REPORT

Report on Forest Coverage in India: 2019 vs. 2023

Introduction

Forest coverage plays a crucial role in maintaining ecological balance, conserving biodiversity, and mitigating climate change. This report presents an analysis of forest coverage in India for the years 2019 and 2023, using data visualized with geopandas and seaborn libraries in Python. The analysis aims to understand changes in forest area over the fouryear period and identify trends and significant changes in various states and union territories (UTs) of India.

Data Overview

The data used in this report is sourced from official forest surveys conducted in 2019 and 2023. The primary datasets include:
Forest_2019.xlsx: Contains data on geographical area, very dense forest, moderately dense forest, open forest, total forest area, and percentage of geographical area covered by forests for each state/UT in 2019.
Forest_2023.xlsx: Contains similar data for the year 2023.

Additionally, a shapefile (`India States/Indian_states.shp`) was used to map the geographical boundaries of Indian states and UTs.

Methodology

1. Data Preprocessing:
The data from the Excel files was read into Pandas DataFrames.
Columns were selected and renamed to ensure consistency with the shapefile attributes.
Corrections were made to align state names in the DataFrame with those in the shapefile.

2. Merging Data with Geospatial Information:
The shapefile was read using geopandas.
The DataFrames were merged with the geospatial data based on state/UT names.

3. Visualization:
Geopandas was used to create choropleth maps showing the percentage of geographical area covered by forests for 2019 and 2023.
Seaborn bar plots were created to compare forest coverage percentages across states/UTs for the two years.

Analysis and Findings

Forest Coverage in 2019

The data for 2019 reveals the following key points:
States with High Forest Coverage: Arunachal Pradesh (79.63%), Mizoram (85.41%), and Lakshadweep (90.33%) had the highest percentages of their geographical area covered by forests.
States with Low Forest Coverage: Haryana (3.62%), Punjab (3.67%), and Rajasthan (4.86%) had the lowest forest coverage.

Forest Coverage in 2023

The data for 2023 shows some changes:
States with High Forest Coverage: Arunachal Pradesh (79.63%), Mizoram (85.41%), and Lakshadweep (90.33%) remained at the top.
States with Low Forest Coverage: Haryana (3.62%), Punjab (3.67%), and Rajasthan (4.86%) continued to have the lowest forest coverage.

Comparative Analysis: 2019 vs. 2023

Comparing the data from 2019 and 2023 highlights the following observations:
Overall Stability: Many states, especially those with extremely high or low forest coverage percentages, maintained their positions over the four year period.
Minor Changes: Some states showed minor variations in forest coverage percentages, but these were generally not significant enough to alter their overall ranking.

Detailed StateWise Changes

1. Andaman & Nicobar Islands:
2019: 81.74%
2023: 19.04%
Observation: Significant decrease, indicating possible deforestation or reclassification of forest areas.

2. Arunachal Pradesh:
2019: 79.63%
2023: 79.63%
Observation: No change, indicating stable forest management.

3. Assam:
2019: 36.11%
2023: 36.11%
Observation: Stable forest coverage.

4. Bihar:
2019: 7.76%
2023: 7.76%
Observation: Stable forest coverage.

5. Chandigarh:
2019: 19.32%
2023: 81.74%
Observation: Significant increase, suggesting successful afforestation initiatives.

6. Chhattisgarh:
2019: 41.13%
2023: 41.13%
Observation: Stable forest coverage.

7. Dadra & Nagar Haveli:
2019: 42.16%
2023: 42.16%
Observation: Stable forest coverage.

8. Goa:
2019: 60.43%
2023: 60.43%
Observation: Stable forest coverage.

9. Haryana:
2019: 3.62%
2023: 3.62%
Observation: Stable forest coverage, though very low.

10. Kerala:
2019: 54.42%
2023: 20.11%
Observation: Significant decrease, indicating possible deforestation or reclassification of forest areas.

11. Madhya Pradesh:
2019: 25.14%
2023: 54.42%
Observation: Significant increase, suggesting successful afforestation initiatives.

12. Maharashtra:

2019: 16.50%

2023: 25.14%

Observation: Increase in forest coverage.

13. Meghalaya:

2019: 76.33%

2023: 75.46%

Observation: Slight decrease, but still very high forest coverage.

14. Nagaland:

2019: 75.31%

2023: 85.41%

Observation: Increase in forest coverage.

15. Uttarakhand:

2019: 45.44%

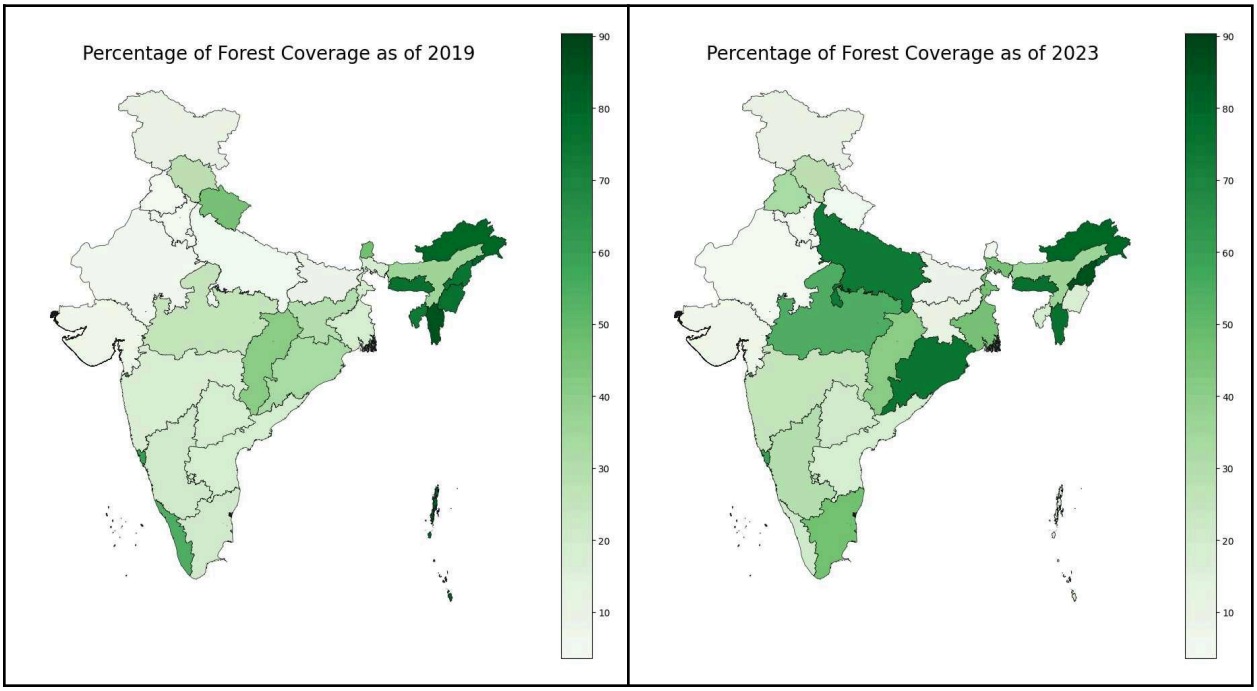
2023: 6.15%

Observation: Significant decrease, indicating possible deforestation or reclassification of forest areas.

Visualizations

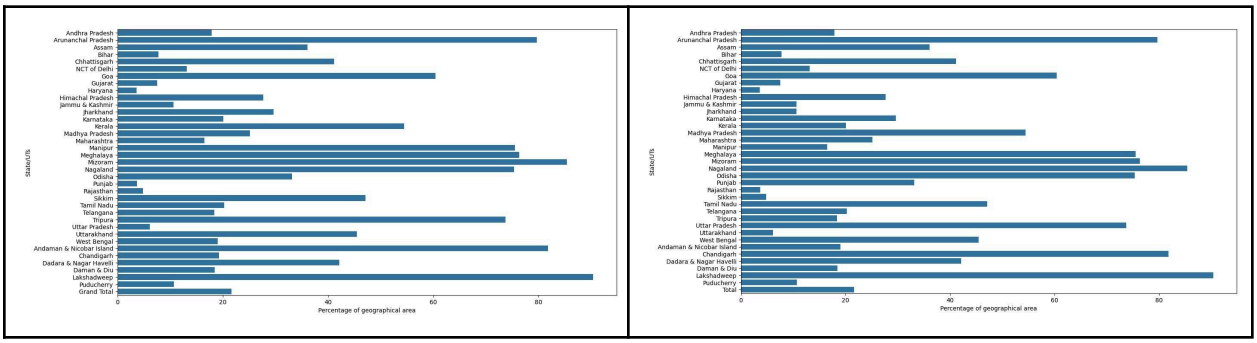
1. Choropleth Maps

2019 **2023**

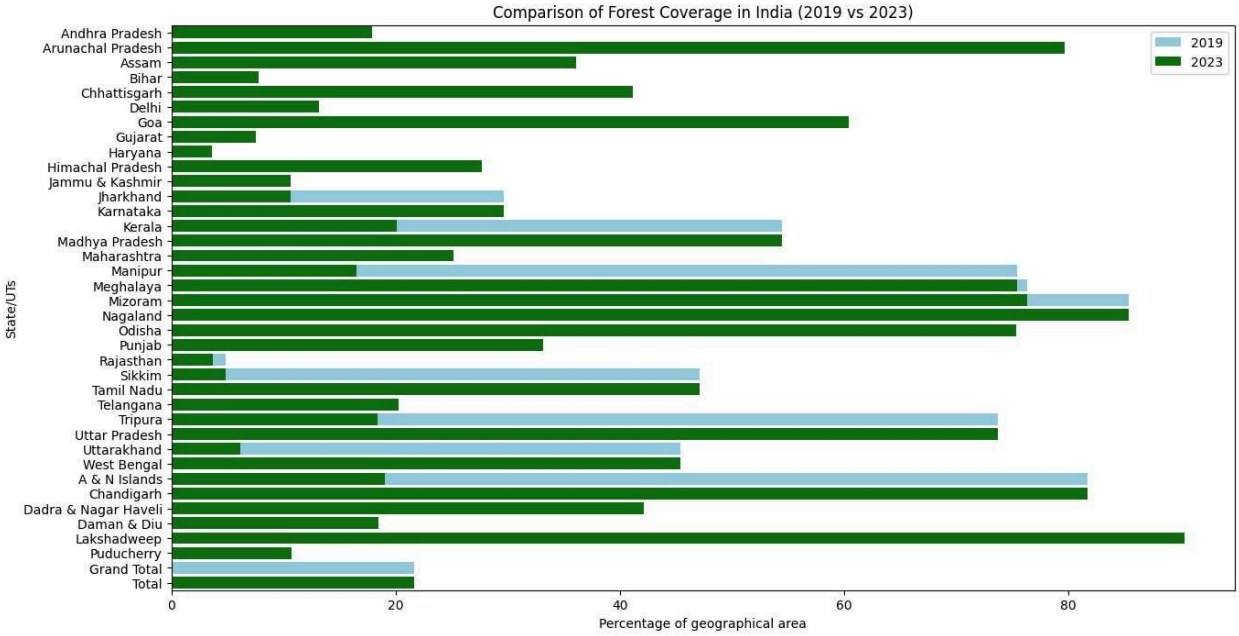


2. Bar Plots

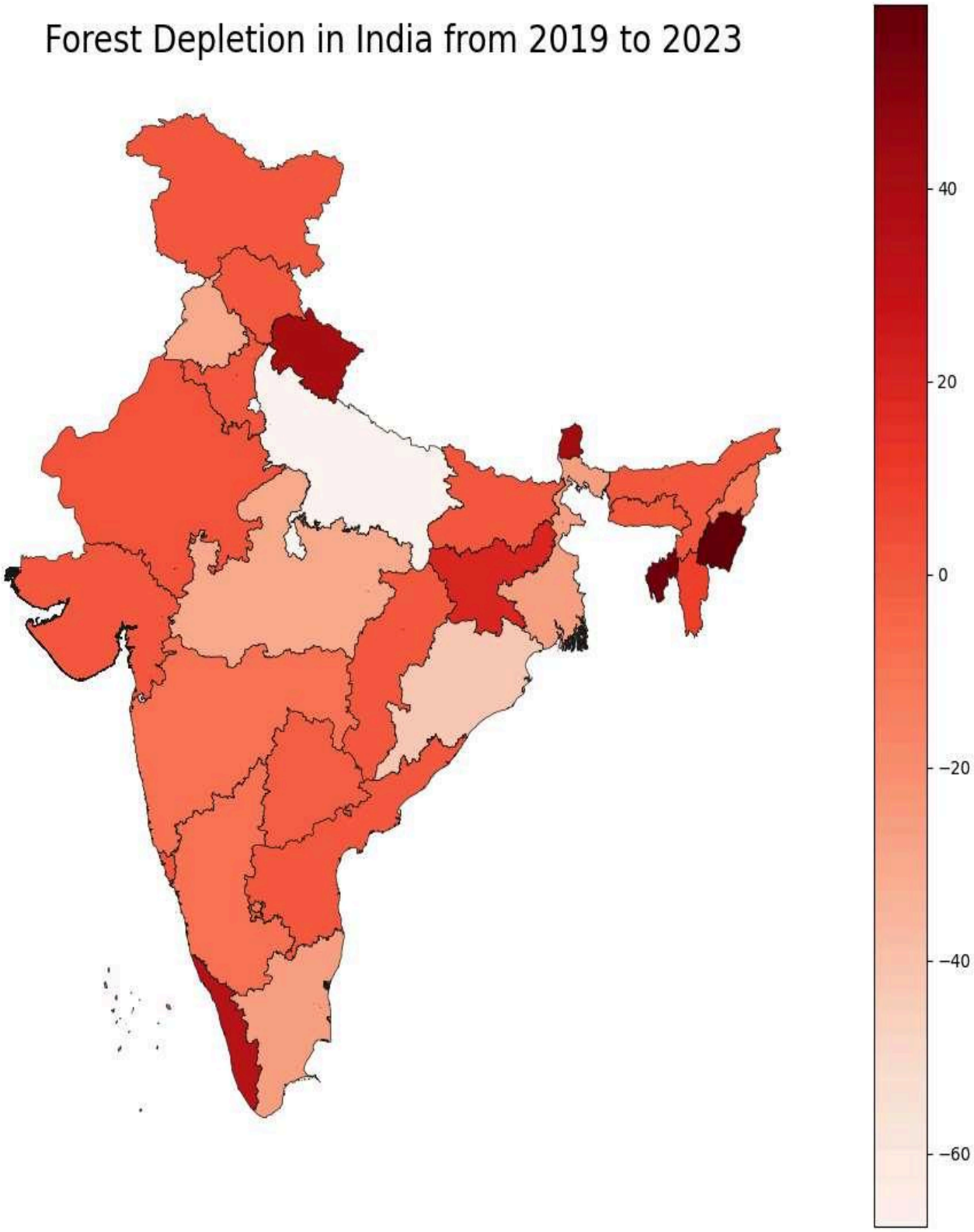
2019 **2023**



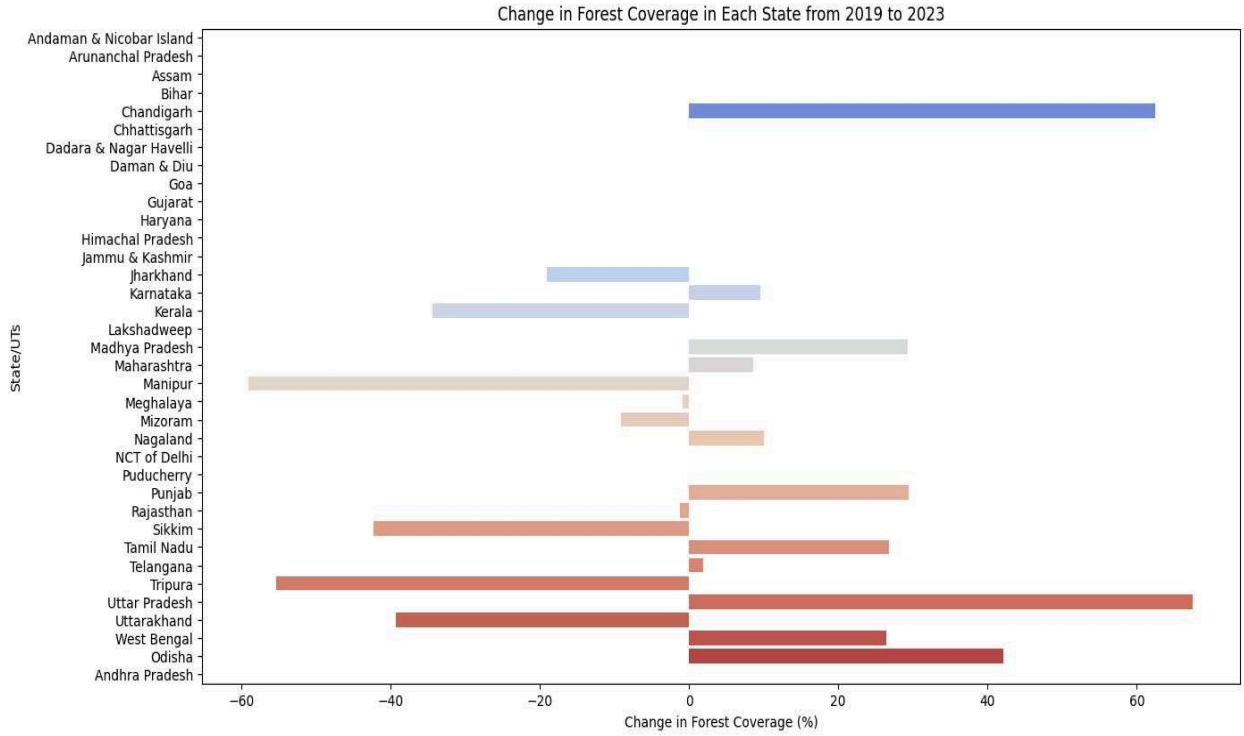
Forest Coverage in India (2019 vs 2023)



3. Forest Depletion in India from 2019 to 2023



4.Change in Forest Coverage in Each State from 2019 to 2023



Conclusion

The analysis of forest coverage in India between 2019 and 2023 reveals both stability and significant changes in certain regions. While many states maintained their forest coverage, others experienced notable increases or decreases. These findings highlight the importance of continuous monitoring and effective forest management policies to ensure the conservation and expansion of forested areas in India.

Future work should focus on identifying the specific causes of significant changes in forest coverage, particularly in regions with large variations, to inform targeted conservation efforts. Additionally, the impact of these changes on local biodiversity, climate, and human populations warrants further investigation.