

# Change Detection Analysis Around Talcher Coalfield Using Remote Sensing & GIS

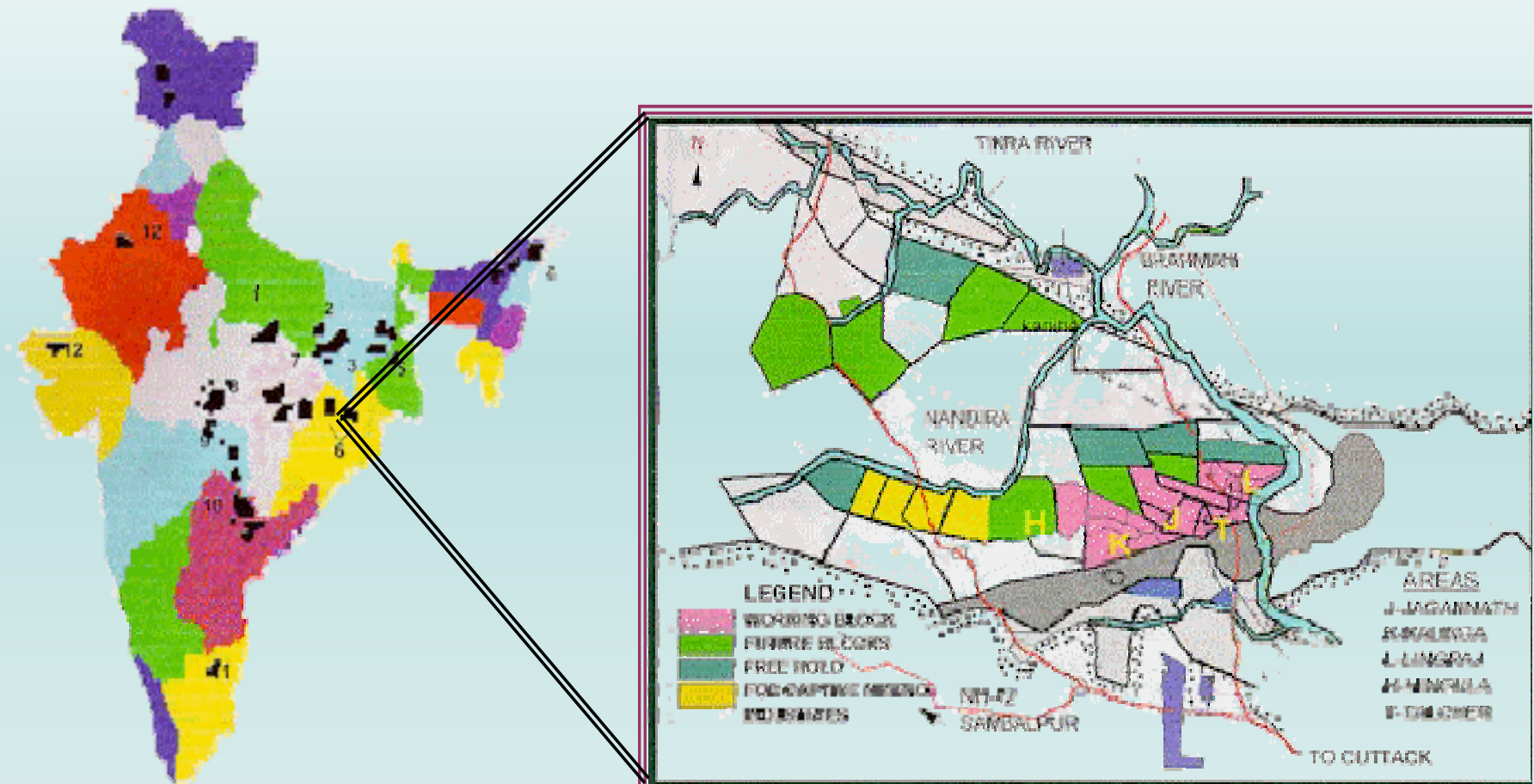
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- Remote Sensing is the art of acquiring information about an object without physical contact.
- Used for change detection analysis because of
  - Less time consuming
  - Accuracy
  - Inaccessible area becomes accessible
  - Frequently and periodically

# Talcher Coalfield



GREAT INDIA

Fig 2- Location of Talcher Coalfields

TALCHER COALFIELDS

# Talcher Coalfield

- Talcher Coalfield lies in the eastern part of India belongs to Lower Gondwana Formation (Permian coal). It is about 110 km long and 25 km wide.
- Coal was discovered in 1837, and the first colliery opened in 1921 by M/S Villers.
- Total reserves at Talcher is estimated to about **46.64 BT**, which is **16.3%** of the country's total reserve (**285.86 BT**).
- Environmental monitoring is essential to asses its impact as it is a highly active mining zone.

# Objective

- To create land use and land cover maps of Talcher area for the years 1973, 1990 and 2009.
- To generate NDVI maps of the area for the particular time period.
- To carry out change detection analysis

# Methodology

Data Type	Time	Scale or Resolution	Source
Landsat MSS	18/11/1978	79 m	Global Land Cover Facility
Landsat TM	28/11/1990 01/11/2009	30 m	USGS Global Visualization Viewer
Toposheets (73G/4, 73D/13, 73H/1, 73H/5)	1980 2010	1:50,000	Survey of India

1

- Obtaining the image sources like toposheets and satellite imagery

2

- Georeferencing the toposheets and allocating Latitudes and Longitudes

3

- Calculating the NDVI and creating NDVI maps

4

- Visual Interpretation and Vector editing with respect to the toposheets

5

- Creating the land cover and land use maps with appropriate colour combinations

6

- Calculation of area and change in area

# Normalized Difference Vegetation Index

- One of the band ratios used for monitoring change detection.

$$NDVI = \frac{R_{NIR} - R_{RED}}{R_{NIR} + R_{RED}}$$

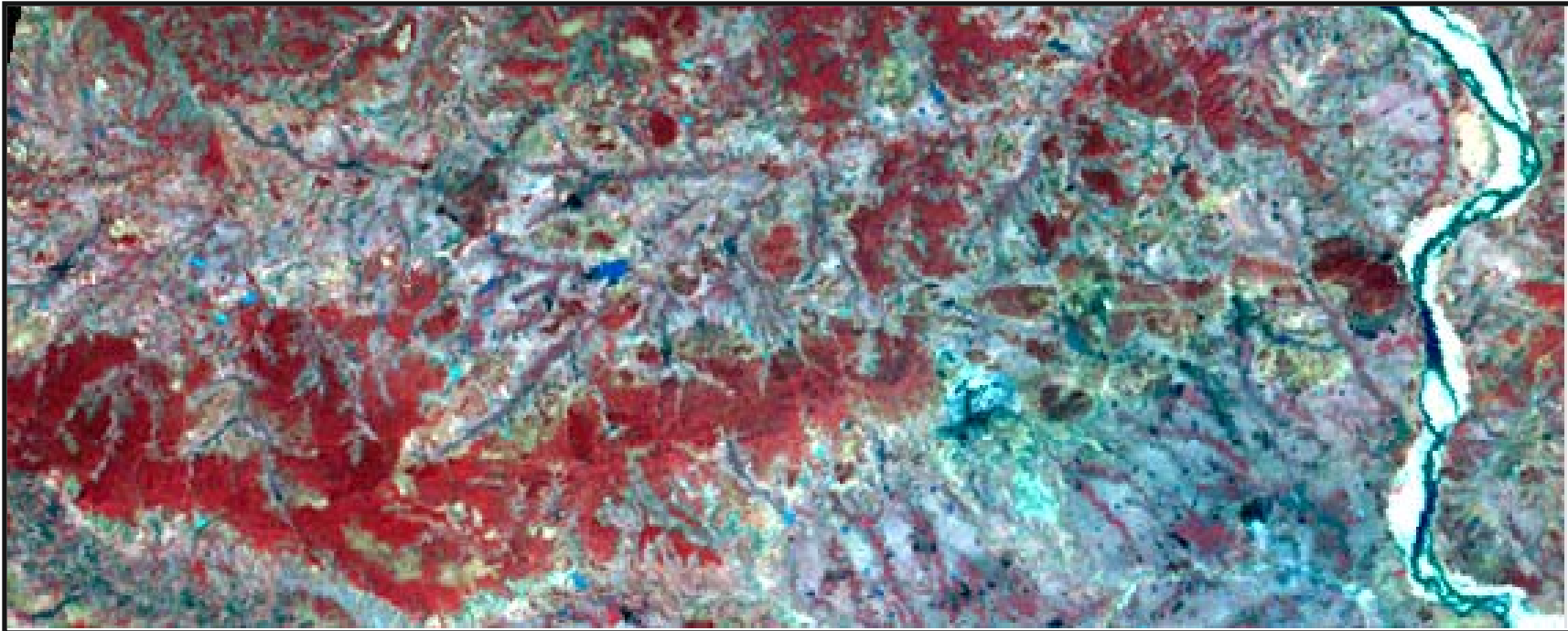
- NDVI value lies between -1 to 1.



# LANDSAT MSS- 1973

21° 00' 21" N 84° 56' 45" E

21° 00' 21" N 85° 15' 07" E



20° 53' 32" N 85° 15' 07" E

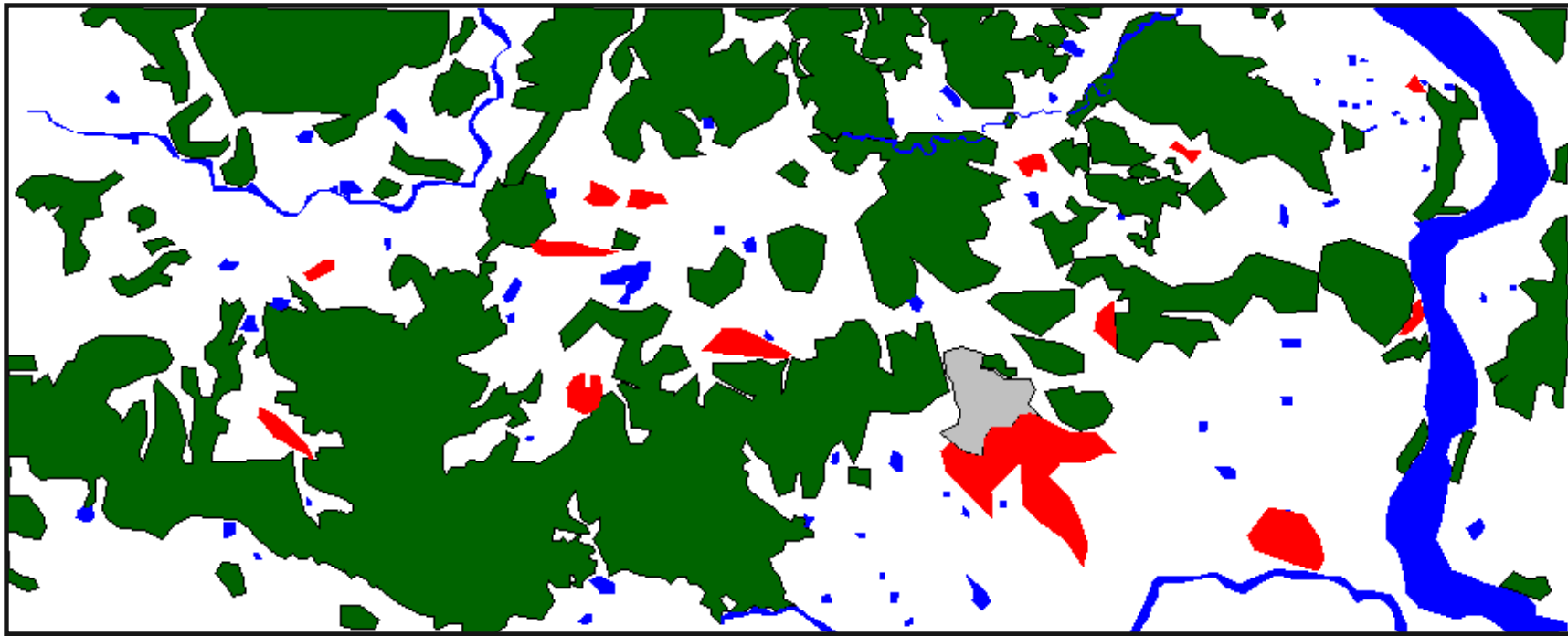
20° 53' 32" N 84° 56' 45" E



# LAND-USE MAP 1973

21° 00' 21" N 84° 56' 45" E

21° 00' 21" N 85° 15' 07" E



20° 53' 32" N 85° 15' 07" E

20° 53' 32" N 84° 56' 45" E



FOREST



WATER BODY



NON FOREST AREA

MINES



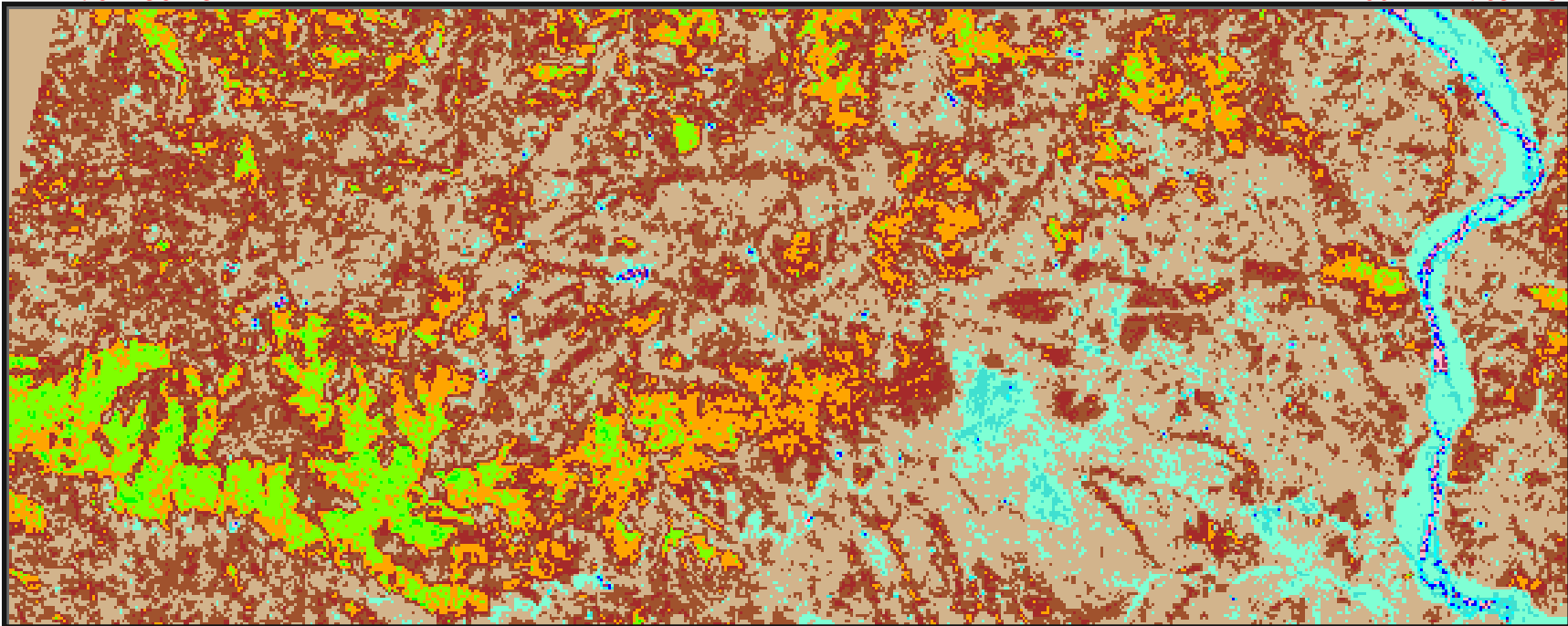
SETTLEMENTS



# NDVI MAP 1973

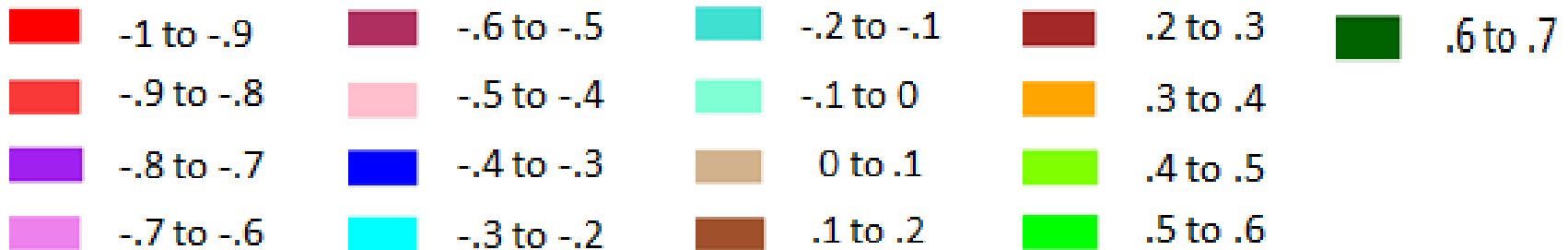
21° 00' 21" N 84° 56' 45" E

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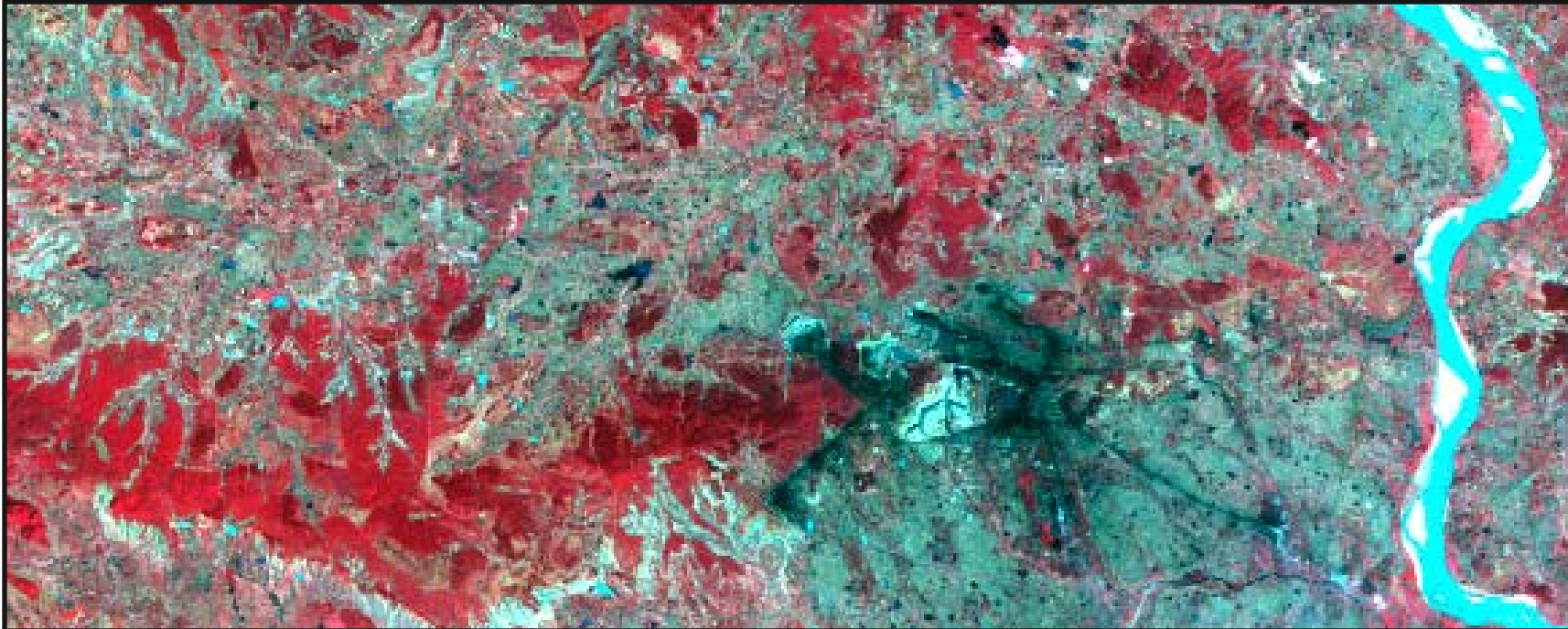
20° 53' 32" N 84° 56' 45" E



# LANDSAT TM- 1990

21° 00' 21" N 84° 56' 45" E

21° 00' 21" N 85° 15' 07" E



20° 53' 32" N 85° 15' 07" E

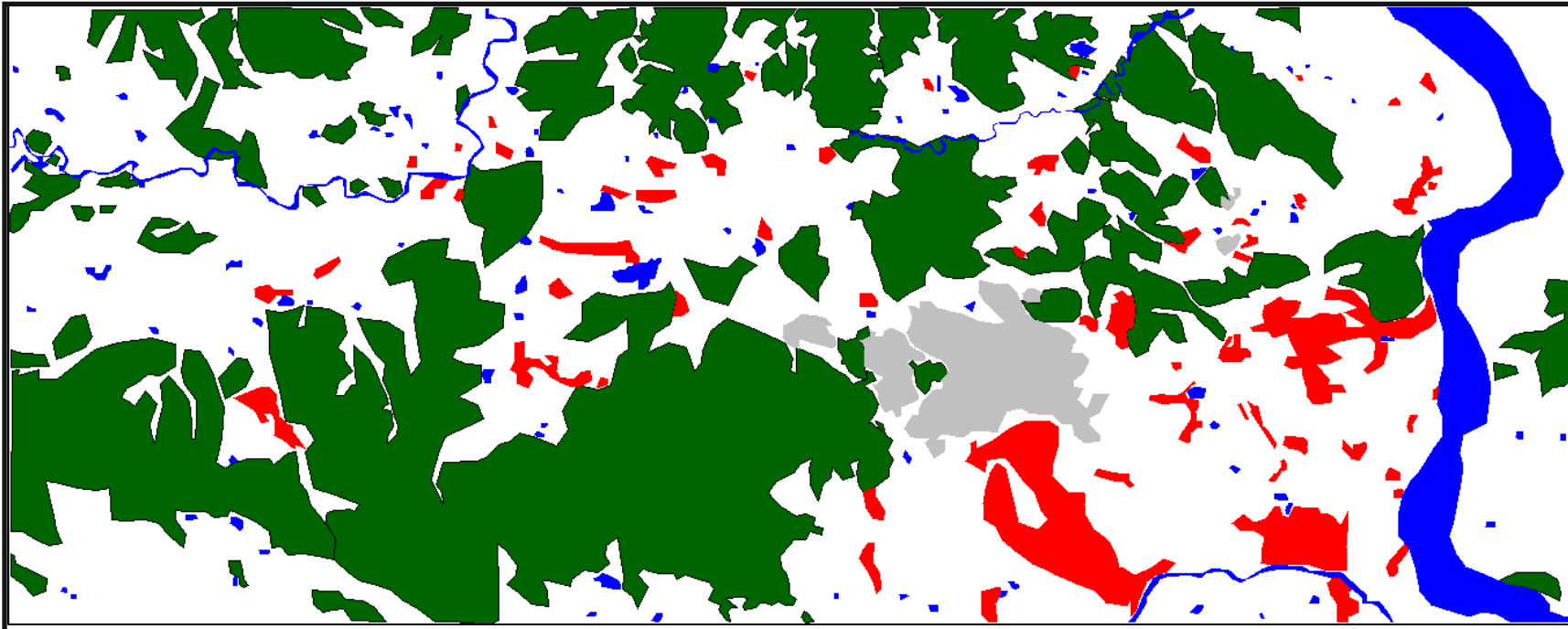
20° 53' 32" N 84° 56' 45" E



# LAND-USE MAP 1990

21° 00' 21" N 84° 56' 45" E

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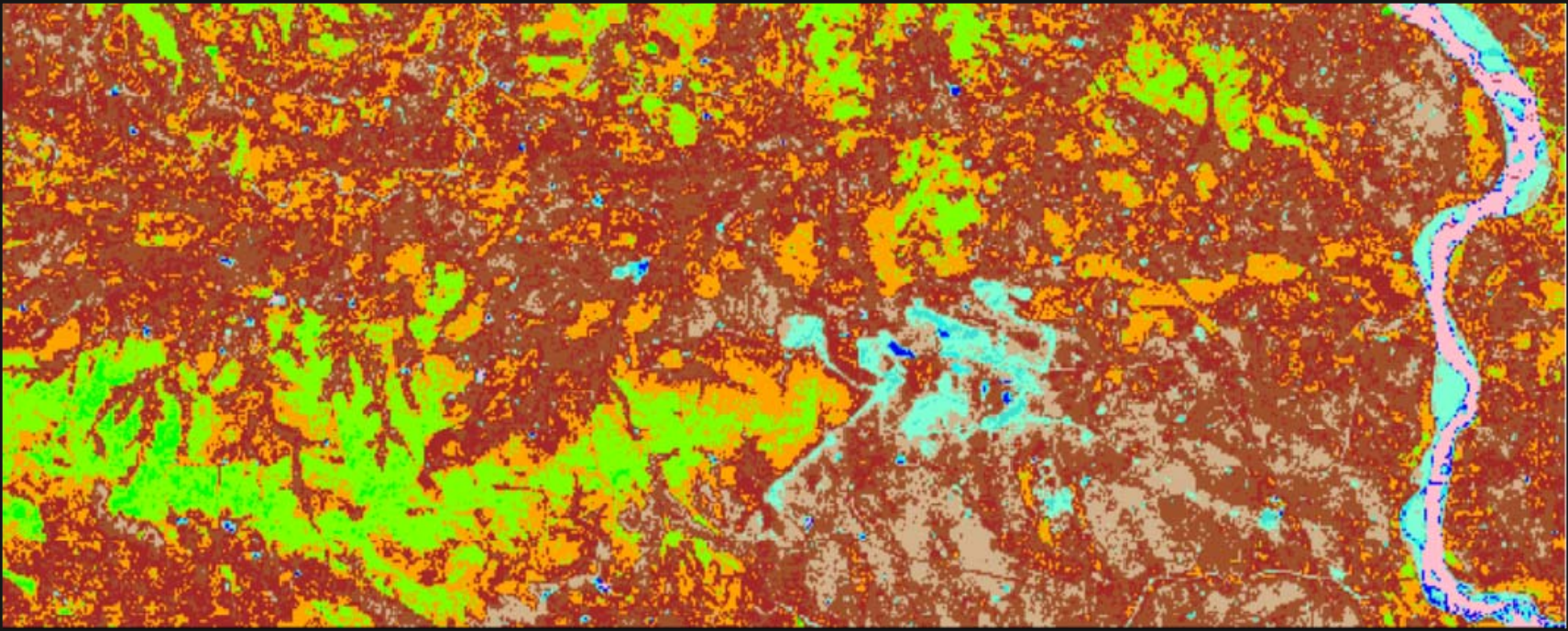
SETTLEMENTS



# NDVI MAP 1990

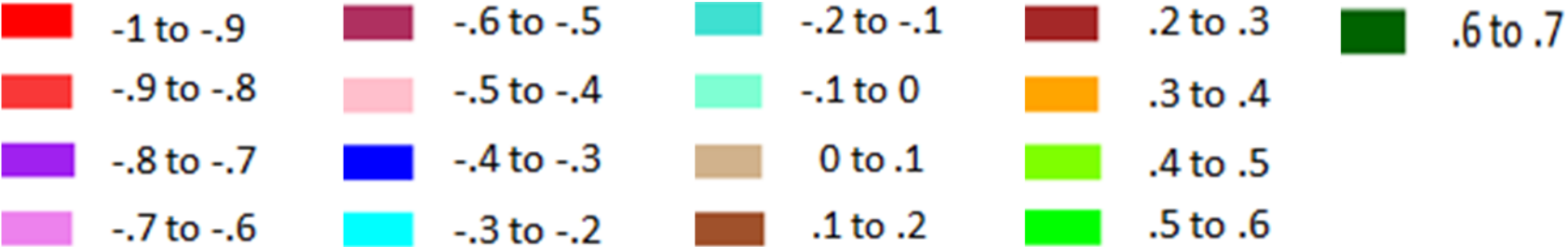
21° 00' 21" N 84° 56' 45" E

21° 00' 21" N 85° 15' 07" E



20° 53' 32" N 85° 15' 07" E

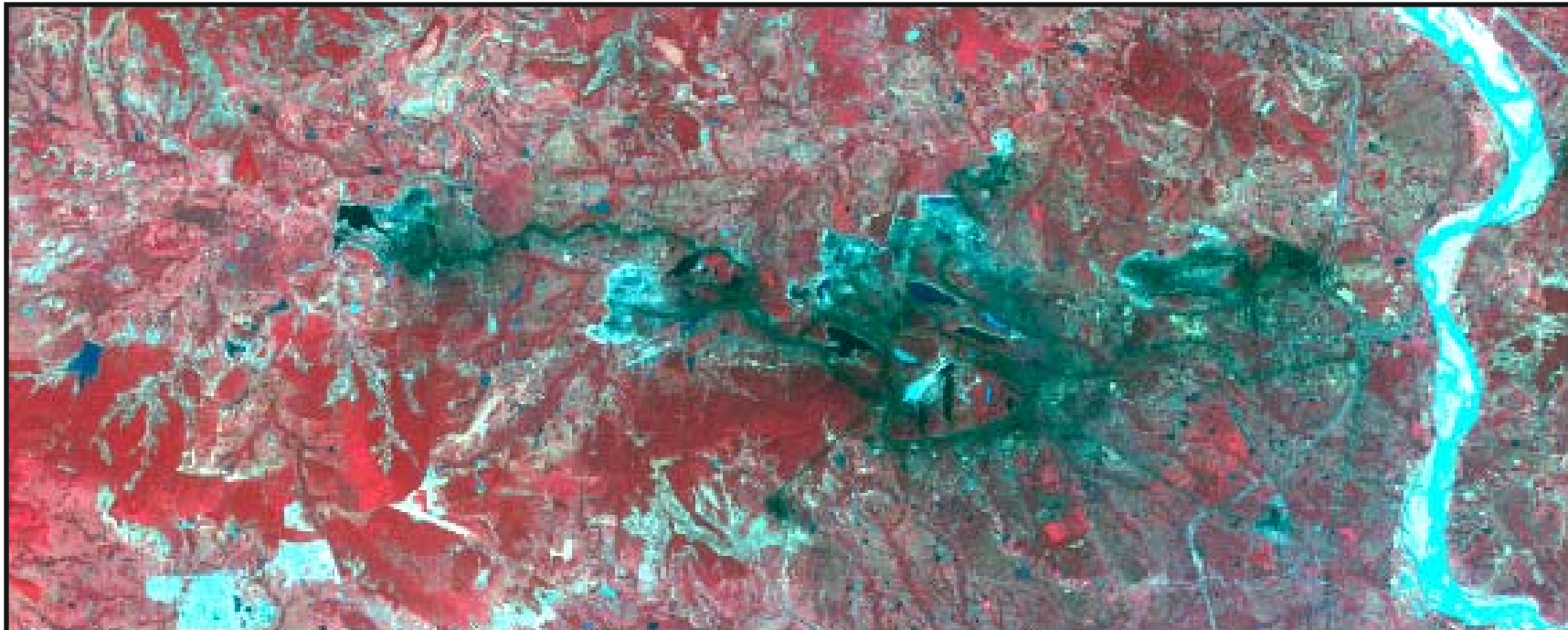
20° 53' 32" N 84° 56' 45" E



# LANDSAT TM- 2009

21° 00' 21" N 84° 56' 45" E

21° 00' 21" N 85° 15' 07" E



20° 53' 32" N 85° 15' 07" E

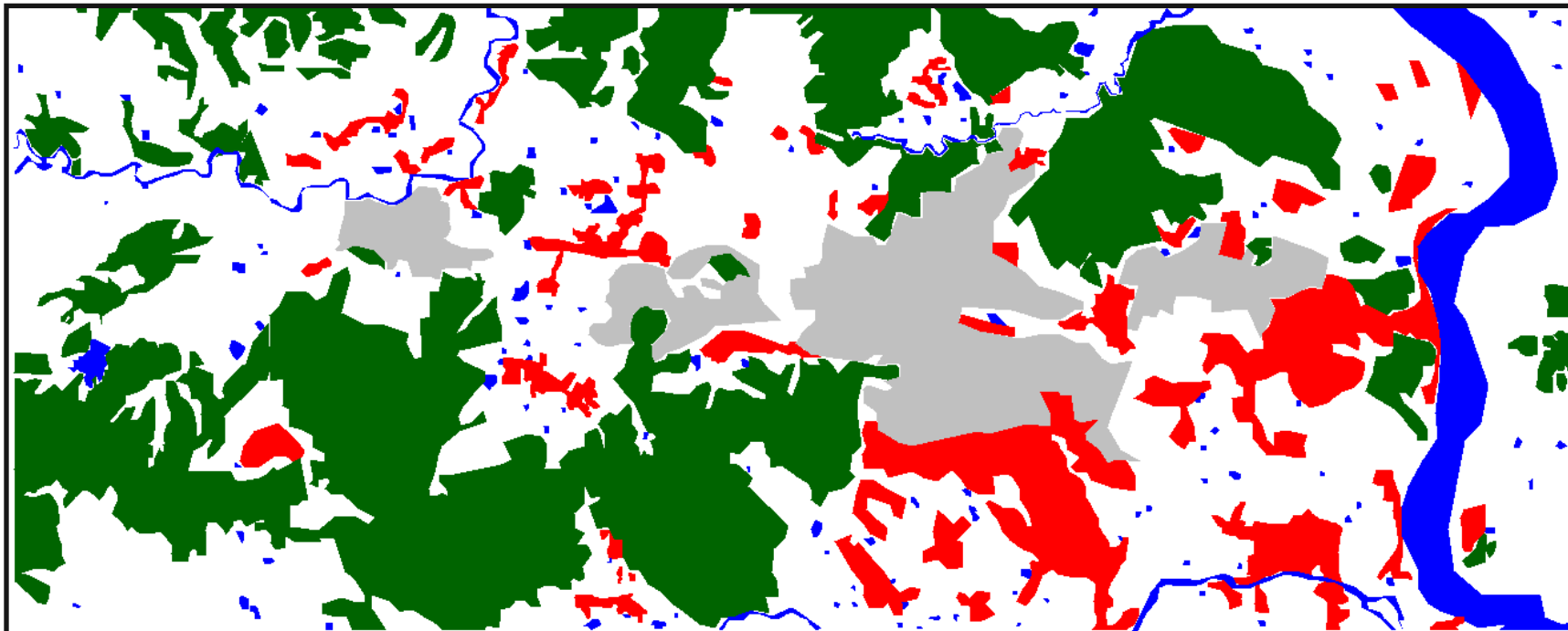
20° 53' 32" N 84° 56' 45" E



# Land Use MAP 2009

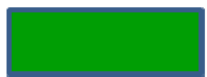
21° 00' 21" N 84° 56' 45" E

21° 00' 21" N 85° 15' 07" E



20° 53' 32" N 85° 15' 07" E

20° 53' 32" N 84° 56' 45" E



**FOREST**



**WATER BODY**



**NON FOREST AREA**

**MINES**



**SETTLEMENTS**

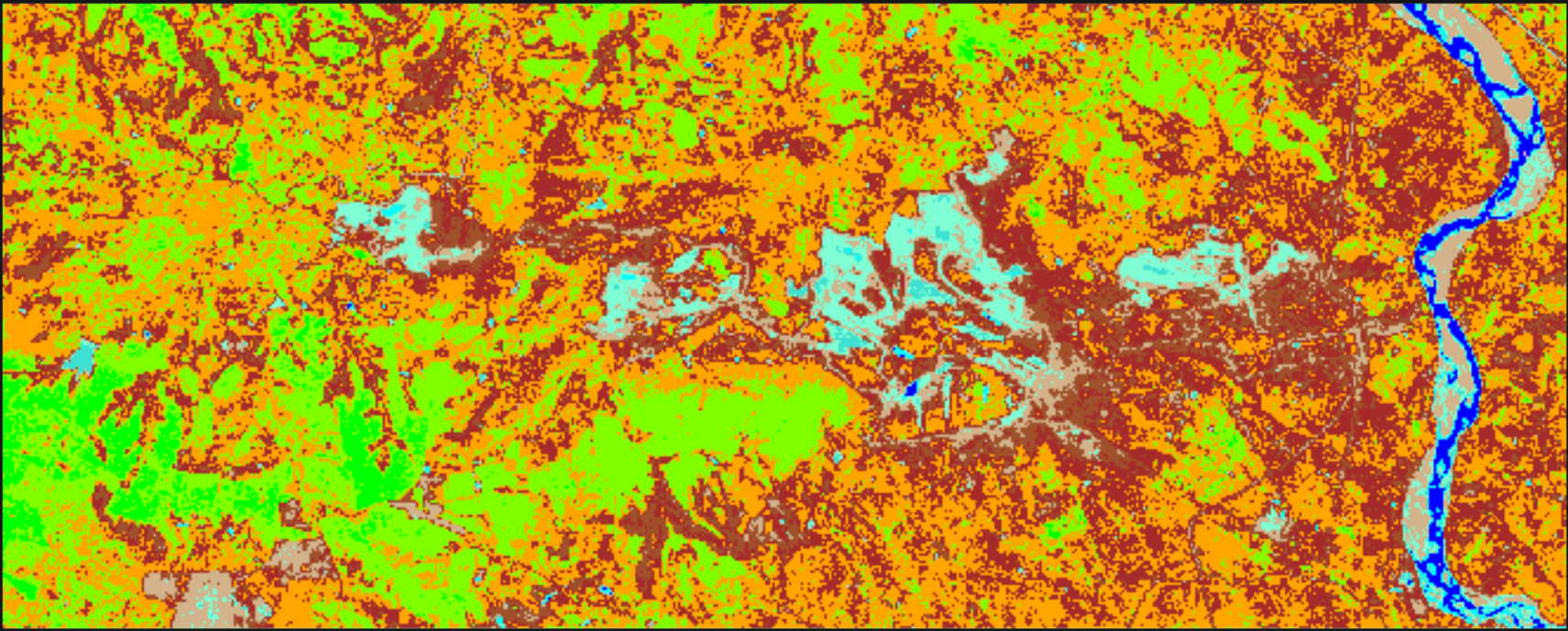




# NDVI MAP 2009

21° 00' 21" N 84° 56' 45" E

21° 00' 21" N 85° 15' 07" E



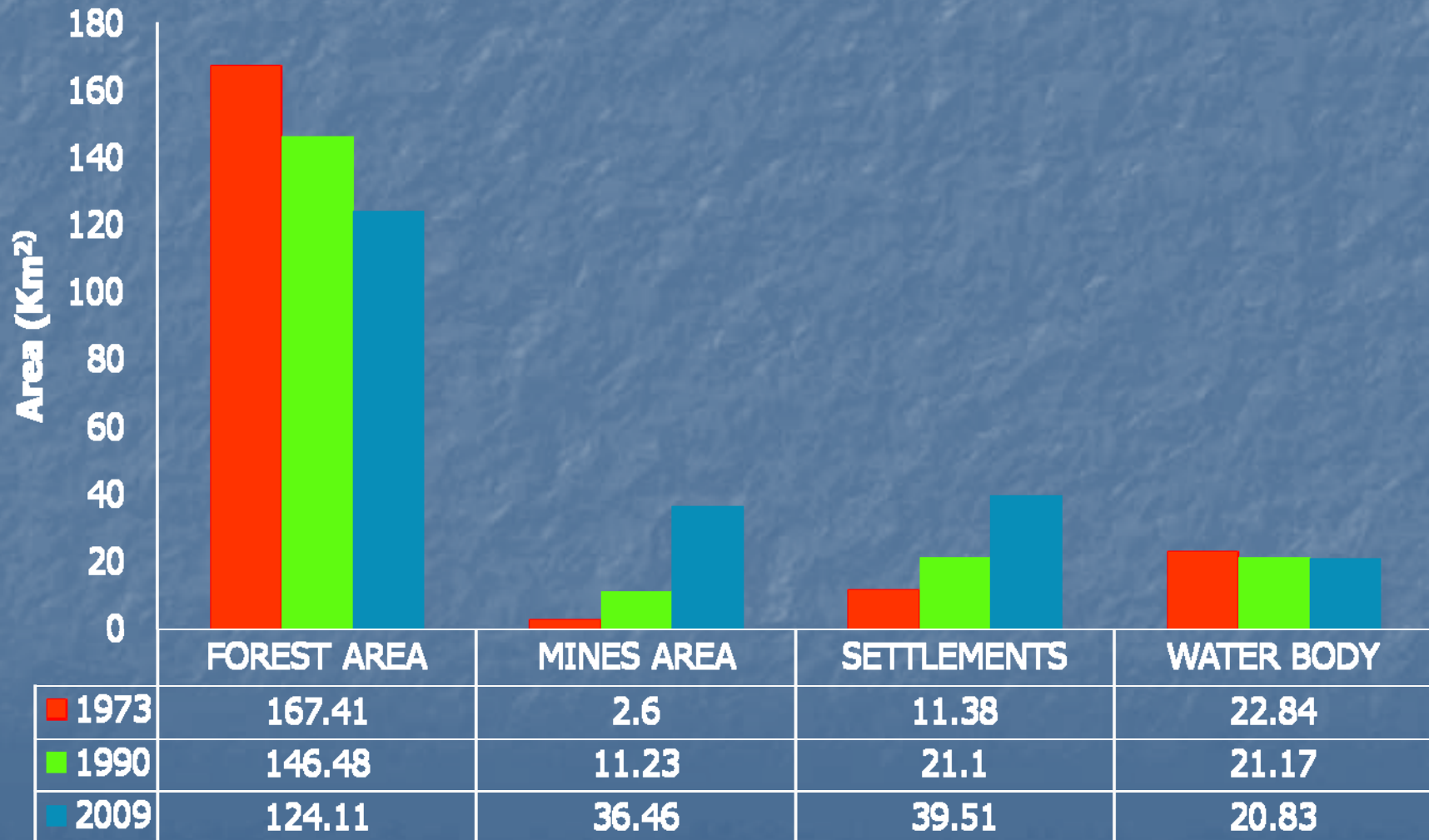
20° 53' 32" N 85° 15' 07" E

20° 53' 32" N 84° 56' 45" E



# Change Analysis

## CHANGE DETECTION ANALYSIS



# Conclusion

- The following conclusions can be drawn from the study:
  1. drastic decrease in forest cover- 43km<sup>2</sup>
  2. Tremendous increase in mines area- 34km<sup>2</sup>
  3. Large scale urbanization- 28 km<sup>2</sup>
  4. Not much change in non forest areas and water bodies.
- Ways to improve the scenario:
  1. Proper mine closure and land reclamation activities.
  2. Effective mining practices.
  3. Proper drainage facilities after mining is over.
  4. Appropriate environmental management techniques.

**THANK YOU**