"Framing the Last Waters: A Requiem for Dying Lakes"

1. Title of the project with team members

- Title: "Framing the Last Waters: A Requiem for Dying Lakes"
- Members:
  - 2023201075 - Shrayon Bose
  - 2023202007 - Akshay Kohad
  - 2023201078 - Binoy Skaria
  - 2023201024 - Onkar Sawant

2 Objective of the study

This study aims to create an interactive tool that allows users to observe changes in water content within lakes across the globe over time. Using satellite imagery, users can visualize the changes in water bodies, helping in environmental monitoring, wetland preservation, and urban planning.

3. Data and methods used

- *Data*

  After the literature survey, we found the below datasets which can be used to solve the above problem statement.

  a. Landsat 5, 7, and 8 (Collection 2, Level 2) Satellite Images
     - These collections provide imagery from 1984 to the present, with Landsat 5 covering 1984–2012, Landsat 7 starting in 1999, and Landsat 8 from 2013 onward.
     - SR_B3 (Green) and SR_B5 (SWIR) were specific bands for NDWI calculation.
     - Reference: [Landsat Collection 2 Level-2 Science Products | U.S. Geological Survey (usgs.gov)](usgs.gov)
  b. Sentinel-2 Satellite Images (Copernicus)
     - Sentinel-2 provides data from 2015 onward, specifically suited for water and vegetation analysis.
     - Specific bands used: B3 (Green) and B8 (NIR) for NDWI calculation.
     - Reference: [Sentinel-2 | Copernicus Data Space Ecosystem](#)
  c. Global Surface Water Dataset (JRC Global Surface Water Explorer)
     - Provides detailed data on the extent, occurrence, and change of surface water from 1984 to the present. It can be useful for tracking changes in lakes and other water bodies.
     - Reference: [Global Surface Water - Data Access (global-surface-water.appspot.com)](global-surface-water.appspot.com)
  d. HydroLAKES Database
     - A global database of lake polygons and attributes that can help cross-reference the locations of lakes for further analysis and validation.
     - Reference: [HydroLAKES (hydrosheds.org)](hydrosheds.org)

- *Methods*

  In this project, we will calculate the NDWI (Normalized Difference Water Index) to measure water content by using the green and SWIR bands from Landsat imagery, and the green and NIR bands from Sentinel-2 imagery. Users will be able to manually draw a region of interest (ROI) on the map to select a lake for analysis. We will utilize historical data from 1995 to 2023, filtering out cloud-covered images to ensure clearer analysis. An interactive slider will be implemented to visualize NDWI values for each selected year, allowing users to observe changes in water content over time. Additionally, we will apply cloud filtering to exclude images with more than 20% cloud cover to maintain data quality.

4. Expected outcome or deliverable

The expected outcome is an interactive tool that enables users to:

- Select regions of interest on a global scale.
- Visualize data to assess water content changes over the years.
- Facilitate research and planning by offering a way to analyze historical water trends in lakes for environmental assessments and conservation planning.