvegetation area (1998) that changed to vegetation.
159.97 km² is the initial vegetation area (1998) that changed to nonvegetation (2005).

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