Title: Average Annual Rainfall of Odisha (2019–2024)

1. Introduction

Rainfall is the most important climatic factor influencing agriculture, water resources, and ecological balance in Odisha. Understanding rainfall patterns over time provides crucial insights into regional climate variability, monsoon behaviour, and potential implications for water resource management. This study focuses on calculating and analysing the average annual rainfall of Odisha for the period 2019 to 2024 using CHRS rainfall datasets and ArcGIS spatial analysis techniques. Special attention was given to comparing the years 2019 and 2024 to understand short-term variability.

2. Objectives

- To estimate the average annual rainfall of Odisha from 2019 to 2024.
- To analyse and compare rainfall distribution between 2019 and 2024.
- To visualize rainfall spatial patterns using GIS interpolation techniques.

3. Data Used

- Source: CHRS Data Portal (Climate Hazards Group Rainfall Data)
- Data Type: Raster rainfall datasets (annual and monthly)
- Study Area: Odisha, India
- Software Used: ArcGIS

4. Methodology

4.1 Data Acquisition

- Annual rainfall raster datasets for 2019 to 2024 were downloaded from the CHRS Data Portal.
- Monthly rainfall datasets for 2019 and 2024 were also obtained for year-to-year comparison.

4.2 Preprocessing

- All raster datasets were imported into ArcGIS.
- Datasets were clipped to Odisha's administrative boundary to define the study area.

4.3 Calculation of Average Annual Rainfall (2019–2024)

- The Raster Calculator tool was used to compute the average of annual rainfall rasters (2019–2024).
- This generated a composite raster showing the mean rainfall over the six-year period.

4.4 Conversion and Interpolation

- Raster datasets were converted into point data.
- The Inverse Distance Weighted (IDW) interpolation method was applied to generate continuous rainfall distribution surfaces.

- Suitable symbology and classification were applied to highlight rainfall variations across Odisha.

4.5 Comparison of 2019 and 2024

- Monthly rainfall rasters (12 months) for 2019 and 2024 were averaged using Raster Calculator.
- The results were converted into points and interpolated using IDW.
- Comparative maps were prepared to showcase spatial differences.

5. Results

5.1 Average Annual Rainfall (2019–2024)

- The mean rainfall across 2019–2024 was found to be 1652.26 mm.

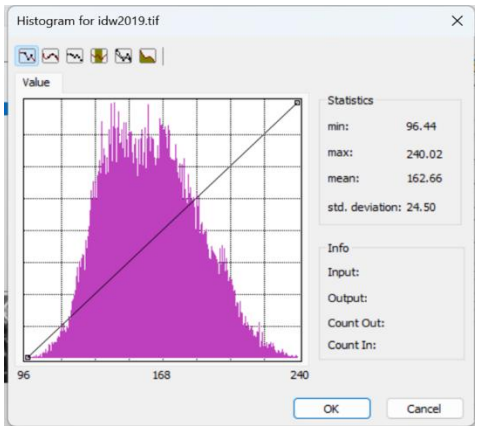
Year	Average annual rainfall(mm)
2019-2024	1652.26
2019	162.66
2024	112.36
Change in mean value(2019&2024	**(162.66-112.36) = 50.3**

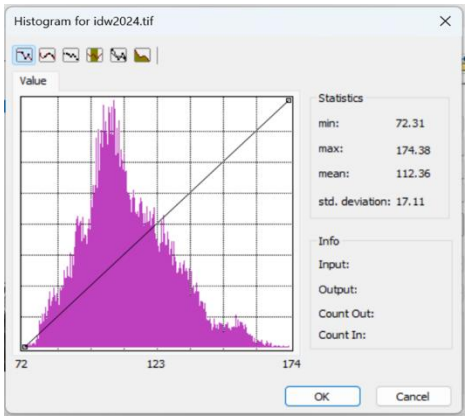
5.2 Annual Rainfall in 2019 and 2024

- The mean rainfall in 2019 was 162.66 mm, while in 2024 it decreased to 112.36 mm.

5.3 Standard Deviation Analysis

- In 2019, the standard deviation was 24.50.
- In 2024, the standard deviation was 17.11

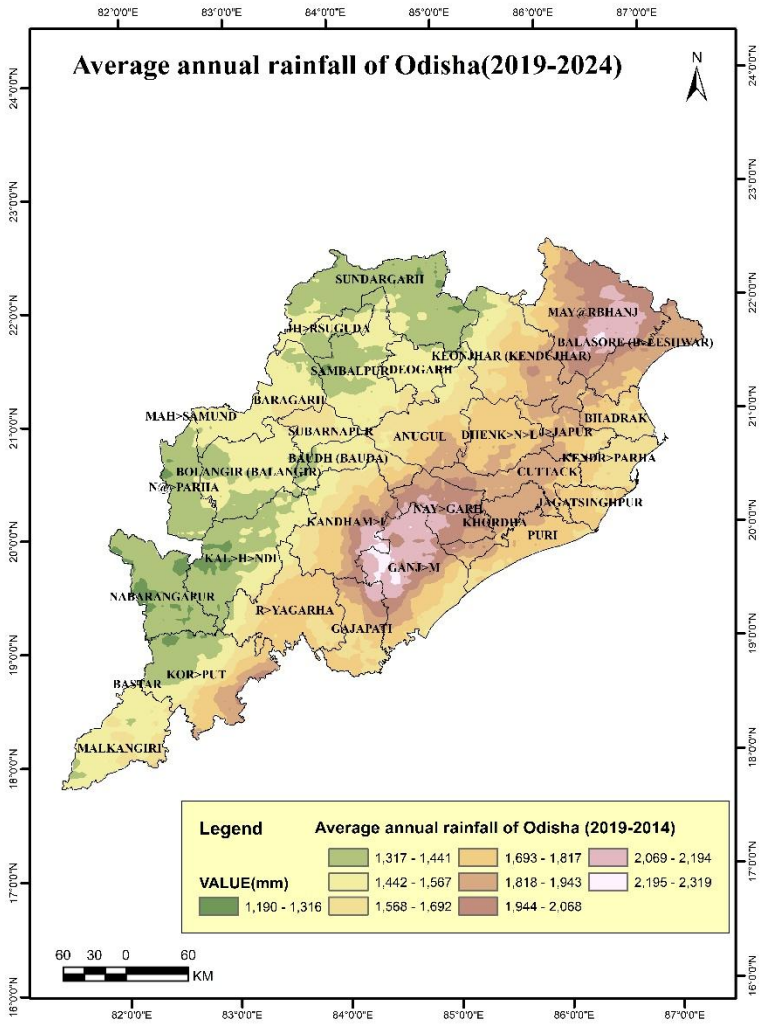




6. Conclusion

This study assessed the average annual rainfall of Odisha for the period 2019–2024 using CHRS rainfall datasets and GIS-based spatial analysis. The overall mean annual rainfall for the six-year period was found to be 1652.26 mm, highlighting Odisha's dependence on monsoon precipitation. A focused comparison between 2019 and 2024 revealed a decline of approximately 50.3 mm in average rainfall.

The higher variability in 2019 (standard deviation: 24.50) indicates that rainfall was more erratic, with certain regions or months experiencing sharp fluctuations. In contrast, 2024 recorded lower rainfall but with reduced variability (standard deviation: 17.11), suggesting a more spatially and temporally uniform distribution.


Average annual rainfall of Odisha(2019-2024)
N
SUNDARGARH
MAY@RBHANJ
H>RSUGUDA
BALASORE (BALESHWAR)
KEONJHAR (KENDUJHAR)
SAMBALPUR
DEOGARH
BARAGARH
MAH>SAMUND
BHADRAK
SUBARNAPUR
ANUGUL
DHENK>N>L
JAPUR
BAUDH (BAUDA)
KENDR>PARHA
BOLANGIR (BALANGIR)
CUTTACK
N@>PARHA
JAGATSINGHPUR
KANDHAMAL
NAY>GARH
KHURDHA
PURI
KAL>H>NDI
GANJ>M
NABARANGAPUR
R>YAGARHA
GAJAPATI
KOR>PUT
BASTAR
MALKANGIRI
Legend
Average annual rainfall of Odisha (2019-2014)
VALUE(mm)
1,190 - 1,316
1,317 - 1,441
1,442 - 1,567
1,568 - 1,692
1,693 - 1,817
1,818 - 1,943
1,944 - 2,068
2,069 - 2,194
2,195 - 2,319
60 30 0 60
KM
82°0'0"E
83°0'0"E
84°0'0"E
85°0'0"E
86°0'0"E
87°0'0"E
24°0'0"N
23°0'0"N
22°0'0"N
21°0'0"N
20°0'0"N
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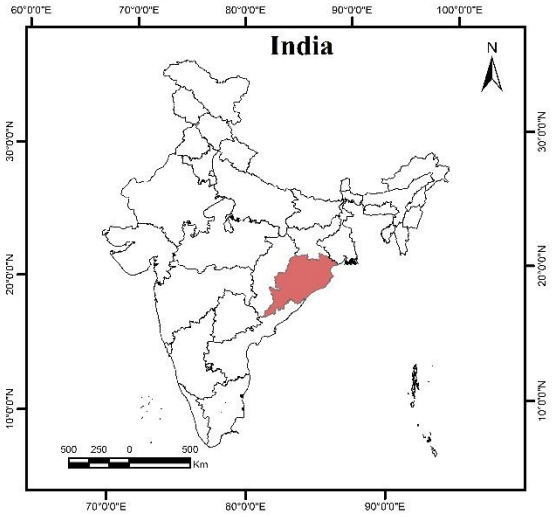
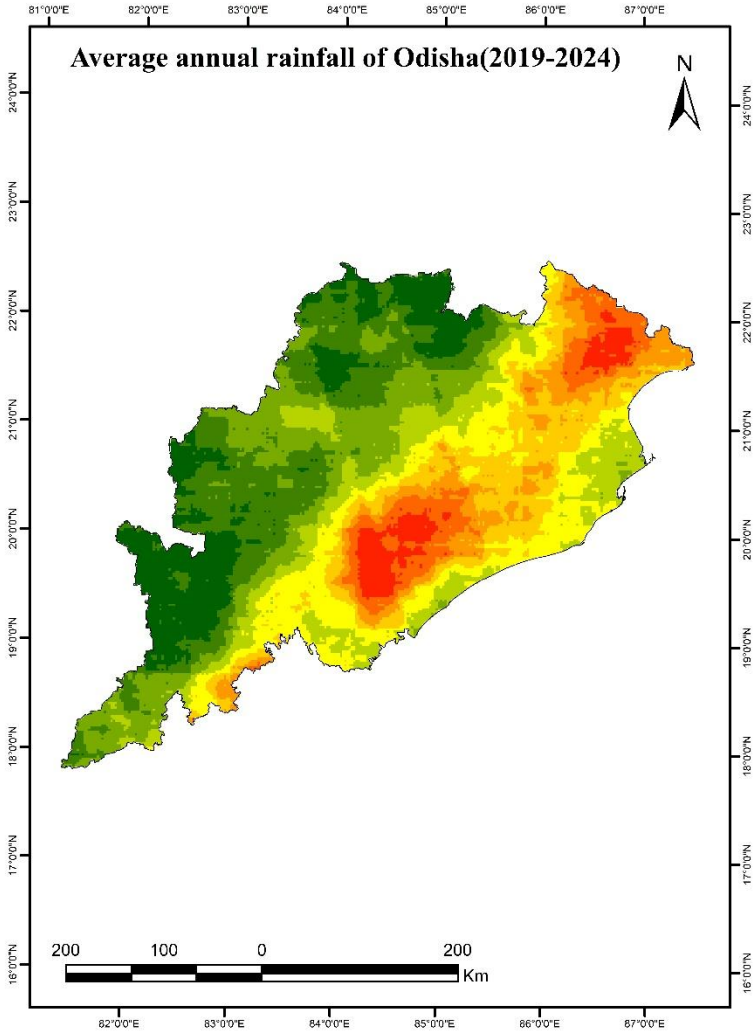
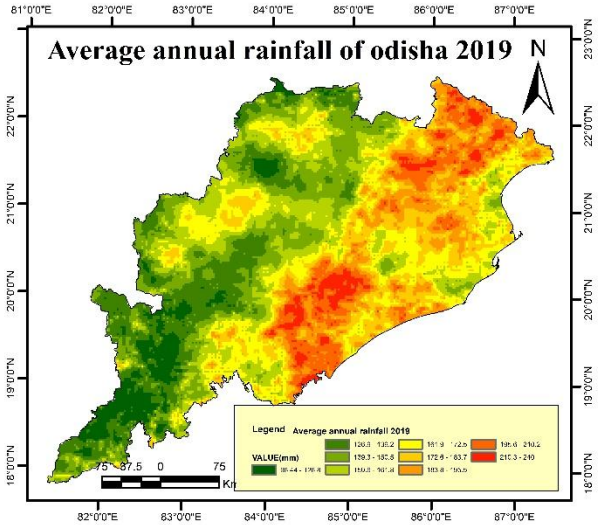
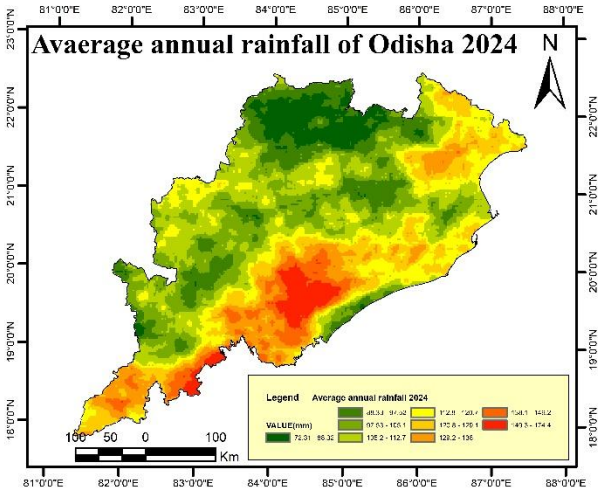
17°0'0"N
16°0'0"N


India
N
500 250 0 500
Km
60°0'0"E
70°0'0"E
80°0'0"E
90°0'0"E
100°0'0"E
30°0'0"N
20°0'0"N
10°0'0"N


Average annual rainfall of Odisha(2019-2024)
N
200 100 0 200
Km


Average annual rainfall of odisha 2019
N
Legend
Average annual rainfall 2019
VALUE(mm)
75 37.5 0 75
Km


Avaerage annual rainfall of Odisha 2024
N
Legend
Average annual rainfall 2024
VALUE(mm)
100 50 0 100
Km