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**Environmental Programming**

**Report of Assignment 11**

**Environmental analysis using Remote Sensing Data**

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## **Introduction**

## **Objective**

The objective of the Landslide and Flash Flood Event Analysis Software is to examine a catastrophic incident that coincided with landslides and flash floods in Uvira, Democratic Republic of the Congo. The program makes use of remote sensing data to offer insights into the elements influencing the incident, such as a map of natural hazards, slope data, and rainfall data. Data processing, visualization, rainfall statistical analysis, and an optional graphical user interface (GUI) for interactive execution are the main goals.

## **Software Structure**

The software is structured to perform distinct tasks, each encapsulated in modular functions:

* Task Execution:
  + Open natural hazard, slope, and stream network maps.
  + Visualize and export slope and stream network maps.
  + Create a binary map for affected and non-affected areas.
  + Discriminate landslide and flash flood locations.
  + Create and export maps showing only landslide and flash flood areas.
* Time Series Analysis:
  + Read time series of rainfall maps.
  + Plot spatially averaged daily rainfall as a time series.
  + Calculate rainfall statistics for the entire area.
* Optional Task - GUI:
  + Develop a simple GUI for interactive execution of the code.

## **User Manual**

### **Task Execution:**

1. Start the Python script or Jupyter Notebook:  
   Open the Python script or Jupyter notebook that is provided.
2. Perform Code Cells One by One:  
     
   In order to complete the necessary tasks, run each code cell in the correct order.  
   As needed, change the parameters (such as the threshold values).
3. Examine the exported images and visualizations:  
     
   Examine the visuals that are present in the notebook.  
   Examine the output folder to see any exported photos.

### **Time Series Analysis:**

* Review Time Series Plot:
  + Examine the time series plot of spatially averaged daily rainfall.
* Execute Rainfall Statistics Function:
  + Execute the rainfall statistics function with desired parameters.
  + Review the results displayed in the notebook.