

Environmental Analysis of Manesar, Gurgaon

Data Analytics

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Introduction

This report presents an environmental data analysis project focused on **Manesar**, a rapidly urbanizing industrial town in **Gurgaon, Haryana**. The project was undertaken as part of a **Data Analytics Internship at Novanectar Pvt Ltd**, using real-world data, Python programming, and visualization tools.

The goal is to assess the region's ecological trends and provide actionable insights related to:

- Climate & rainfall
 - Pollution levels
 - Land use changes
 - Water availability
 - Disaster risk
 - Biodiversity
 - Socio-economic conditions
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Tools & Technologies

- **Python (Jupyter Notebook)**
 - **Libraries:** pandas, matplotlib, seaborn
 - **Dataset sources:** OpenAQ, CPCB, ISRO Bhuvan, Global Forest Watch, Meteostat, Census of India
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Datasets Used

Parameter	Source
Climate (2022–2024)	Meteostat

Parameter	Source
Geological & Soil Data	Bhuvan, Local DEM
Water Resources	CPCB, GRACE
Forest & Biodiversity	FSI, Global Forest Watch
Land Use and Urbanization	ISRO GHSL, Bhuvan
Pollution & Air Quality	CPCB, OpenAQ
Disaster Risk	IMD, USGS, News Reports
Socio-Economic	Census India, State Portals

Analysis Summary

Climate Trends

- Summer peaks at 33–35°C (May–June)
- Rainfall highest in monsoon (June–Aug)
- Winters cool (14–17°C)

Terrain & Soil

- Elevation: 269–275m
- Soil: Mostly Sandy Loam
- Slope: Gentle (1–2%)

Water

- Groundwater declined from 23.5m (2018) to 26.4m (2023)
- WQI ~60–70 → Needs improvement

Forests & Biodiversity

- Forest area decreasing yearly
- Tree cover loss 5–6 ha/year
- Biodiversity richness index slightly declined

Urbanization

- Built-up area doubled from 2010–2023

- Green/agricultural land reduced significantly

Pollution

- PM2.5 levels above $100 \mu\text{g}/\text{m}^3$ → “Very Poor” category
- Waste generation rising annually

Disaster Risk

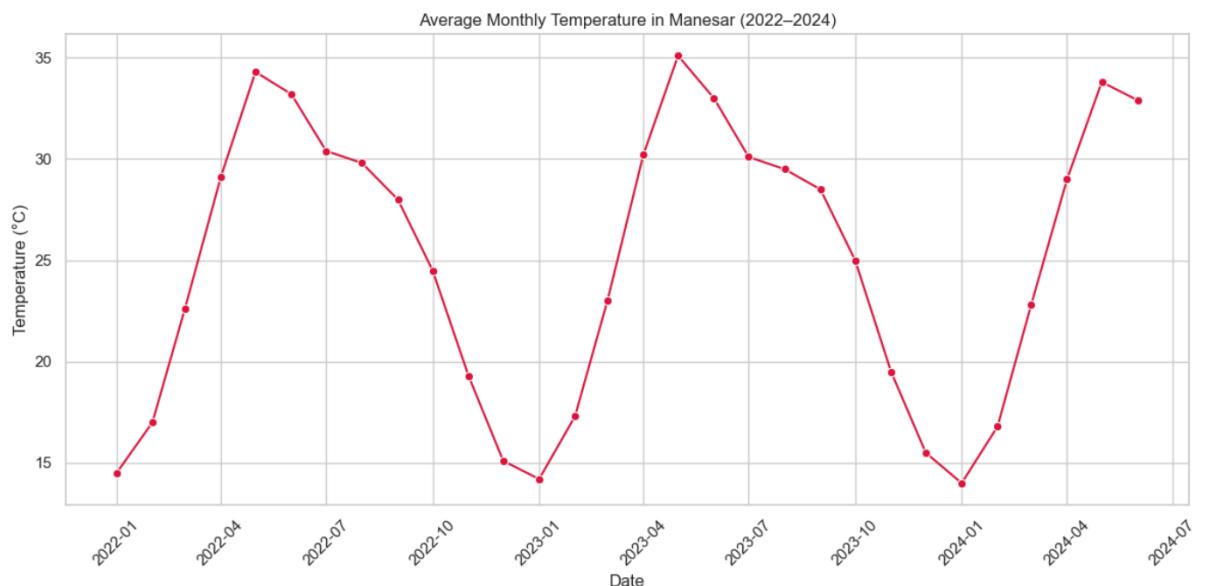
- Earthquake: Zone IV (moderate risk)
- Heatwaves increasing
- Minor flooding due to unplanned urbanization

Socio-Economic

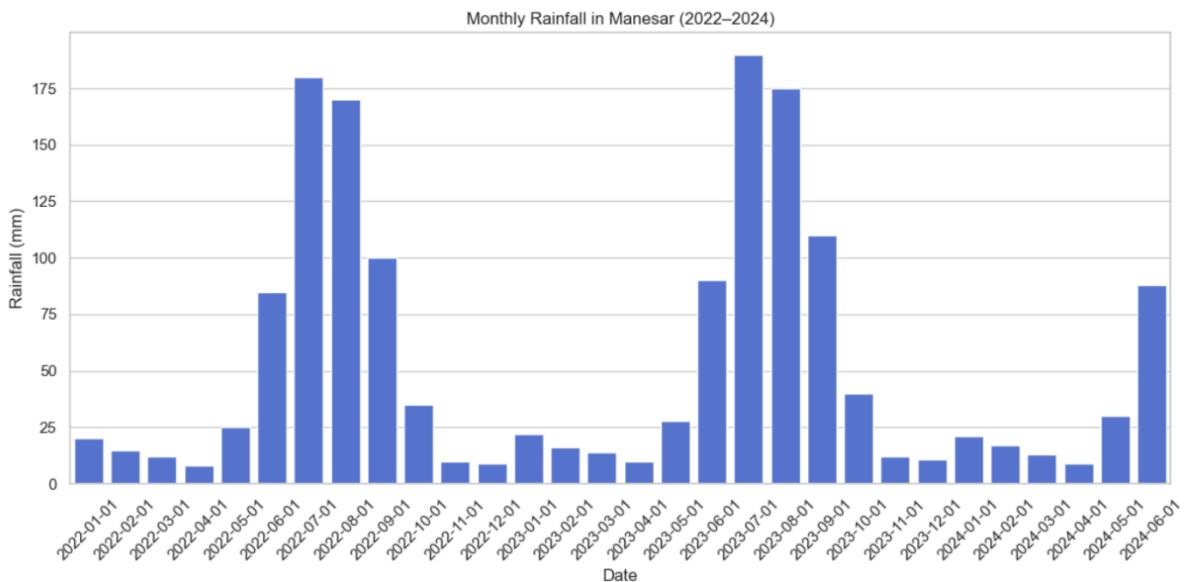
- High industrial growth
 - Mixed development: housing, labor colonies, and SEZs
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Screenshots

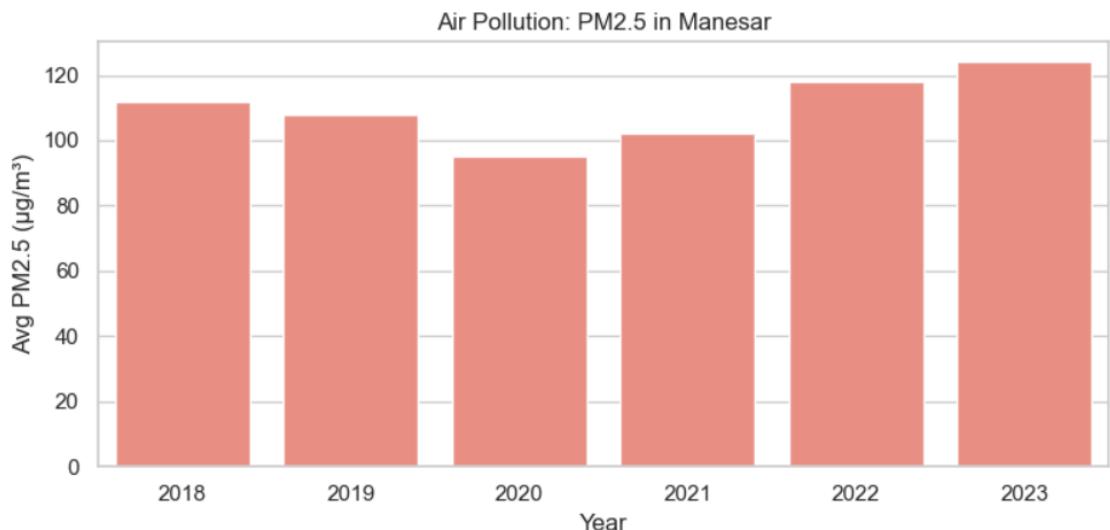
- Temperature line plot



- Rainfall bar chart



- Pollution chart



- Land use trend



Conclusion & Recommendations

- **Urban expansion** must include sustainable zoning and green belts.
 - **Pollution control** policies should focus on waste and air emissions.
 - **Water conservation** via rainwater harvesting is crucial.
 - **Afforestation** programs should be implemented to restore green cover.
 - **Disaster preparedness** must address both natural and industrial risks.
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References

- Central Pollution Control Board (<https://cpcb.nic.in>)
 - OpenAQ (<https://openaq.org>)
 - ISRO Bhuvan
 - Forest Survey of India
 - Meteostat.net
 - Census of India (<https://censusindia.gov.in>)
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Submitted By

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