Uttarakhand Environment Analysis using Power BI and MySQL

ID: NN/22/2355

Name: Amogh Javali

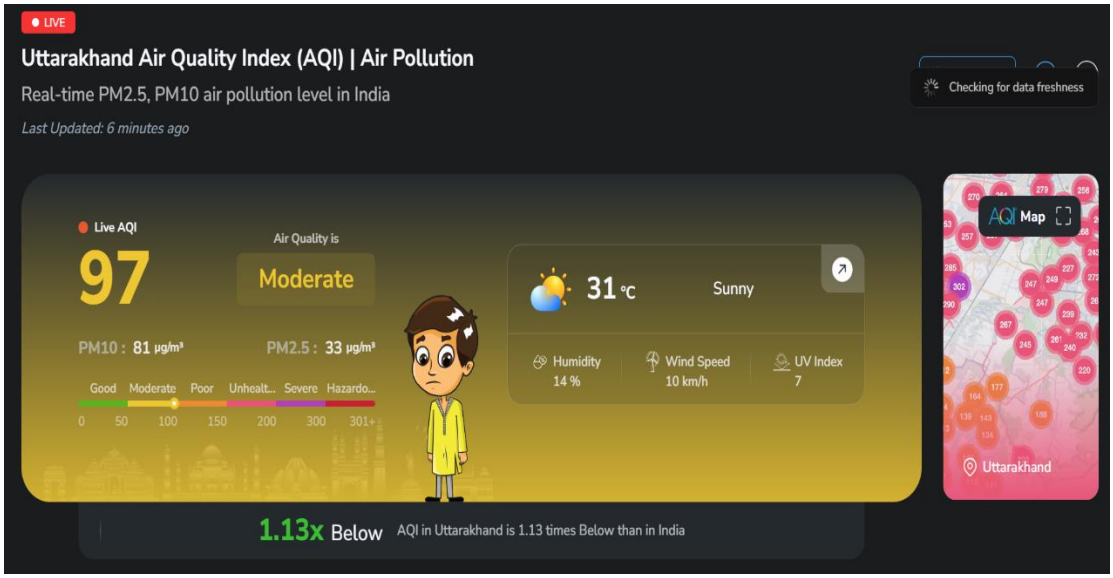
Domain: Data Analytics

Project Overview

The Uttarakhand Environment Analysis project focuses on studying various environmental, socio-economic, and policy aspects using Power BI and MySQL. This report details the methodology, data cleaning, analytical approach, and visualization techniques used to derive insights into the past and present conditions of Uttarakhand's environment.

Data Sources and Methodology

The data for this project was sourced from multiple official and research-based sources, covering aspects like air and water quality, climate conditions, forest cover, urbanization, and pollution levels. The data was imported into MySQL for structured storage and later connected to Power BI for analysis and visualization.



Data Cleaning using Power Query

Before performing any analysis, data preprocessing was necessary to ensure accuracy and consistency. The following steps were executed using Power Query in Power BI:

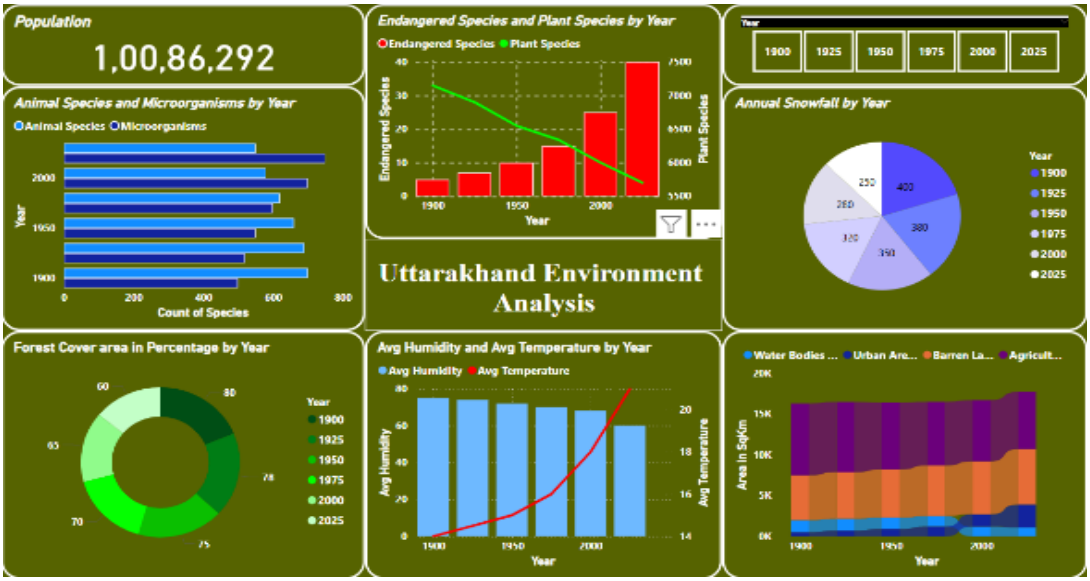
- **Handling Missing Data:** Null values were replaced with appropriate estimates based on historical trends.
- **Data Formatting:** Date formats, numerical values, and categorical labels were standardized.
- **Outlier Removal:** Extreme values in pollution levels, climate records, and demographic statistics were identified and adjusted.
- **Merging Data:** Multiple datasets from different years were combined to create a comprehensive timeline-based analysis.

Data Analysis and Visualization

Use of DAX for Custom Measures

To enhance analytical capabilities, multiple custom measures were created using the DAX (Data Analysis Expressions) language in Power BI. Some key DAX measures include:

- Average AQI Calculation: To dynamically display the air quality index over time.
- Year-over-Year Change in Forest Cover: To measure the deforestation rate.
- Total Tourism Growth Rate: To understand trends in domestic and international tourism.
- Percentage Change in Urbanization: To assess rapid urban development and its effects on the environment.



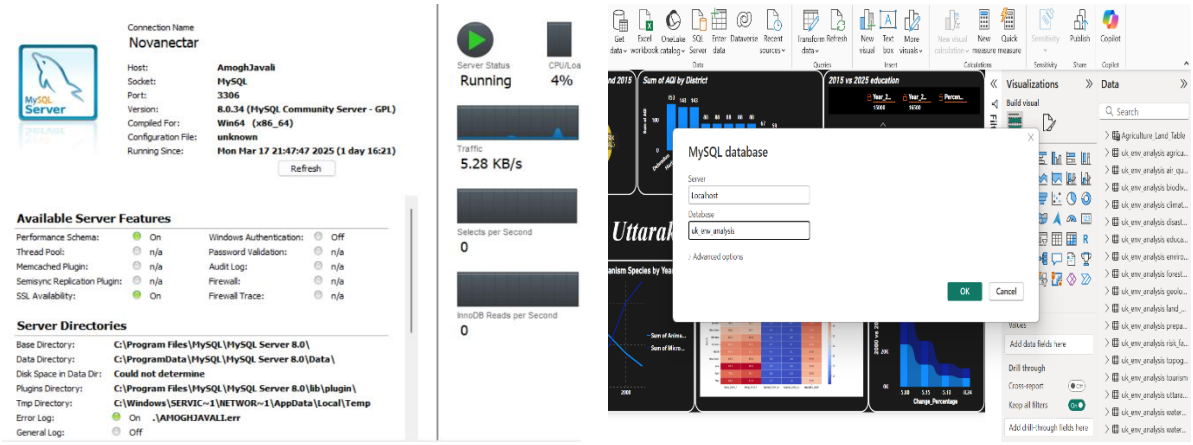
Key Findings

1. Air and Water Quality Trends
    - The air quality index (AQI) has worsened over time, especially in cities like Dehradun and Haridwar.
    - Water quality has declined in urban areas due to industrial and sewage pollution.
2. Climate and Forest Cover Changes
    - Increasing temperatures and declining snowfall patterns indicate climate change effects.
    - Forest cover has significantly reduced due to urbanization and wildfires.
3. Socio-Economic Impact
    - The growth in tourism has led to economic benefits but also increased environmental stress.
    - Urbanization and infrastructure development have caused deforestation and habitat loss.

Connecting MySQL to Power BI

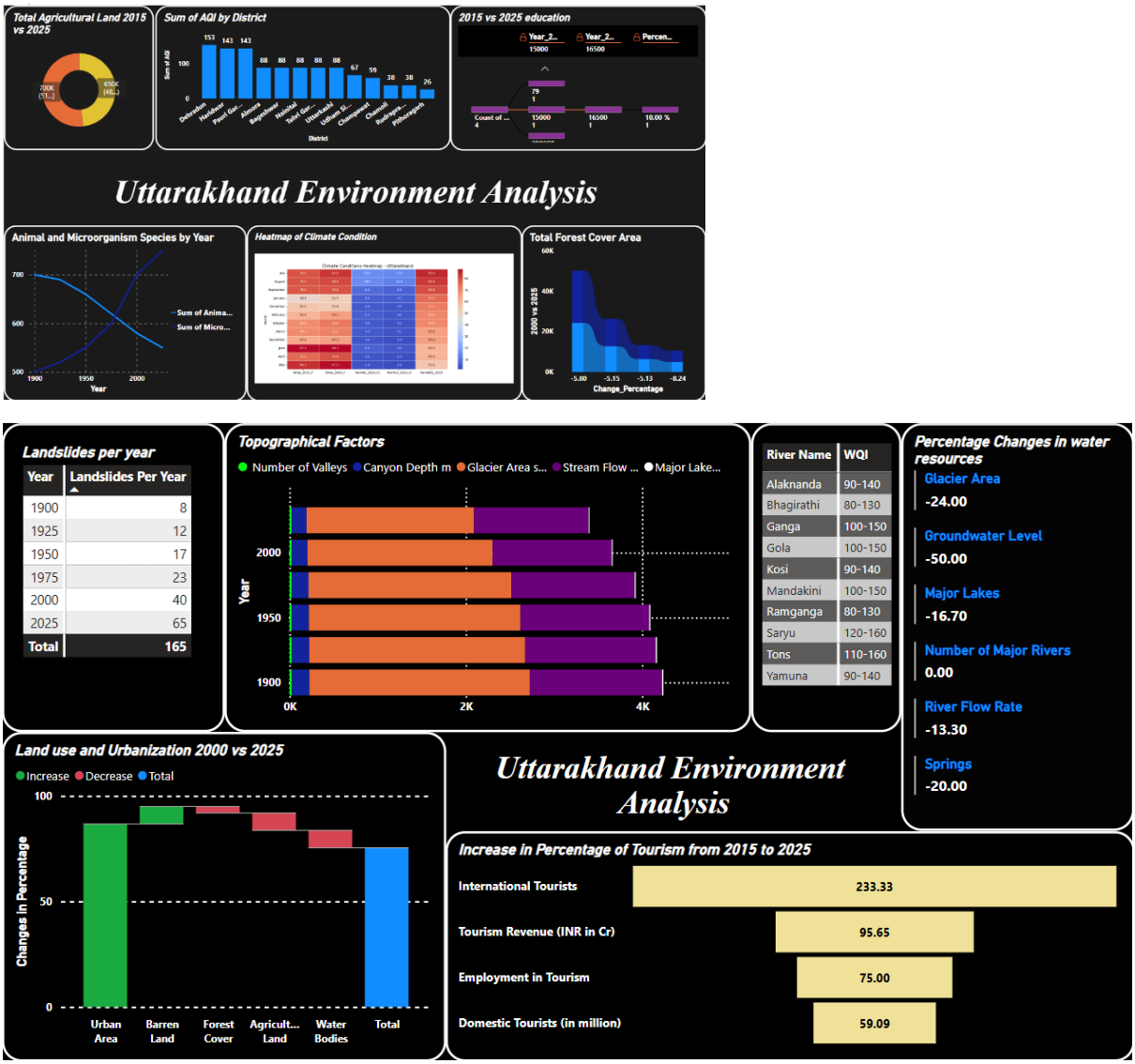
To integrate data from MySQL into Power BI for dynamic reporting, the following steps were followed:

1. Setting up the MySQL server with appropriate tables for storing environmental and socio-economic data.
2. Creating SQL queries to fetch relevant data and aggregate historical trends.
3. Establishing a connection using Power BI's MySQL connector.
4. Automating data refresh to ensure real-time updates in Power BI dashboards.



Dashboard Insights

- **Air Quality Monitoring:** Visualizing AQI trends over the years to identify worsening pollution levels.
- **Deforestation Trends:** Tracking forest loss and the impact of human activities on green cover.
- **Climate Change Impact:** Analysing temperature fluctuations and snowfall reduction in Uttarakhand.
- **Tourism Growth vs. Environmental Strain:** Examining the economic benefits of tourism against environmental degradation.
- **Urbanization Patterns:** Mapping the expansion of urban areas and its consequences for biodiversity.



Conclusion

This analysis provides valuable insights into Uttarakhand's environmental status, highlighting key areas of concern such as pollution, deforestation, and climate change. The integration of MySQL and Power BI, combined with data cleaning using Power Query and calculations using DAX, enhances the efficiency and depth of the analysis.

This project demonstrates how Power BI and MySQL can be leveraged to analyse environmental data effectively, providing actionable insights for policymakers and researchers.

Drive link:
https://drive.google.com/drive/folders/1hpEkxJMTGRrsH3PWLVVbmUWDc6UGrIiB

Github: https://github.com/Amoghjavali2003/NovaNectar_task1