

**Batch: D-2      Roll No.: 16010122151**

## **Experiment No. 2**

**Title: Implement vector data styling and raster data styling in QGIS**

### **Course Outcome:**

CO2 Apply the data analytics in the field of geospatial system

### **Books/ Journals/ Websites referred:**

**QGIS Installation Link: <https://www.qgis.org/download/> Version 3.38**

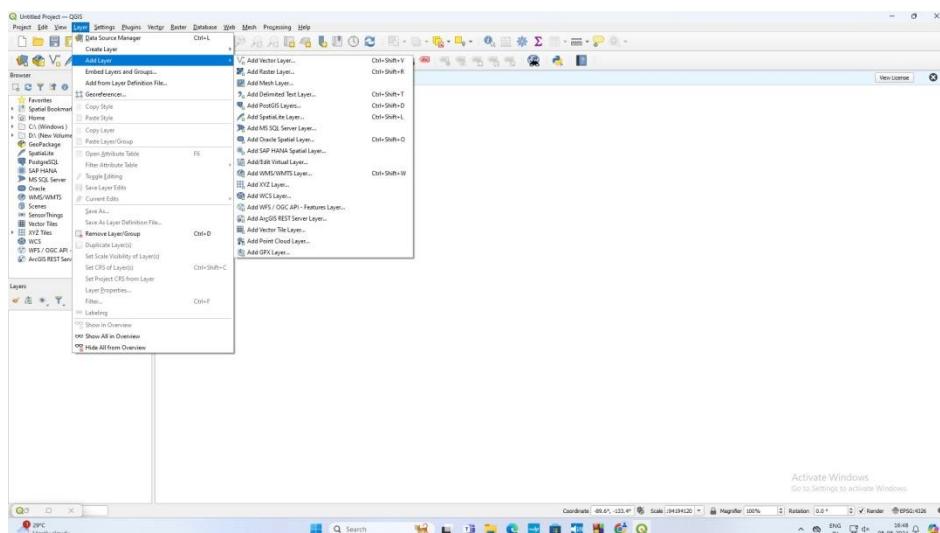
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### **Resources used:**

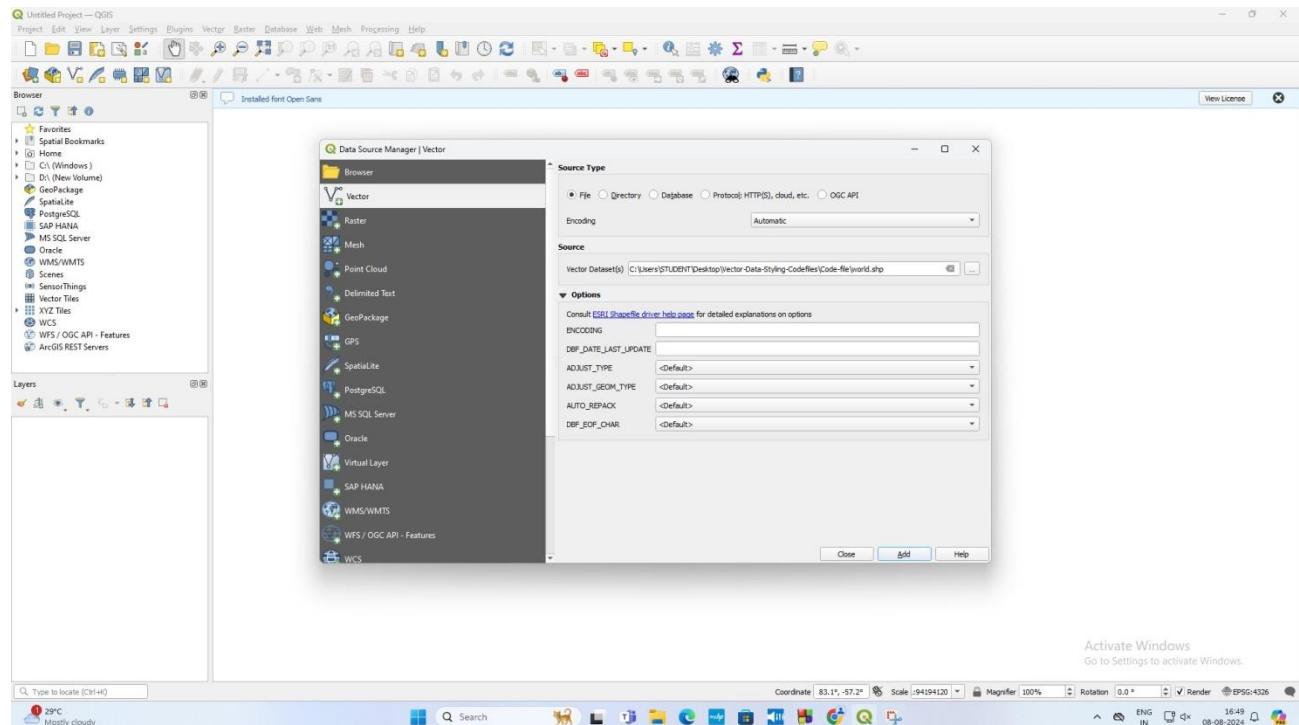
### **Algorithm: Vector data styling**

### **Open QGIS and Load Vector Data:**

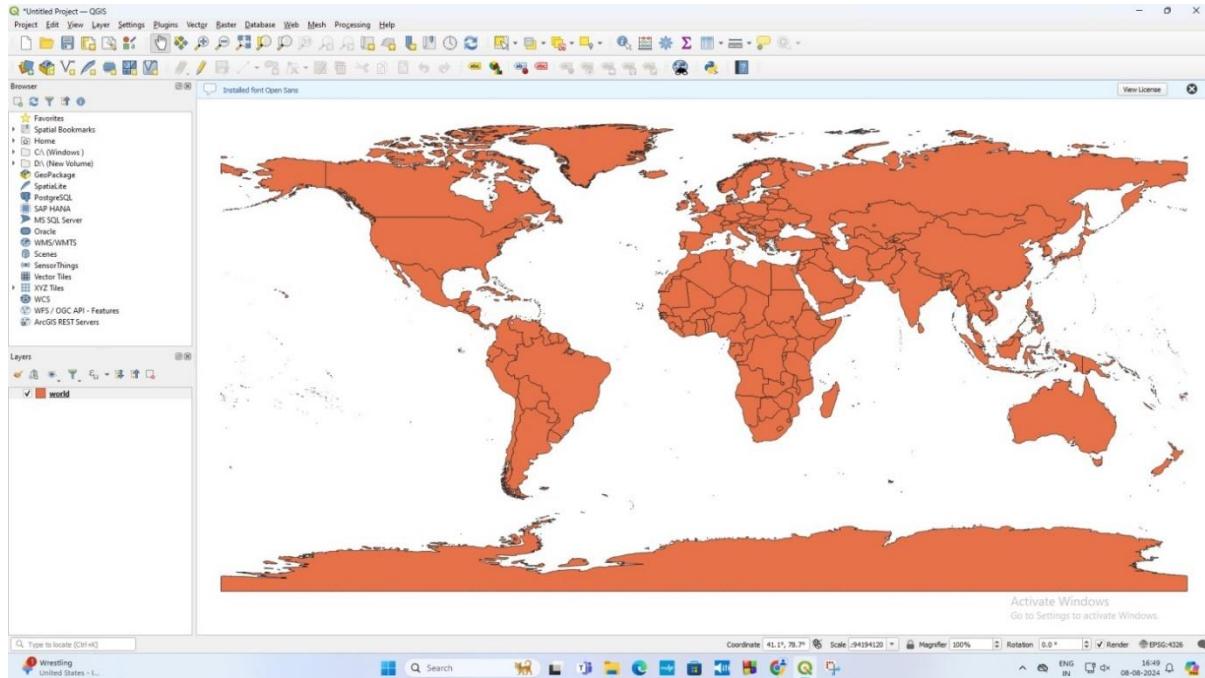
Step 1: Start QGIS and load your vector data (e.g., shapefile, GeoJSON, etc.). Go to Layer-> Add Layer -> Add Vector Layer -> Upload the code file



## Step 2: Open the Layer Styling Panel

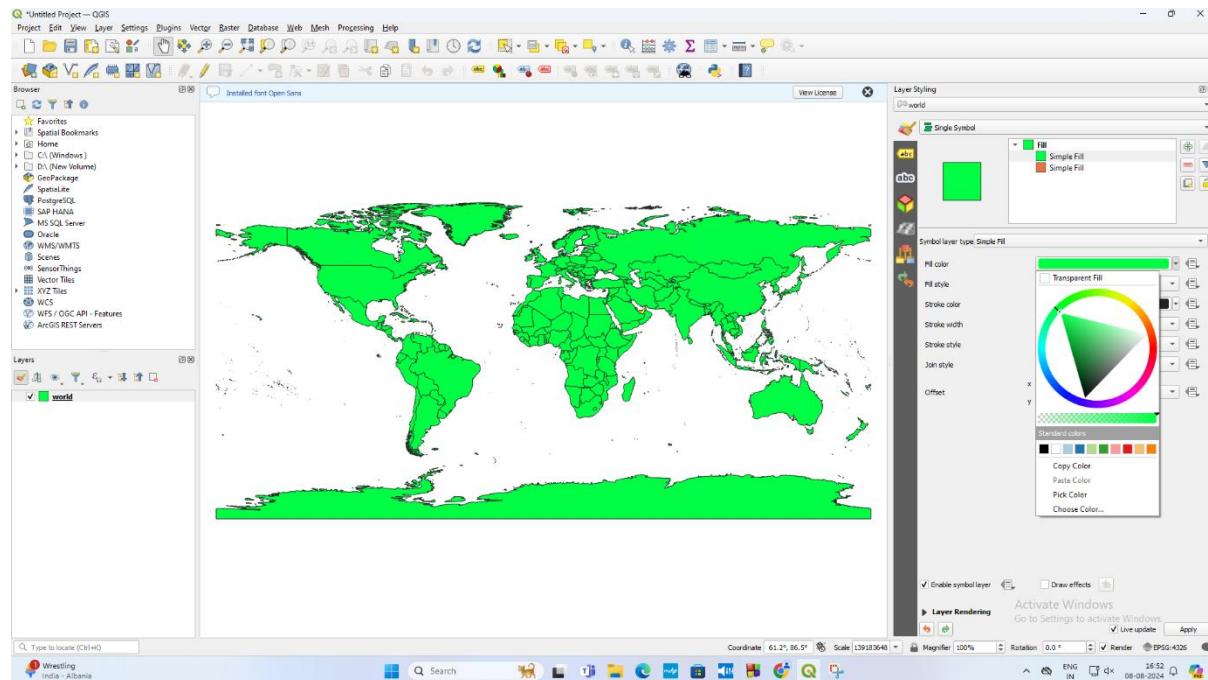


## Step 3: Select your vector layer in the Layers panel.

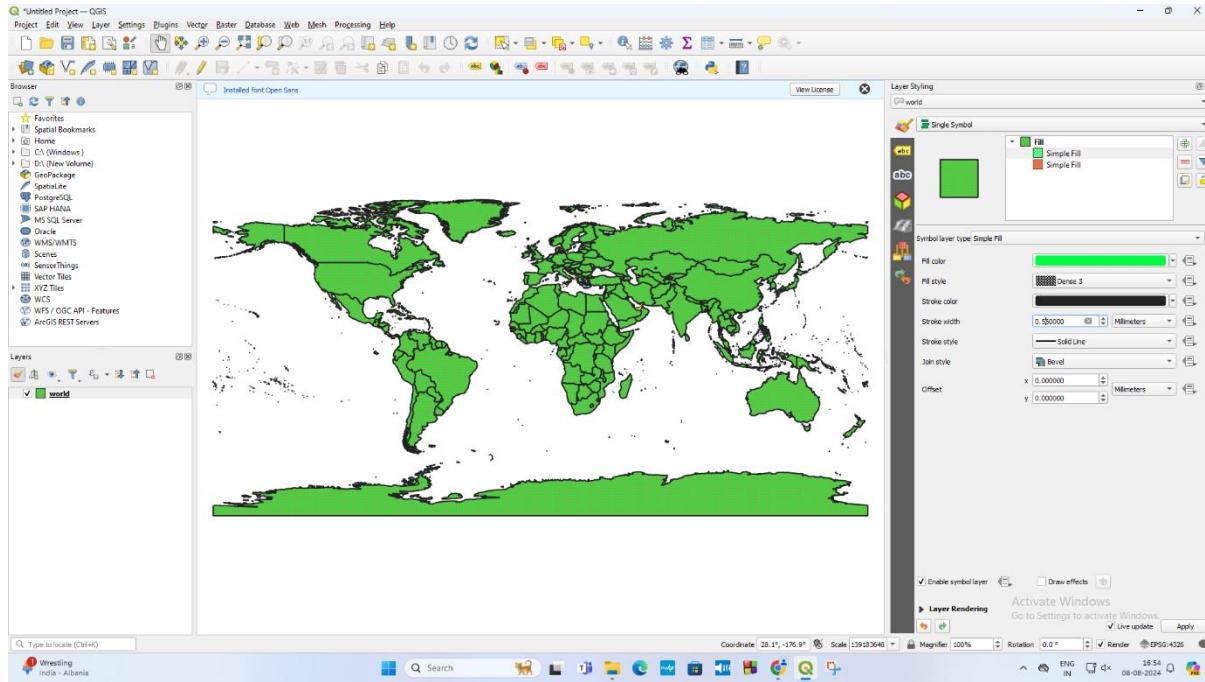


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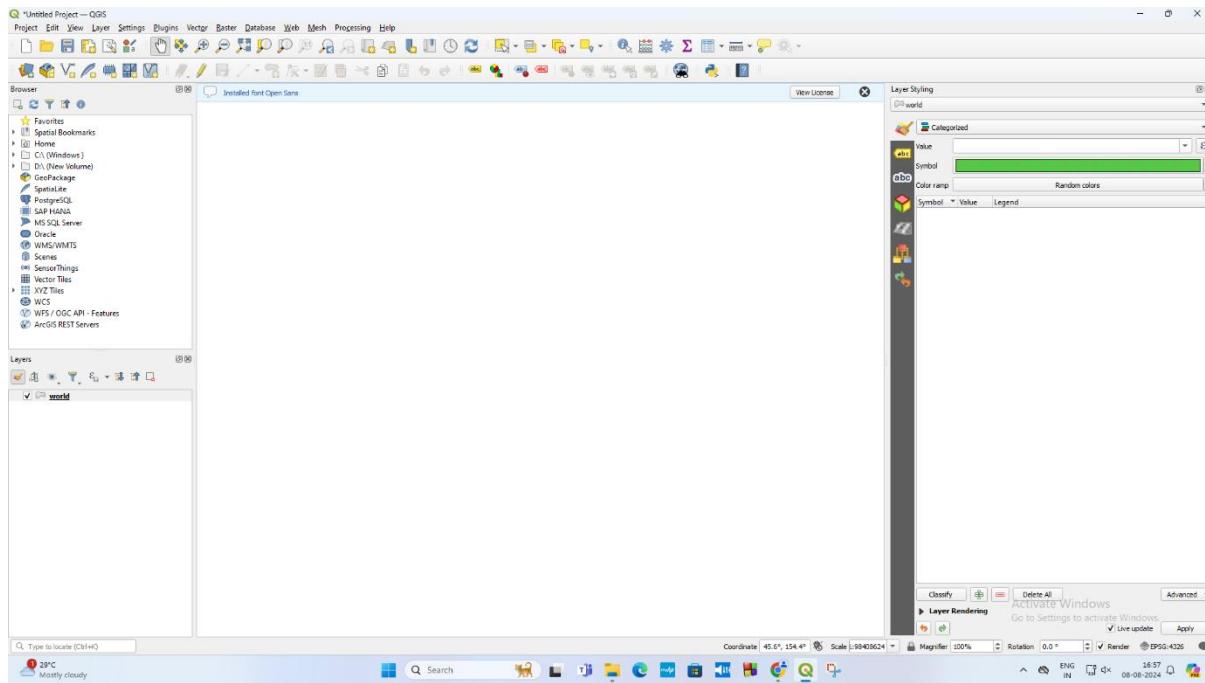
Step 4: Right-click the layer and choose "Properties" or click on the "Layer Styling" panel on the right.



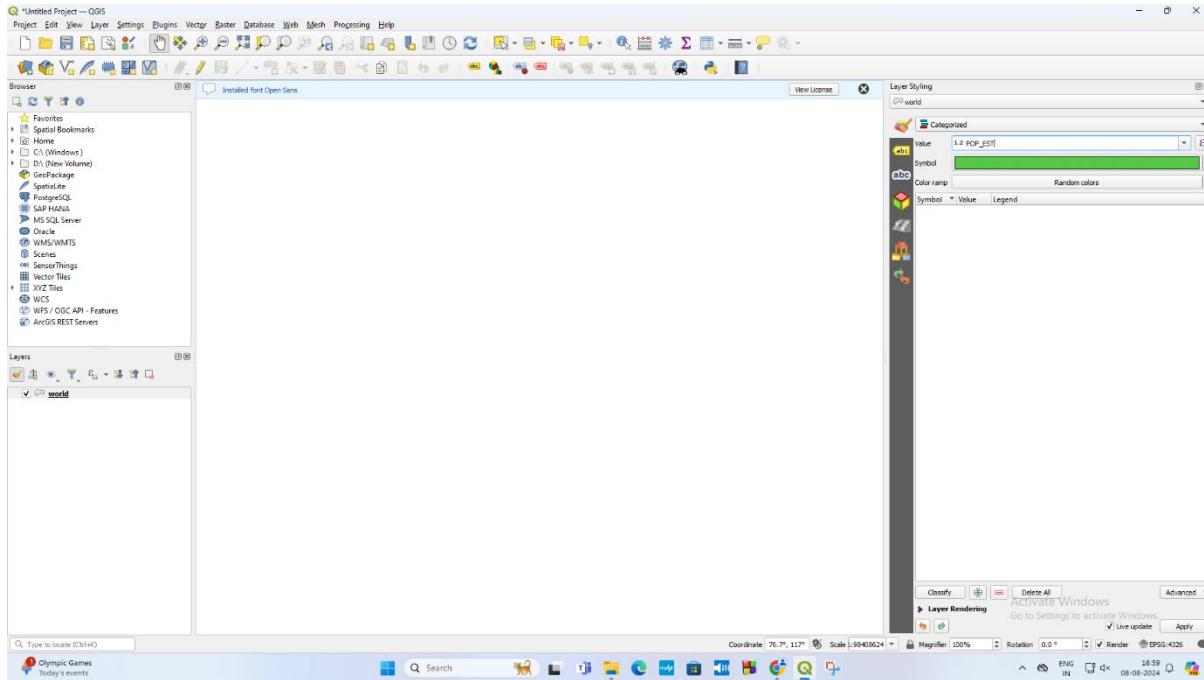
Step 5: Select a Symbology Type: In the Layer Properties window, go to the "Symbology" tab. Choose a symbology type (e.g., Single Symbol, Categorized, Graduated).



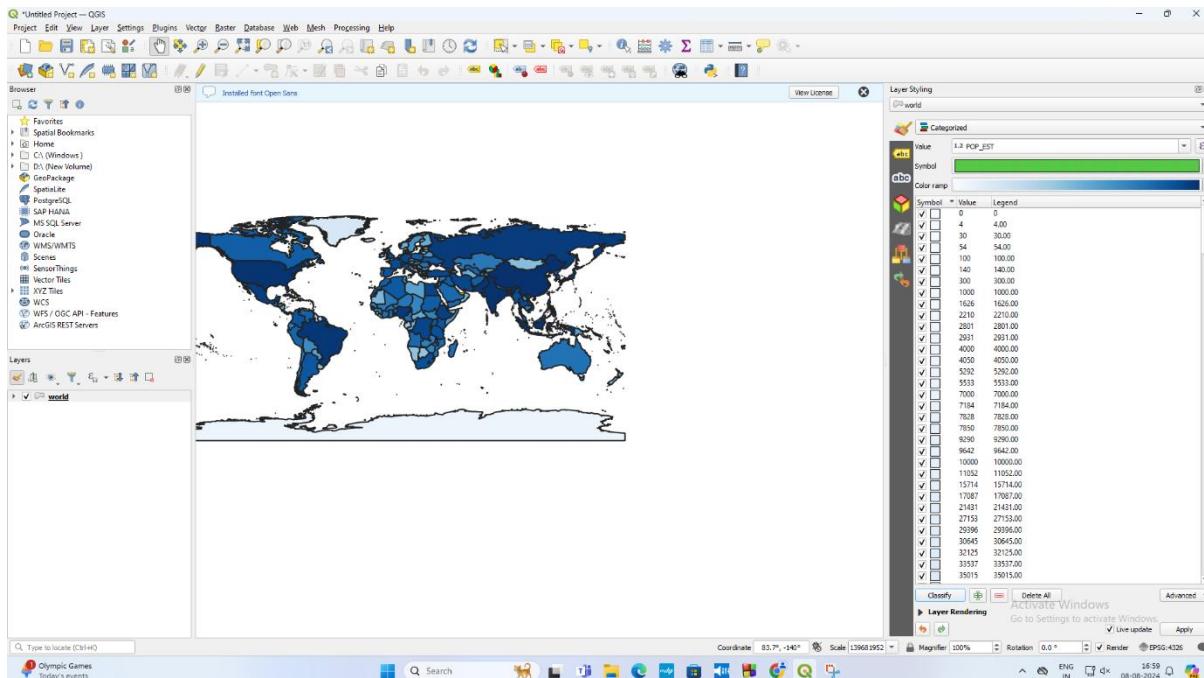
**Step 6: Single Symbol Styling:** For simple styling, choose "Single Symbol." Select the symbol and click on the symbol to open the Symbol Selector. Customize the symbol's color, outline, transparency, and other properties.

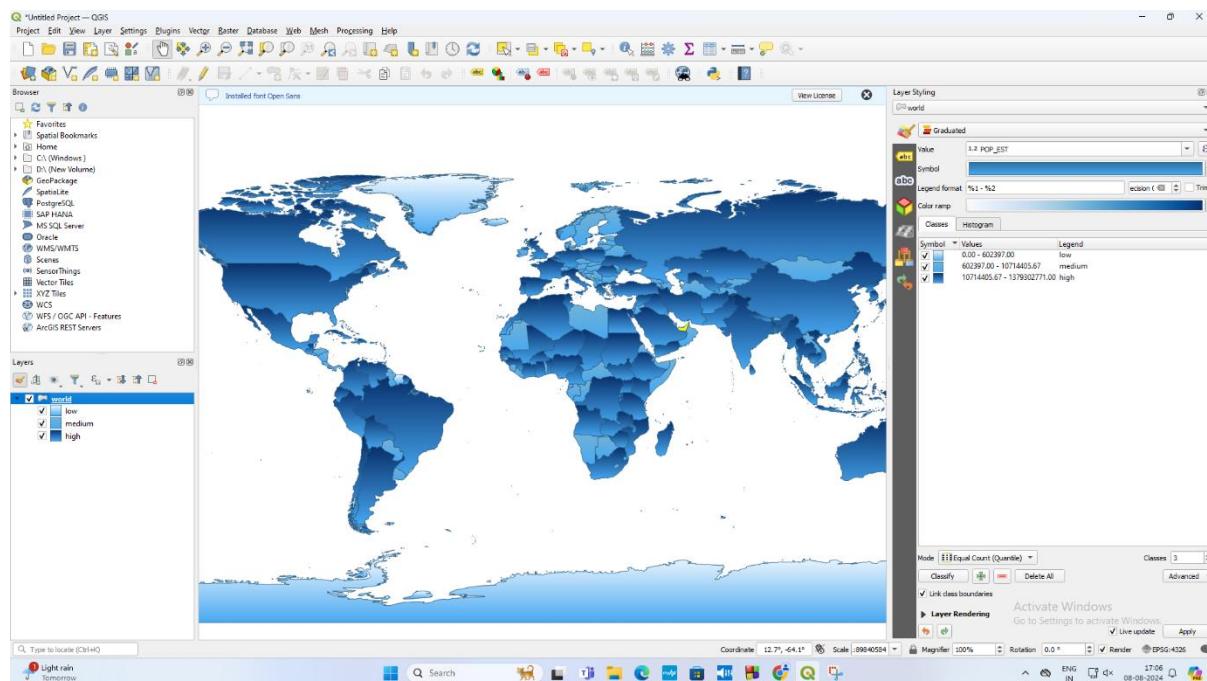
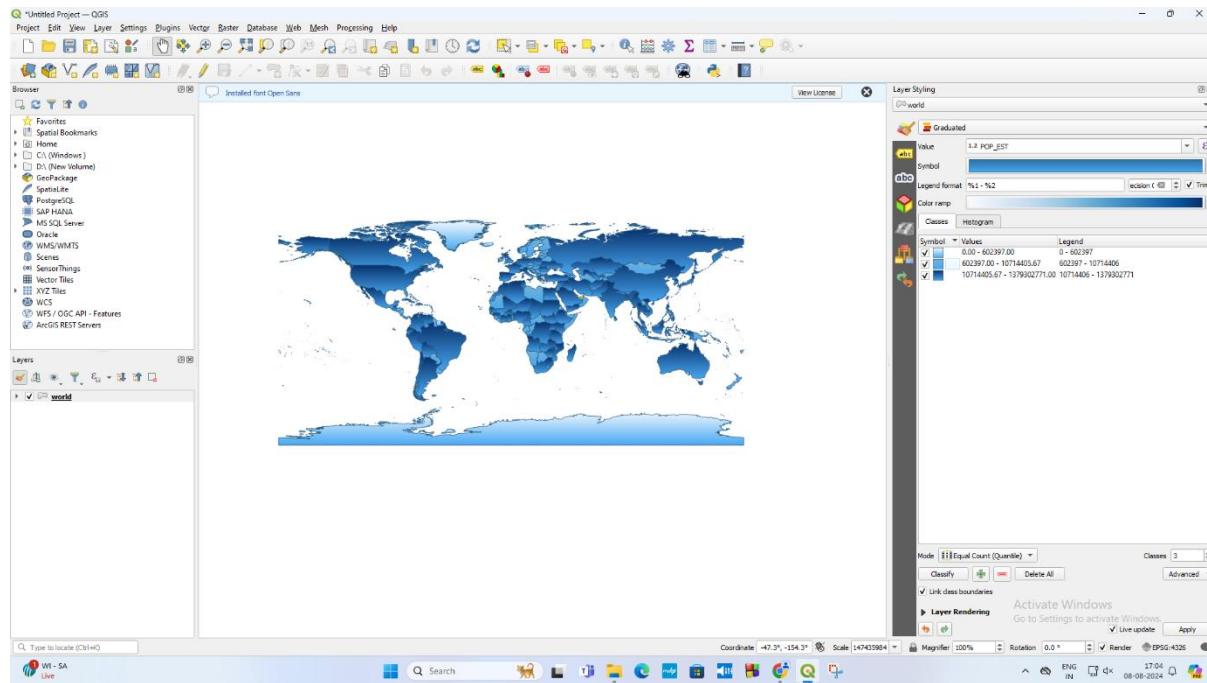


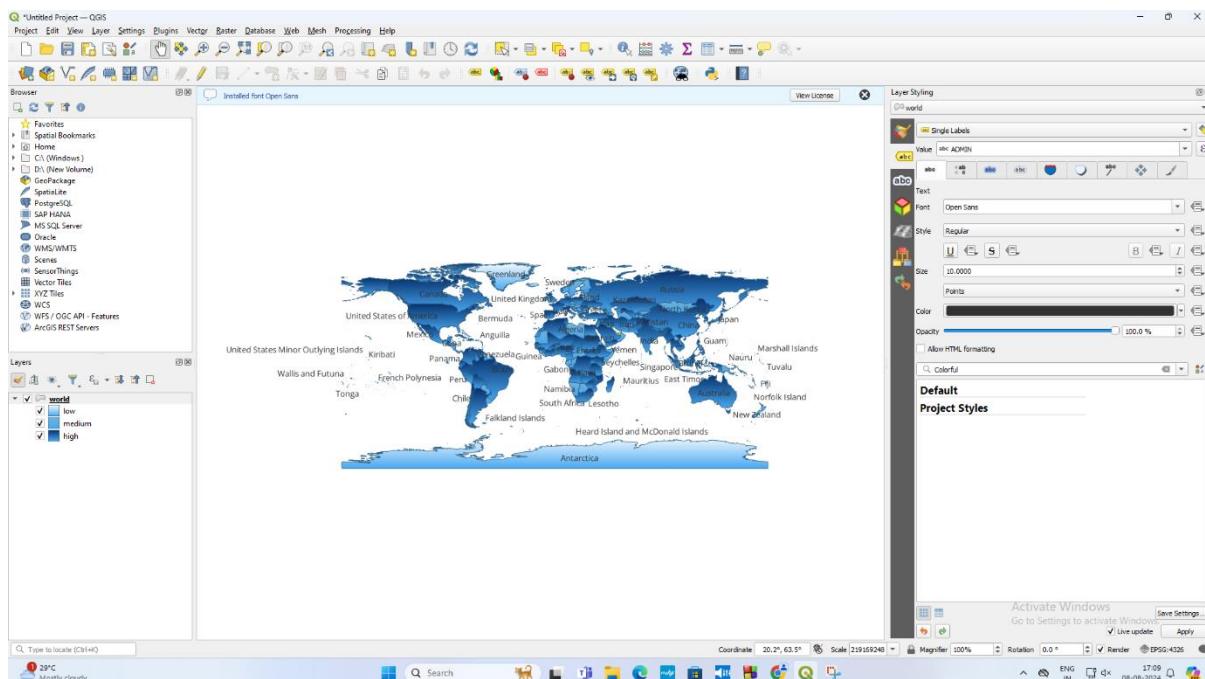
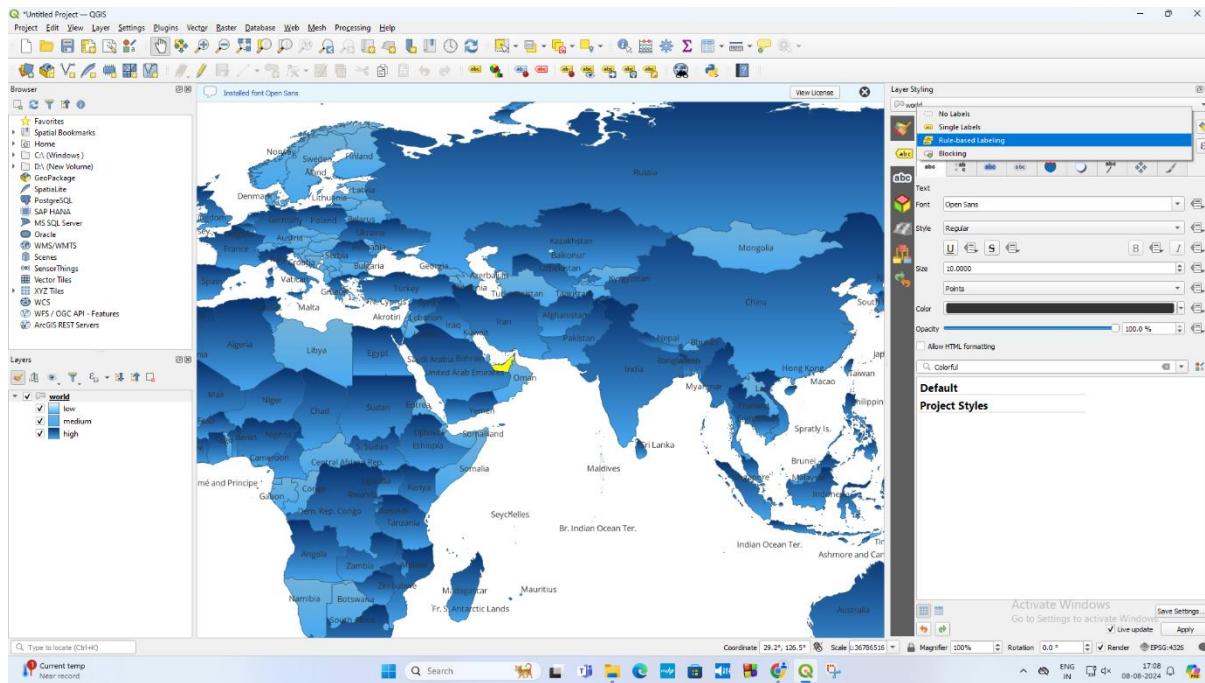
**Step 6: Categorized Styling:** Choose "Categorized" to style the layer based on a categorical attribute. Select the attribute column and click "Classify" to generate unique symbols for each category. Customize each category's symbol by clicking on the symbol next to each category.

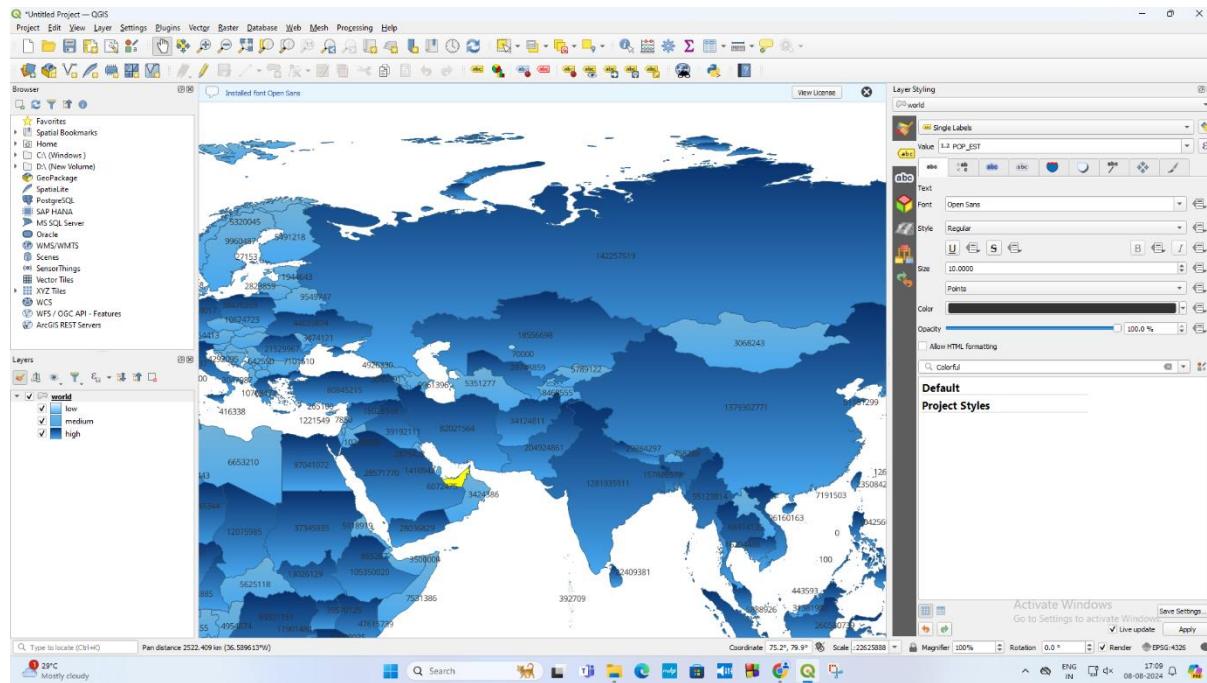


Step 7: Graduated Styling: Choose "Graduated" to style the layer based on a numeric attribute. Select the attribute column and the classification mode (e.g., Equal Interval, Quantile). Click "Classify" to generate ranges and corresponding symbols. Customize each range's symbol by clicking on the symbol next to each range.



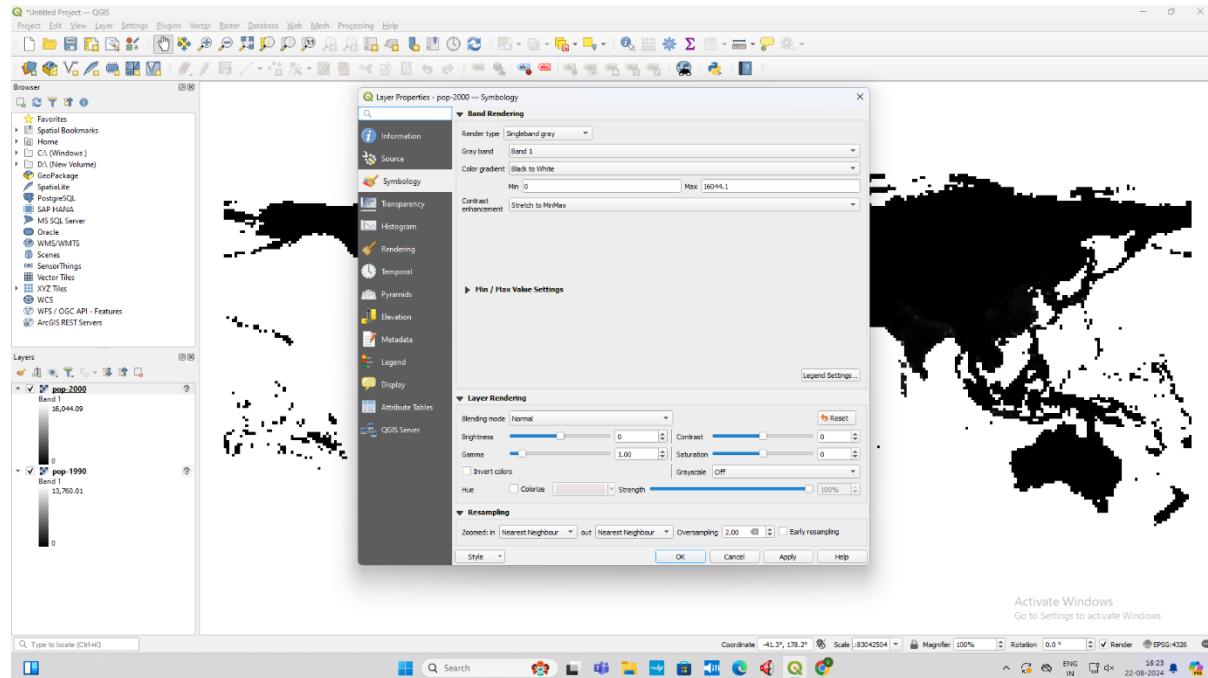




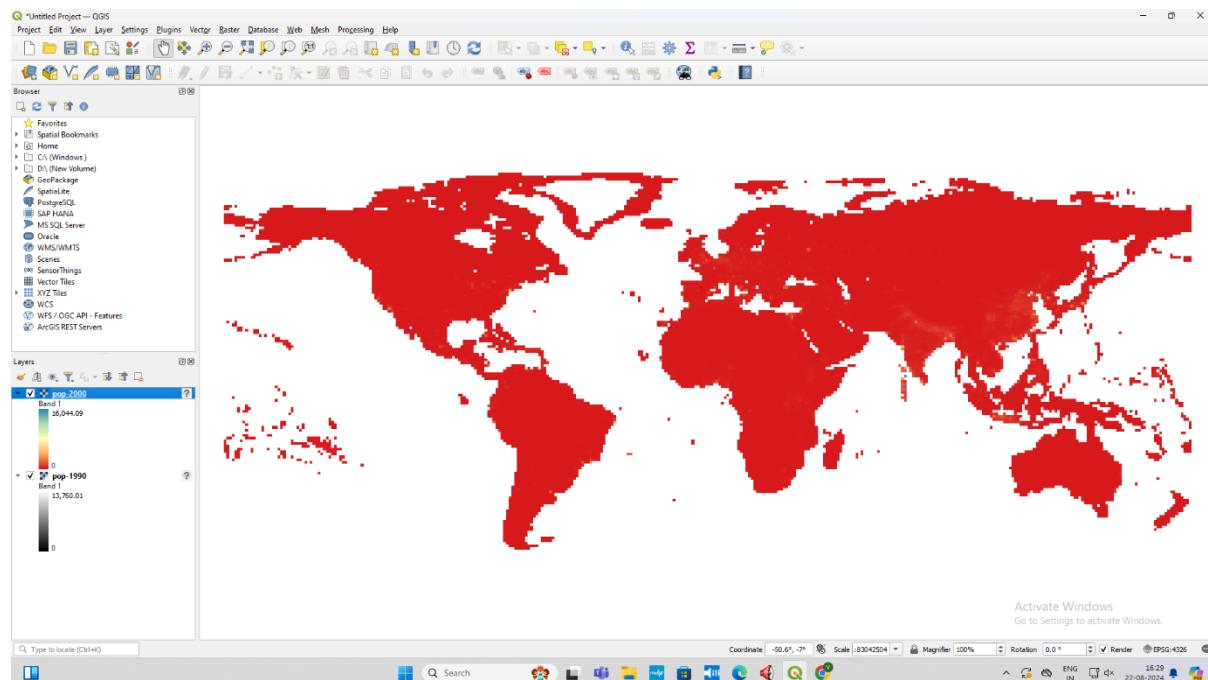


## Algorithm: Raster data styling

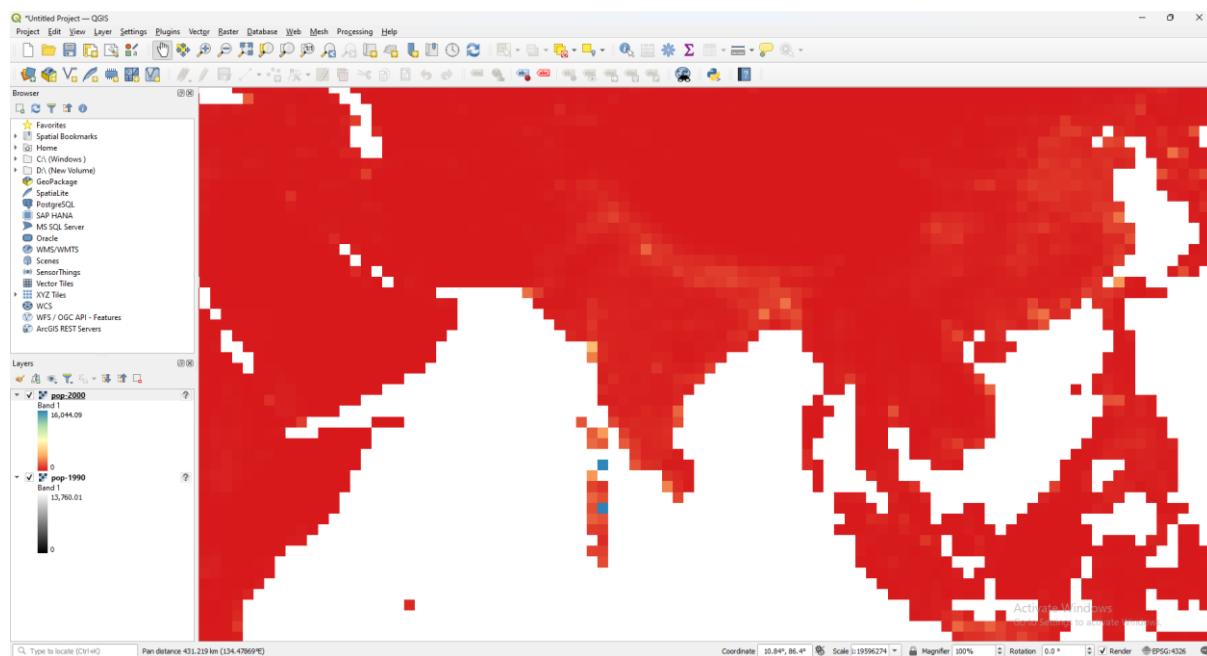
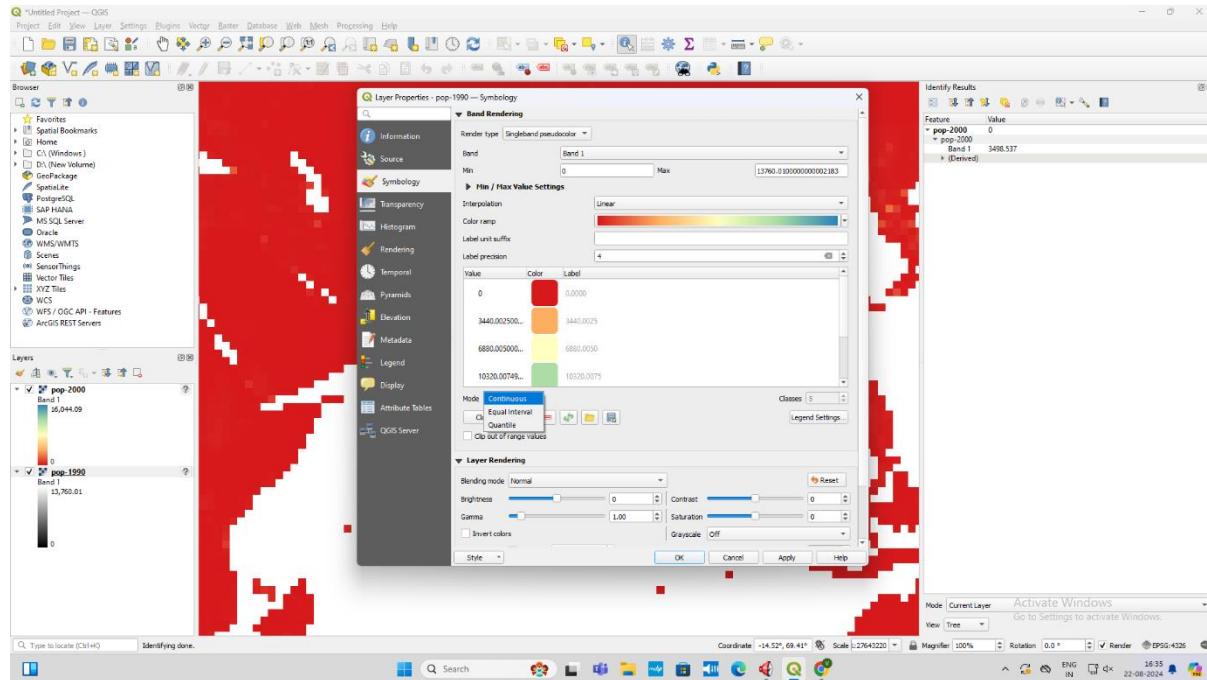
Step 1 : Start QGIS and load your raster data (e.g., GeoTIFF, JPEG, etc.).



Step 2 : Open the Layer Styling Panel:

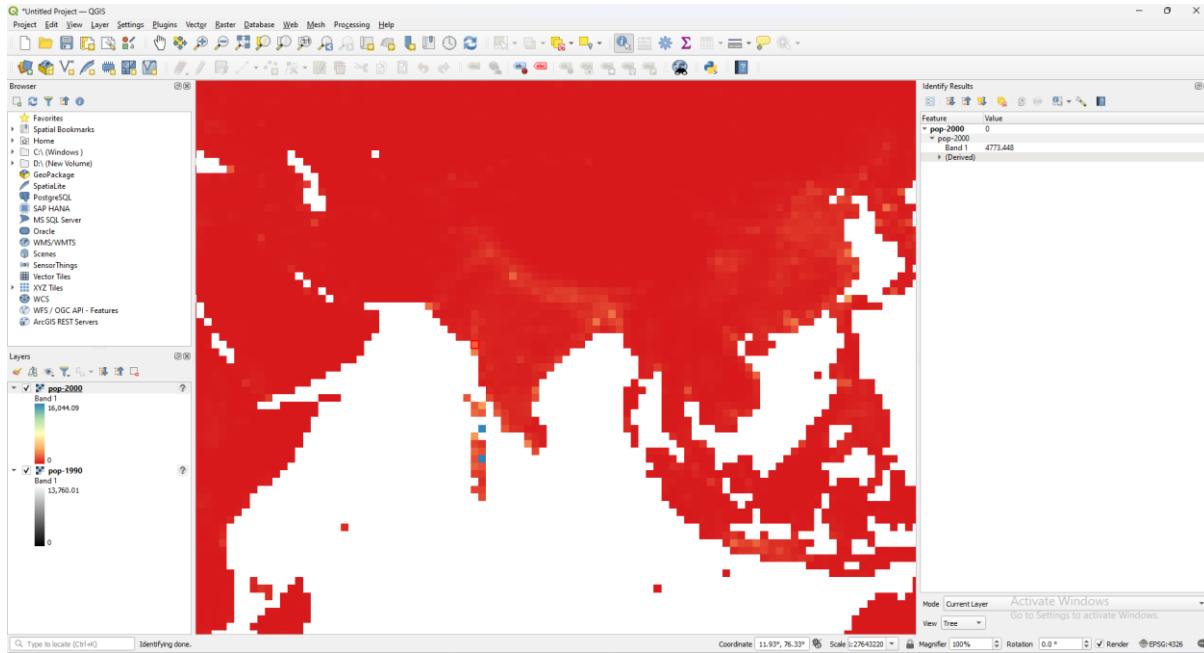


Step 3 : Select your raster layer in the Layers panel. Right-click the layer and choose "Properties" or click on the "Layer Styling" panel on the right.

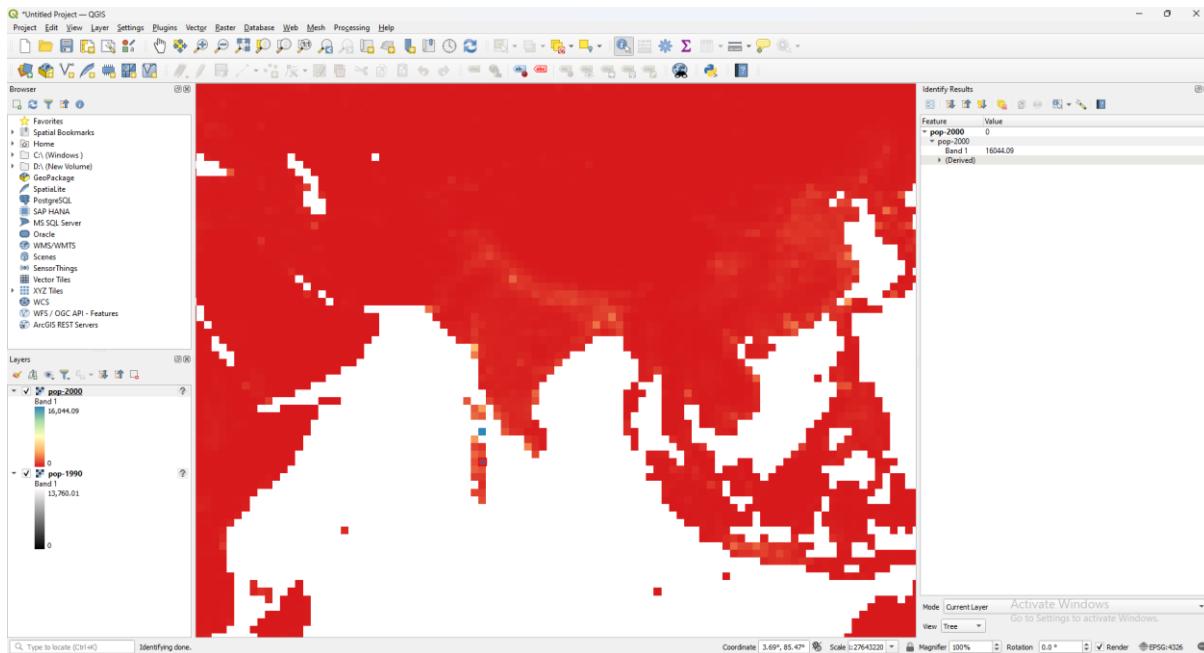


Step 4 : Select a Render Type: In the Layer Properties window, go to the "Symbology" tab.

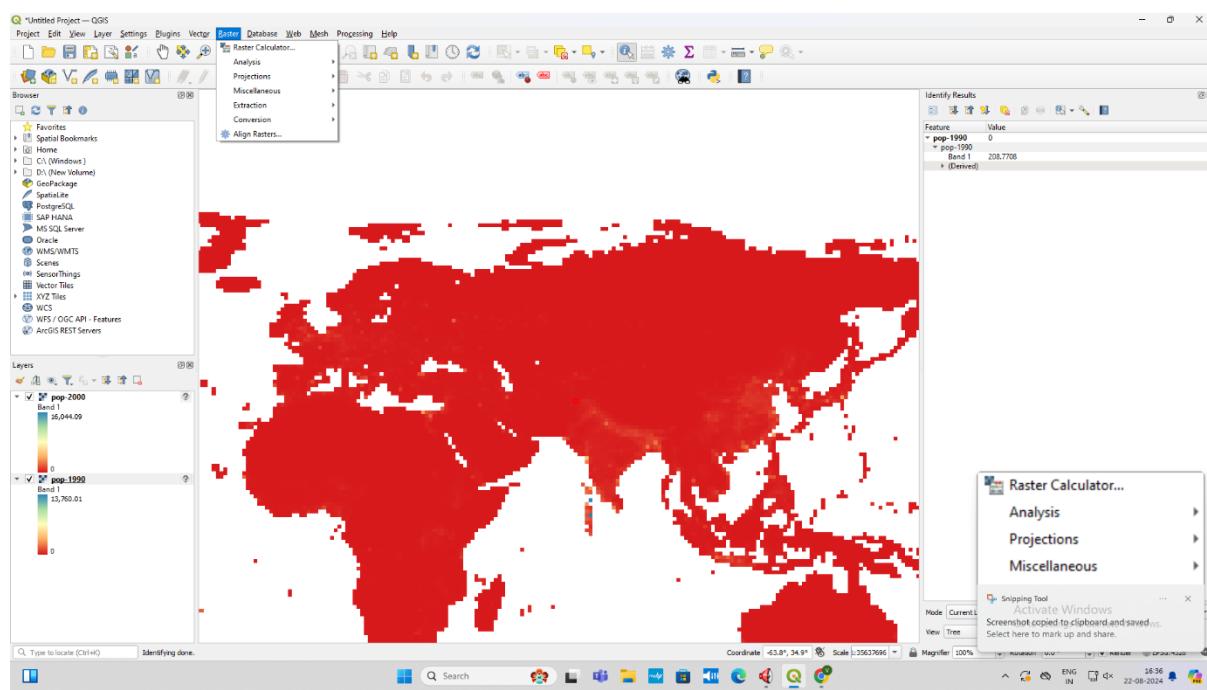
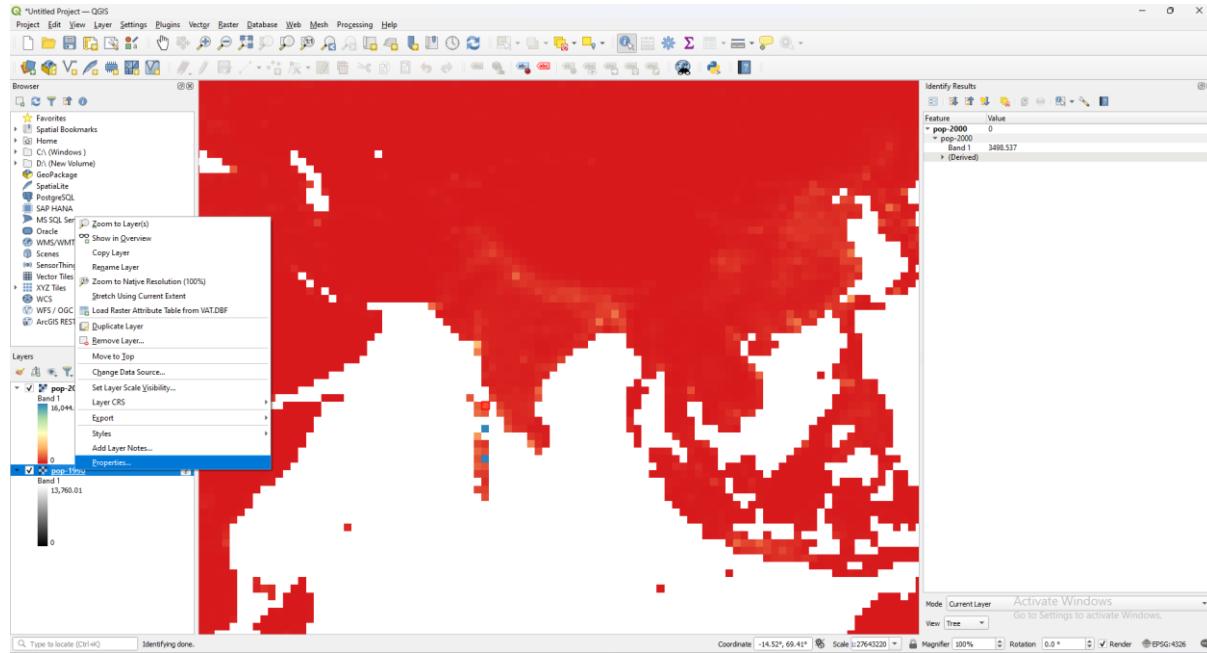
Step 5: Choose a render type (e.g., Singleband gray, Singleband pseudocolor).

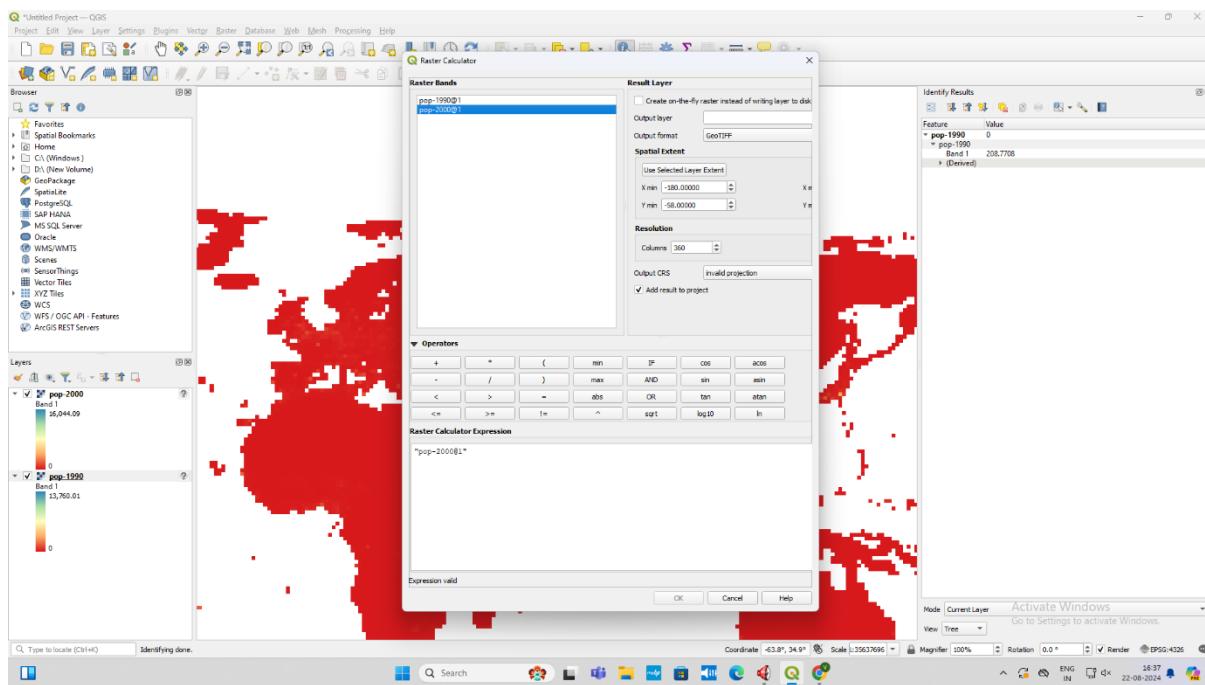
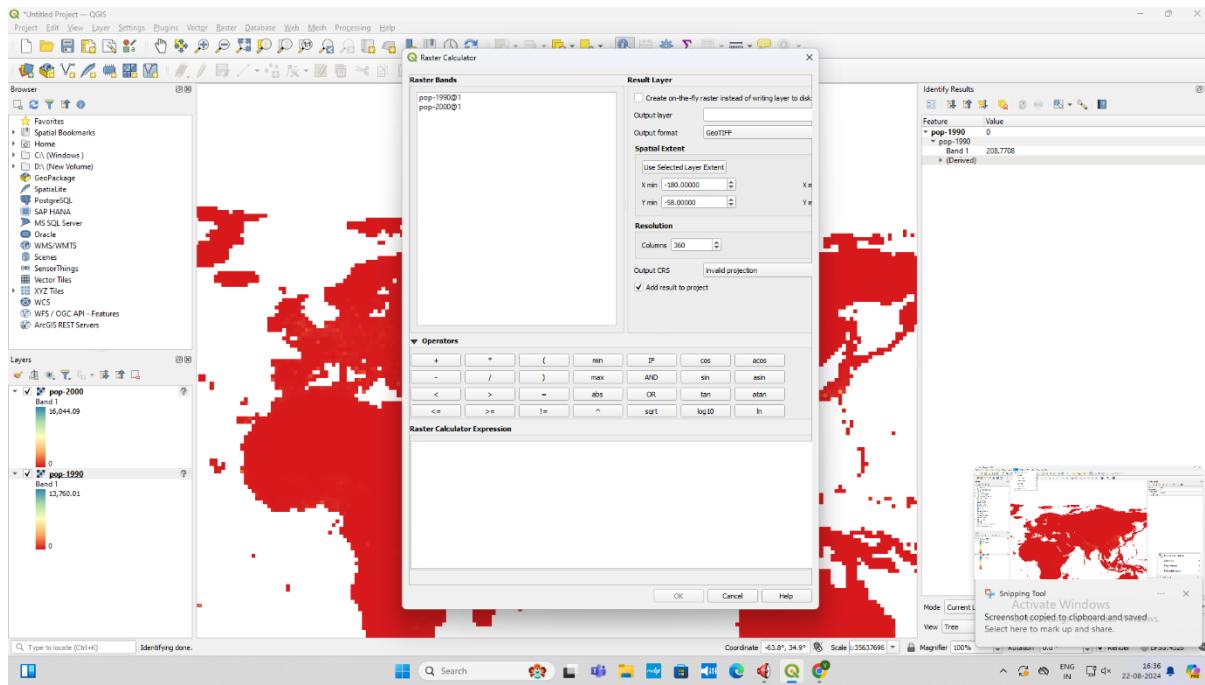


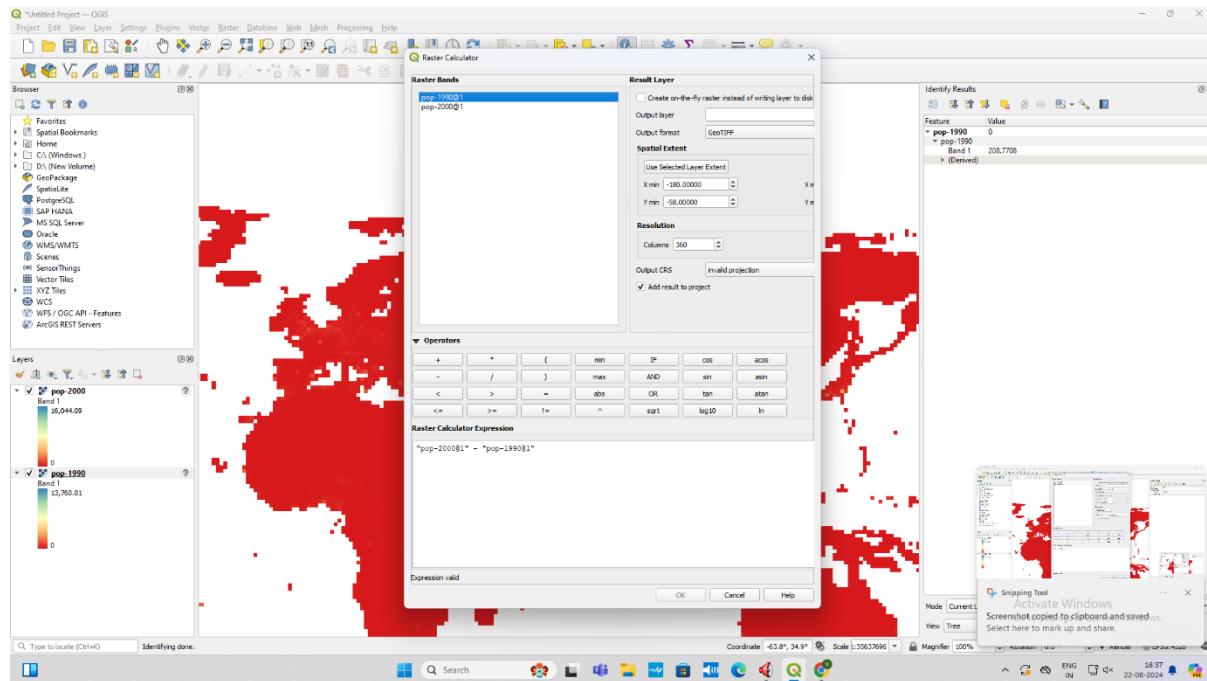
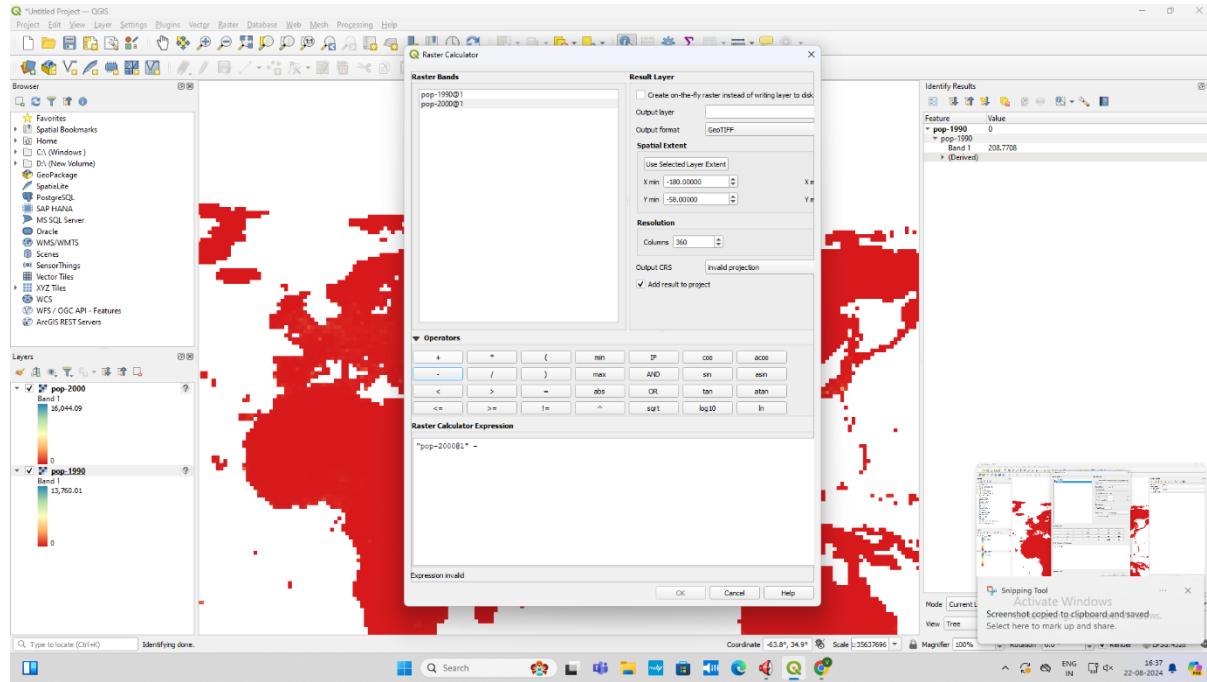
Step 6 : Singleband Gray: For grayscale images, choose "Singleband gray." Adjust the Min and Max values or use the "Load Min/Max Values" button. Choose a Contrast Enhancement mode (e.g., Stretch to MinMax, Stretch and Clip to MinMax).

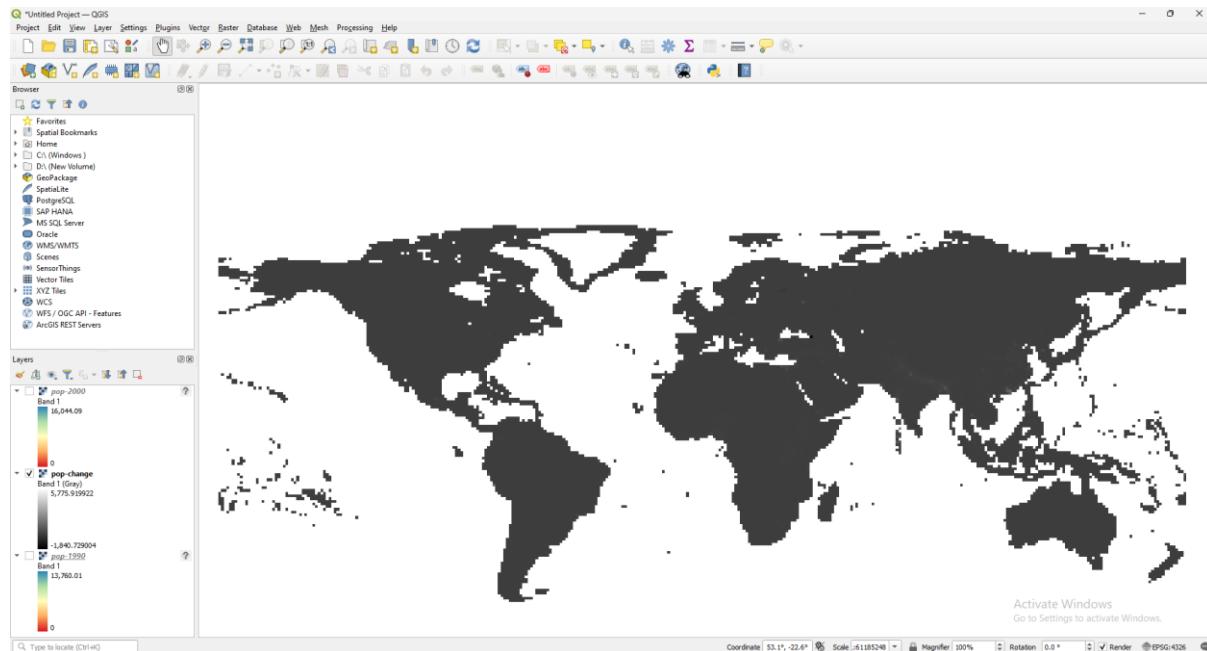
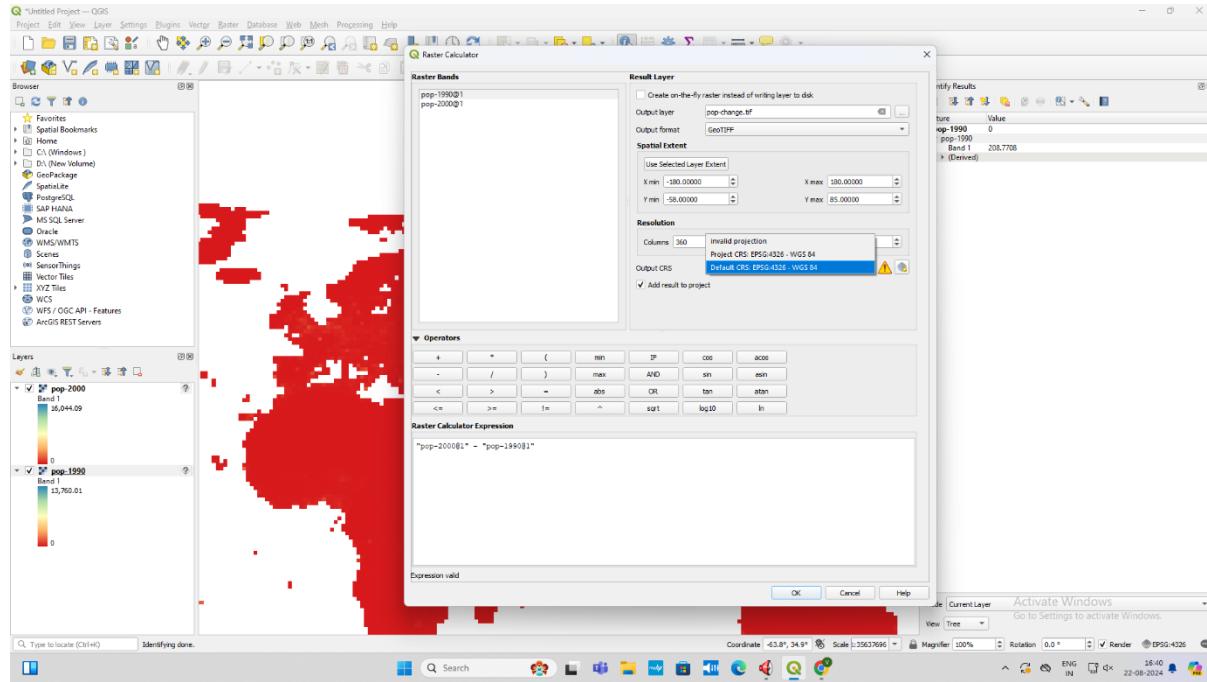


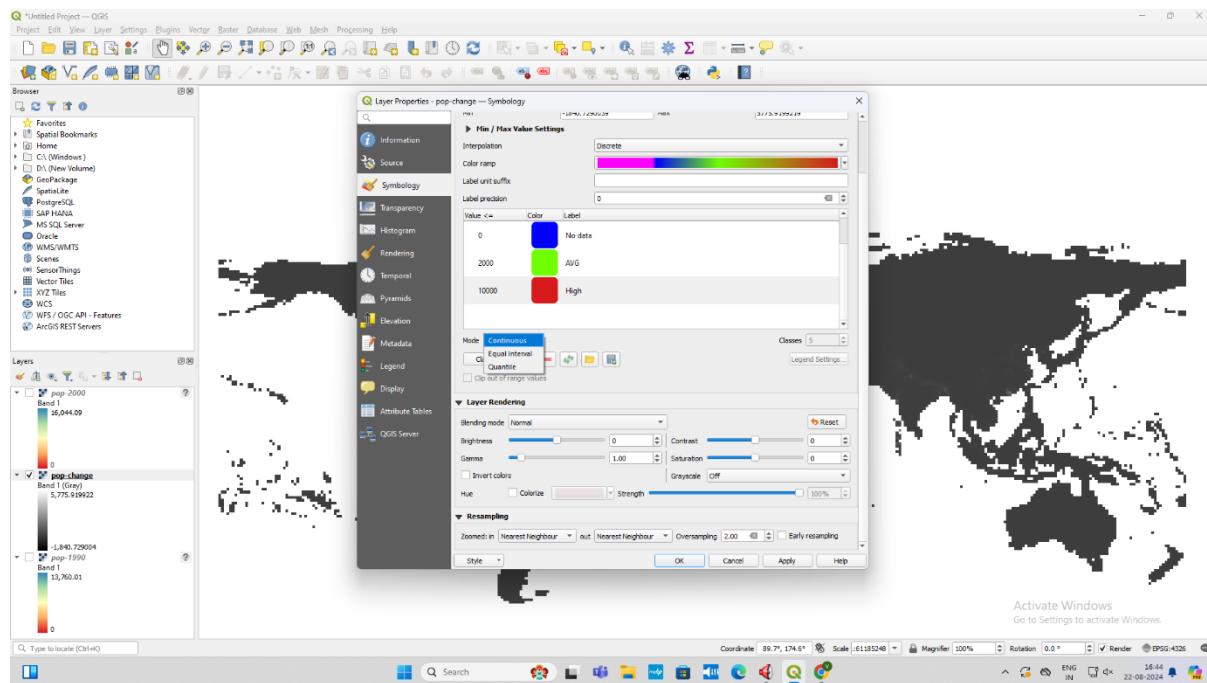
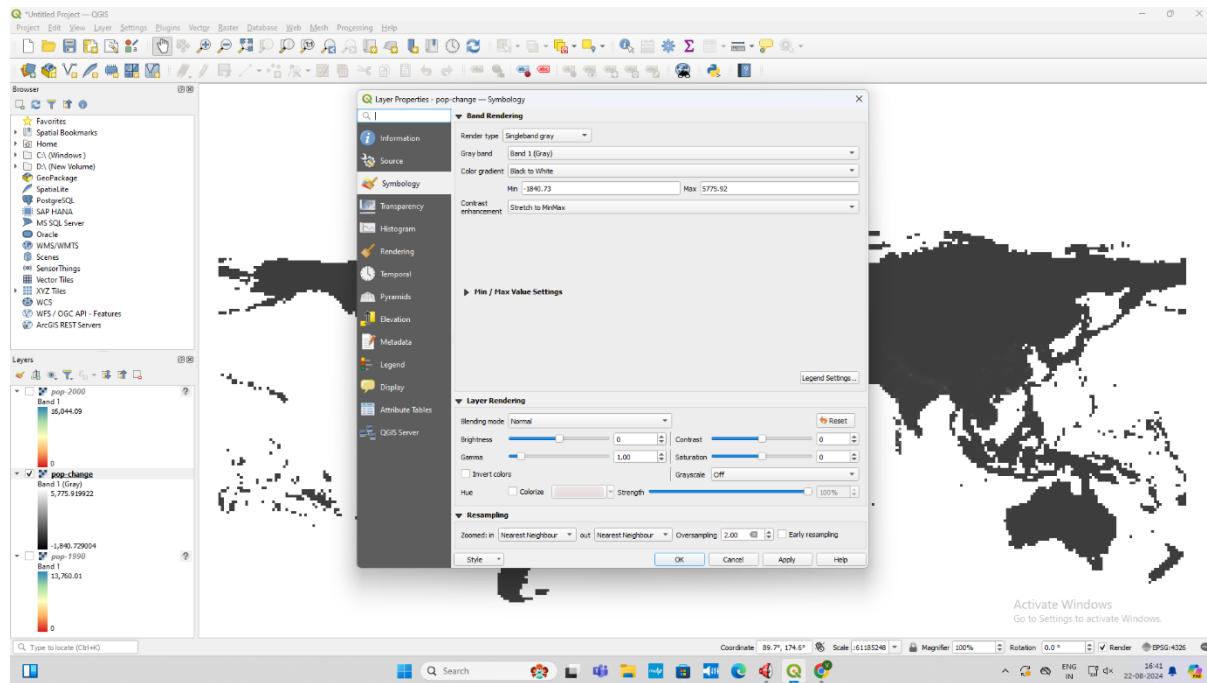
Step 7 : Single band Pseudocolor: For continuous data, choose "Single band pseudocolor." Select a color ramp and adjust the Min and Max values. Click "Classify" to generate a color map based on the selected color ramp.

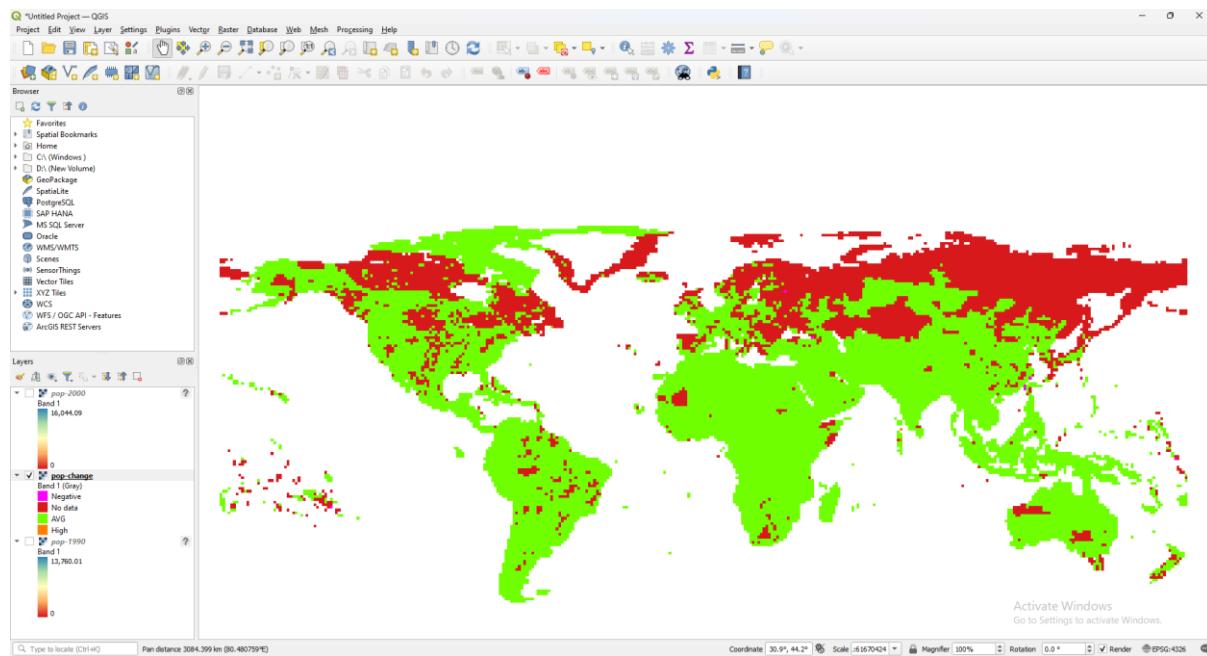
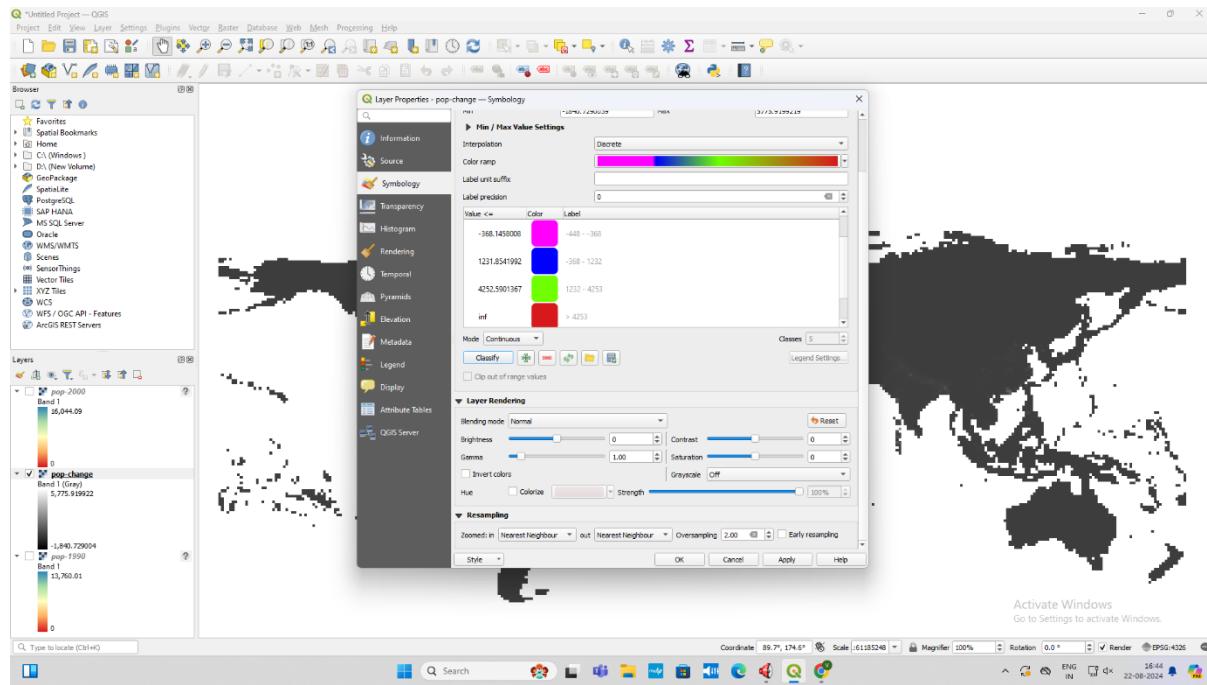


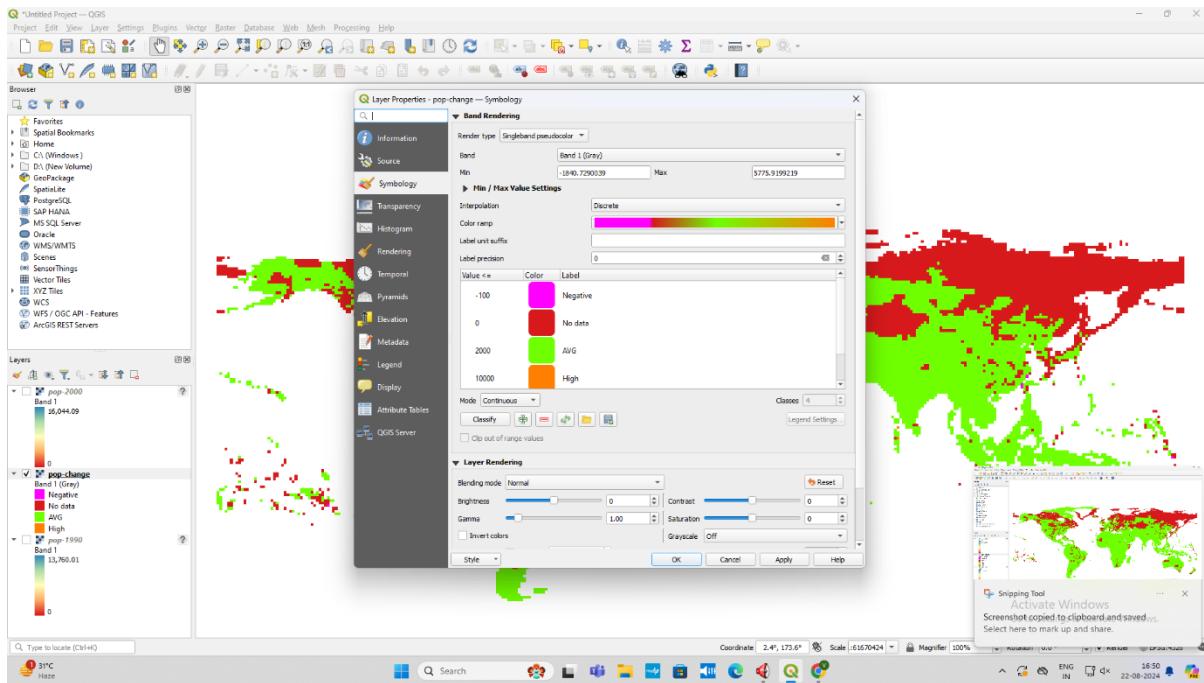












**Platform used by the student: QGIS**

**Following points should be written by students**

Different steps in Vector data styling and raster data styling

### Steps in Vector Data Styling

1. **Load the Vector Data**
  - **Description:** Import your vector data layer into your GIS software.
2. **Open the Layer Properties**
  - **Description:** Access the properties of the vector layer to start styling.
  - **Tools:** Right-click on the layer and select “Properties” or “Layer Properties.”
3. **Choose a Symbology Method**
  - **Description:** Select the appropriate symbology method based on your data and analysis needs.
    - **Simple Symbols:** For uniform feature representation.
    - **Categorized Symbols:** For distinct categories.
    - **Graduated Symbols:** For numerical data variations.
    - **Graduated Colors:** For numerical data gradients.
    - **Unique Values:** For individual attribute values.

- **Tools:** Symbology tab in layer properties.

#### 4. Configure Symbol Settings

- **Description:** Adjust symbols, colors, sizes, and other properties according to the chosen method.
- **Tools:** Symbol editor or style options.

#### 5. Apply Labeling

- **Description:** Add labels to features based on attribute data if needed.
- **Tools:** Labeling tab in layer properties.

#### 6. Preview and Adjust

- **Description:** Preview the styled layer on the map and make adjustments to ensure clarity and accuracy.
- **Tools:** Map canvas or preview window.

#### 7. Save and Export

- **Description:** Save your styled layer or map project. Export maps if needed for presentation or reports.
- **Tools:** Save project, export map options.

### Steps in Raster Data Styling

#### 1. Load the Raster Data

- **Description:** Import your raster data layer into your GIS software.

#### 2. Open the Layer Properties

- **Description:** Access the properties of the raster layer for styling.
- **Tools:** Right-click on the raster layer and select “Properties” or “Layer Properties.”

#### 3. Choose a Symbology Method

- **Description:** Select the appropriate styling method based on the raster data type and analysis needs.
  - **Single Band Gray Scale:** For continuous data.
  - **Color Gradients:** For smooth data variations.
  - **Classified Colors:** For discrete data ranges.
  - **Discrete Color Maps:** For specific value ranges.
  - **Heat Maps:** For density or intensity visualization.
  - **Hillshade:** For terrain relief visualization.
- **Tools:** Symbology or render tab in layer properties.

#### 4. Configure Color Ramps and Classes

- **Description:** Adjust color ramps, classes, and intervals based on the chosen method.
- **Tools:** Color ramp editor, classification options.

#### 5. Apply and Adjust Stretching

- **Description:** Use contrast stretching or other adjustments to enhance the visualization of raster data.

- **Tools:** Stretching options in raster properties.

## 6. Preview and Fine-Tune

- **Description:** Preview the styled raster on the map and make necessary adjustments to improve clarity and detail.
- **Tools:** Map canvas or preview window.

## 7. Save and Export

### **Conclusion (Students should write in their own words):**

We learned that vector data styling involves configuring symbols, colors, and labels to represent different attributes and categories, enhancing map clarity\

Raster data styling uses color ramps and classifications to visualize continuous data and patterns effectively.

### **Post lab questions:**

#### **Q.1 How do different symbolization methods (e.g., simple symbols, graduated symbols, categorized symbols) impact the interpretation of vector data?**

Ans) Different symbolization methods in GIS affect how vector data is interpreted:

##### **1. Simple Symbols:**

- **Description:** Uses a single symbol for all features.
- **Impact:** Provides a clear view of feature types but doesn't show variations in data values.

##### **2. Categorized Symbols:**

- **Description:** Uses different symbols or colors for distinct categories.
- **Impact:** Differentiates categories easily, but doesn't convey the magnitude of data within each category.

##### **3. Graduated Symbols:**

- **Description:** Uses varying symbol sizes or colors to represent different data values.
- **Impact:** Effectively shows variations in magnitude, making it easy to compare values, but can become cluttered with too many symbols.

**Q.2 How can attribute data be used to style vector layers effectively (e.g., using different colors for different categories or sizes based on numerical values)?**

Ans) Categorized Styling:

- **Use:** Different colors or symbols for distinct categories (e.g., land use types).
- **Effect:** Easily differentiates categories.

**Graduated Symbols:**

- **Use:** Vary symbol size or color based on numerical values (e.g., population density).
- **Effect:** Highlights variations in magnitude.

**Graduated Colors:**

- **Use:** Apply color gradients for numerical data (e.g., income levels).
- **Effect:** Shows data range and intensity.

**Unique Values:**

- **Use:** Assign unique colors or symbols to each attribute value (e.g., different land cover types).
- **Effect:** Clearly distinguishes each value.

**Heat Maps:**

- **Use:** Use color intensity to represent data density (e.g., crime hotspots).
- **Effect:** Highlights areas of high activity.

### Q.3 Discuss in detail vector data styling and raster data styling.

#### Ans) Vector Data Styling

**Vector data** represents geographic features using points, lines, and polygons. Effective styling helps convey information and enhance map readability. Here's a detailed look at vector data styling:

#### 1. Simple Symbols

- **Description:** Uses a single symbol for all features of a specific type.
- **Example:** A dot for all schools on a map.
- **Use Case:** Best for showing locations without variation in data values.

#### 2. Categorized Symbols

- **Description:** Uses different symbols or colors for different categories within a dataset.
- **Example:** Different colors for land use types (residential, commercial, industrial).
- **Use Case:** Useful for distinguishing between discrete categories or classes.

#### 3. Graduated Symbols

- **Description:** Varies symbol size or color intensity based on numerical attribute values.
- **Example:** Larger circles for higher population densities.
- **Use Case:** Helps visualize variations in data magnitude or intensity.

#### 4. Graduated Colors

- **Description:** Applies a color gradient to represent numerical ranges.
- **Example:** A gradient from light to dark blue for varying depths of a lake.
- **Use Case:** Effective for showing data distribution and gradients.

#### 5. Unique Values

- **Description:** Assigns a unique color or symbol to each distinct attribute value.
- **Example:** Different colors for each type of land cover (forest, grassland, urban).

- **Use Case:** Differentiates unique attribute values clearly.

## Raster Data Styling

**Raster data** represents spatial data as a grid of cells or pixels, where each cell contains a value. Styling raster data involves visualizing these values effectively. Here's a detailed look at raster data styling:

### 1. Single Band Gray Scale

- **Description:** Uses varying shades of gray to represent different values in a single-band raster.
- **Example:** Elevation data with light gray for low elevations and dark gray for high elevations.
- **Use Case:** Ideal for displaying continuous data where color is not needed.

### 2. Color Gradients

- **Description:** Applies a gradient of colors to represent different values.
- **Example:** A gradient from blue (low elevation) to green (medium elevation) to brown (high elevation).
- **Use Case:** Enhances visualization of continuous data and variations.

### 3. Classified Colors

- **Description:** Divides the range of values into classes and assigns a color to each class.
- **Example:** Land cover classification with different colors for forests, water bodies, and urban areas.
- **Use Case:** Useful for categorical or grouped data to show different ranges clearly.

### 4. Discrete Color Maps

- **Description:** Uses distinct colors for specific value ranges or categories.
- **Example:** Temperature data with specific colors for different temperature ranges.
- **Use Case:** Provides clear differentiation between discrete value ranges.

### 5. Heat Maps

- **Description:** Uses color intensity to represent the density or intensity of values.
- **Example:** Crime density map with areas of high activity shown in red and lower activity in yellow.
- **Use Case:** Highlights areas with high concentrations of values.