FORESTRY & ECOLOGY

Detection of human & natural effects

Using GIS & remote sensing

STUDY AREA

CHANGSARI, GUWAHATI, ASSAM

PRESENTERS:

JIASHA NATH

JYOTIRMOY BARUAH

BHARGAB KUMAR NATH

INTRODUCTION:

The application of remote sensing and GIS in forestry and ecology has been an important area of study in recent years. Forests play a crucial role in the ecological balance of our planet by supporting diverse flora and fauna, sequestering carbon, and regulating the climate. However, forests are facing unprecedented threats from human activities such as deforestation, agricultural expansion, urbanization, and infrastructure development. To monitor and mitigate these impacts, GIS and remote sensing techniques are used to detect forest cover change and assess the factors driving it.

STUDY AREA:

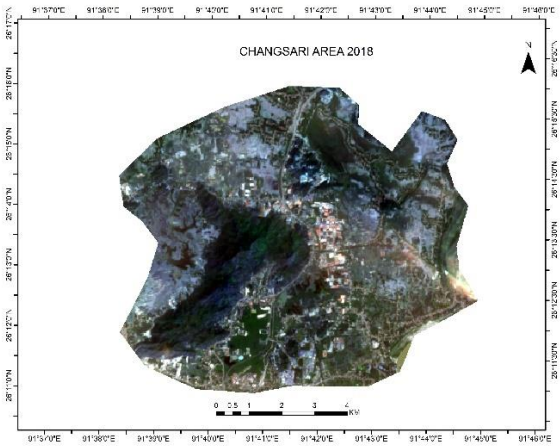
Application of Remote Sensing and GIS in Forestry and Ecology: A Case Study of Changsari area, Guwahati, Assam.

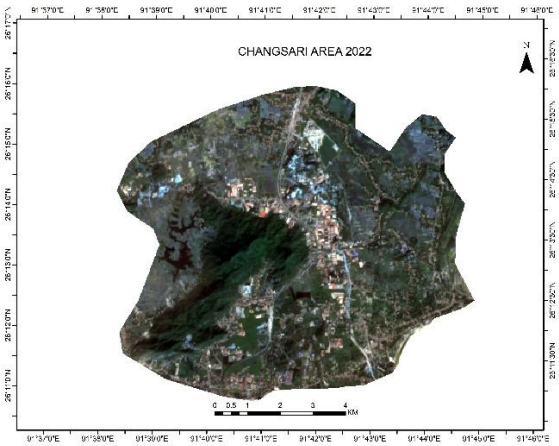
Background: Changsari is located in the Kamrup Rural district of Assam, and it is a biodiversity-rich area with a mix of wetlands, forests, and grasslands. The region is also home to several indigenous communities who depend on the forests for their livelihoods. However, over the years, the forest cover in Changsari has been threatened due to various anthropogenic activities such as deforestation, encroachment, and land-use change. This has led to a decline in the ecological health of the region and has affected the lives of the local communities.

Objective:

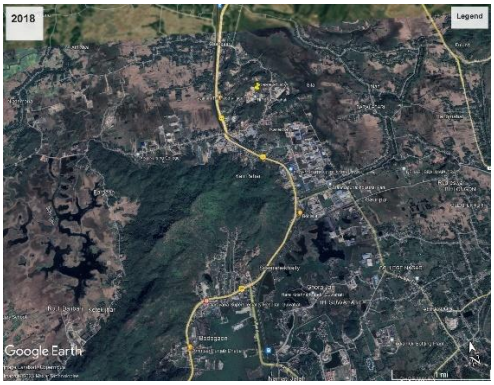
The objective of this case study is to use GIS and remote sensing to detect and analyse forest cover change caused by both human activities and natural disturbances. The study aims to identify the spatial and temporal patterns of forest cover change, assess the factors driving it.

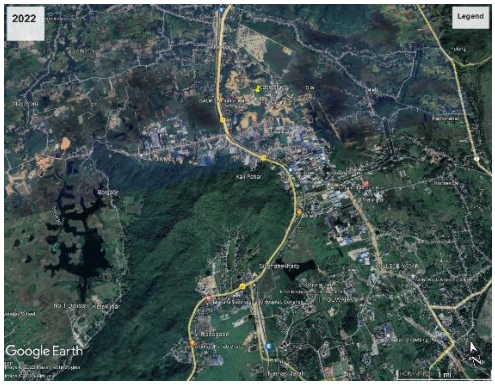
Satellite Images (Sentinal 2)





Reference Images (Google Earth Pro)





METHODOLOGY:

The methodology for this case study involved the following steps:

Data Acquisition: The first step was to acquire satellite data for the study area which is Changsari, Guwahati, Assam for the years 2018 and 2022. The Copernicus Open Access Hub by ESA (Sentinal 2) was used to obtain high-resolution satellite images of the region.

Image Processing: The satellite images were processed using ArcGIS and ERDAS IMAGINE software. First, the images were stacked in ERDAS IMAGINE, and then they were processed and prepared for analysis. The processed images were then georeferenced, which involves assigning geographic coordinates to the pixels in the image, and clipped in ArcGIS to remove any areas outside the study boundary.

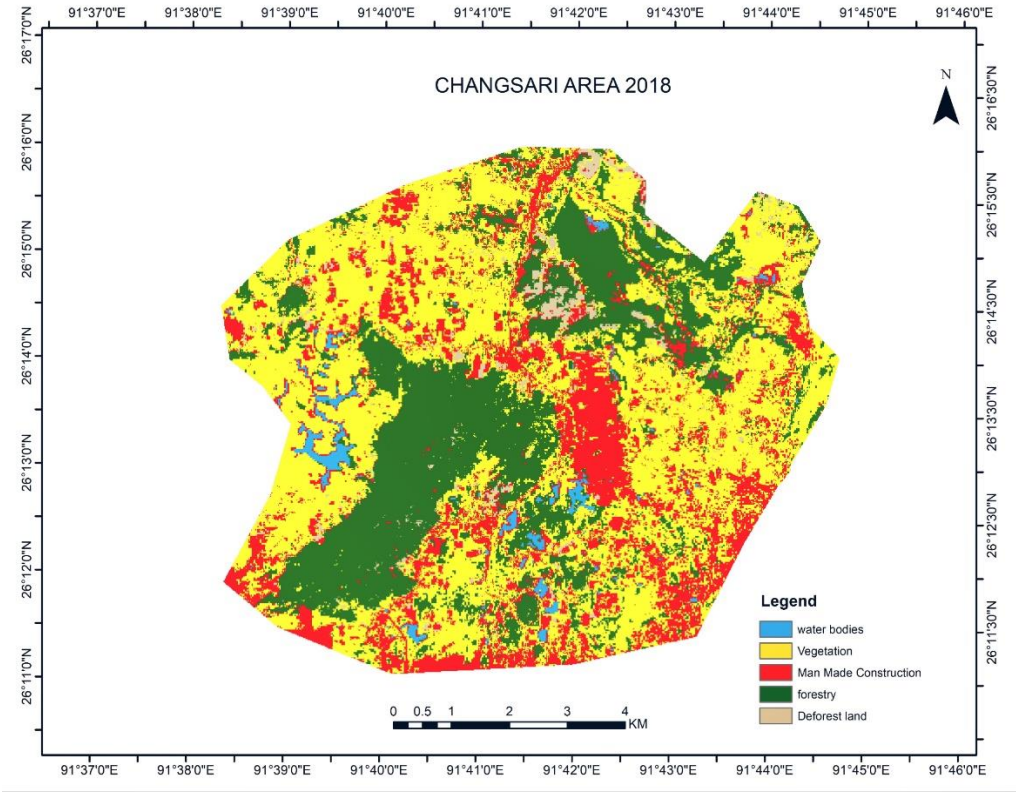
After the satellite image was clipped, it was classified into different land cover classes using a supervised classification technique. However, due to the low pixel resolution of the image, Google Earth Pro was used as a reference for the classification. To do this, a training dataset was created using ground truth data obtained from the satellite image. The training dataset represented the different land cover types in the study area, such as forestry, vegetation, deforested land, waterbody, and man-made construction.

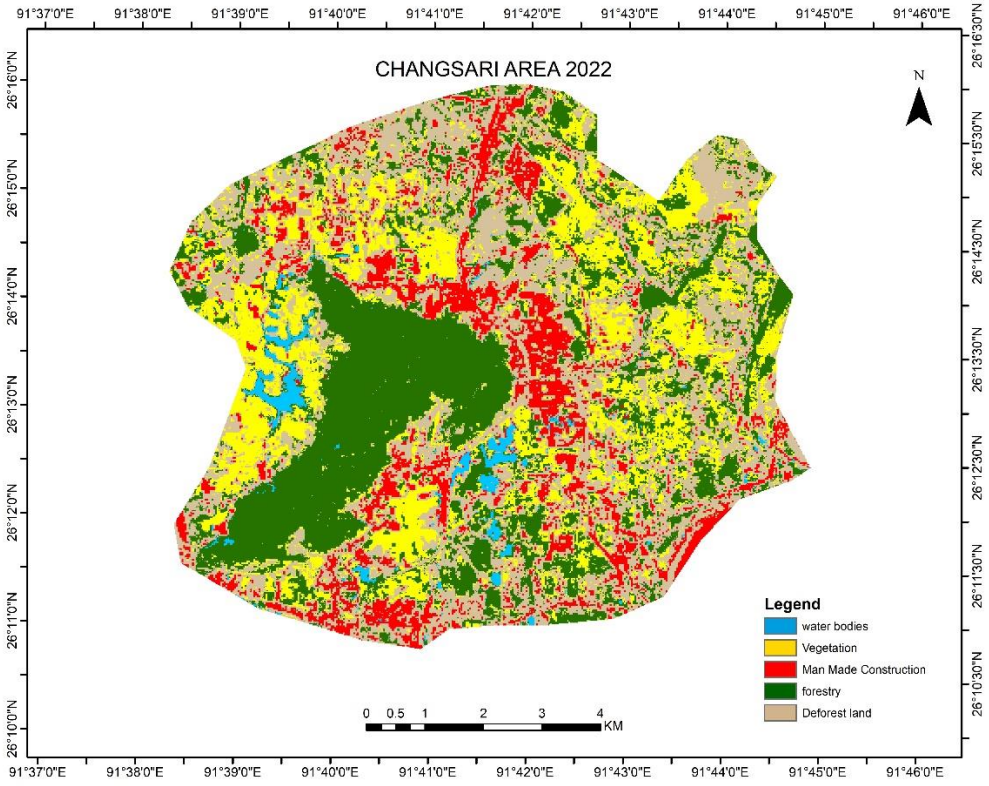
The supervised classification was performed using ERDAS IMAGINE software. The software used the training dataset to assign each pixel in the image to one of the land cover classes. An attribute table was created according to the supervised classification, which provided information about the land cover classes and their distribution in the study area

Change Detection: The classified images of Changsari for the years 2018 and 2022 were then compared to detect the changes in land use and land cover. The extent of human and natural effects was determined by analysing the changes in the area.

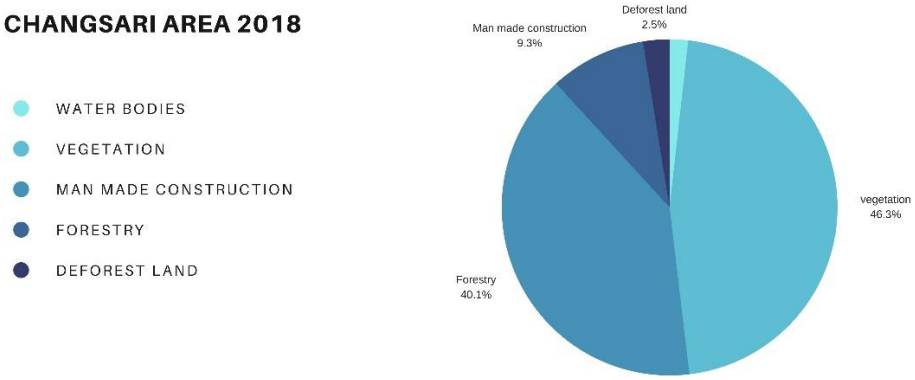
Mapping: The final step involved creating maps of the different land-use/land-cover classes in the study area using ArcGIS software.

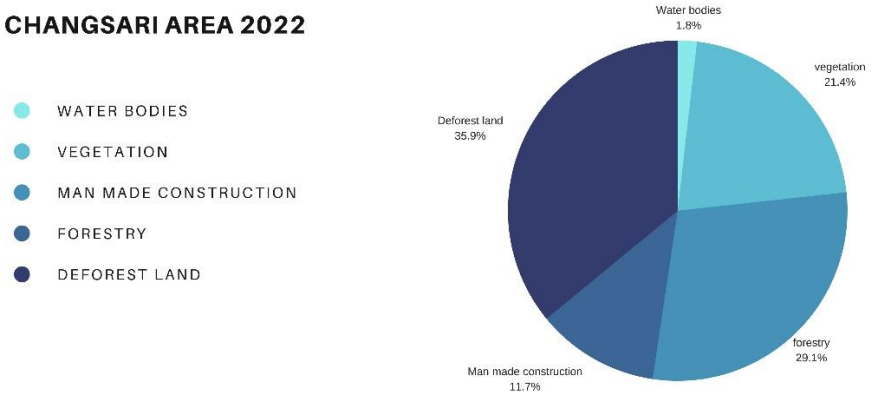
SUPERVISED IMAGES:





GRAPHICAL REPRESENTATION





RESULTS:

The results of the study showed that the forest cover in Changsari had decreased significantly over the past decade due to deforestation and land-use changes. From the year 2018 to 2022 the deforest land changed from 1.860324% to 28.225077%, vegetation from 33.84721% to 16.84622%, forestry from 29.26583% to 22.853857%, waterbody from 1.219216% to 1.427304%, and man-made construction from 6.763068% to 9.18072%.

CONCLUSION:

The case study presented here demonstrates the usefulness of Supervised Classification of GIS and RS in analysing the detection of human and natural effects on the land cover in Changsari, Guwahati, Assam. It highlights the importance of remote sensing and GIS technologies in monitoring and managing the forests and ecology of a region.

The results of the study indicate a significant increase in land-use change and deforestation between 2018 and 2022, with a corresponding decrease in forestry and ecology. These findings have important implications for policymakers and forest managers, as they suggest the need for effective strategies for conservation and sustainable use of forest resources.

The study also emphasizes the need for continued monitoring of the region to identify changes in the forest cover and to assess the effectiveness of the conservation measures implemented. By monitoring the land cover changes, policymakers can make informed decisions to protect the forests and maintain ecological balance in the region.

In conclusion, the study demonstrates the potential of remote sensing and GIS technologies for monitoring and managing the forests and ecology of a region. The findings can help inform forest conservation policies and highlight the need for continued monitoring of land cover changes to maintain the ecological balance in the region

REFERENCES:

Open Access Hub - Copernicus

Google Maps

Member Details:

JIASHA NATH

Jiasha.nath.adtu@gmail.com

Assam Downtown University

8638090207

JYOTIRMOY BARUAH

jyotirmoybaruah02@gmail.com

Assam Downtown University

9954189898

BHARGAB KR NATH

Assam Don Bosco University

bhargabnath6@gmail.com

8011388918