# Methodology

## Data used:

* **LISS III** remote sensing satellite from **Bhuvan.**
* **Cartosat-1** satellite data from **Bhuvan.**
* **Bhuvan-Thematic Services-**Land degradation data 2015-16 (Reference).
* **OCM2-NDVI** data from **Bhuvan.**
* **Vegetation and Crop Monitoring** from **Vedas.**
* **Rainfall data** from **Mosdac.**
* **Soil Data** from Vedas.
* **India District and State boundary files** from (https://iitb-isro-aicte-mapathon.fossee.in).
* **General data** from data.gov.in (Reference).

## Steps Involved:

Download data from the above sources for latitudes of (12°50'-13°30’) N and longitudes from (77°50'-78°) E also download Bangalore urb csv files for rainfall erodibility factor and other analysis.

* Open Qgis and import the India district map files, use select features by area option to select Bangalore Urban map and save it as a separate file.
* Merge the DEM images downloaded and use extraction process to clip the DEM images to Bangalore urban shape file, you will get a raster image in the form of a TIF file.
* Calculation of LS factor - Go to the processing tool box and select LS factor-Insert the clipped Bangalore (DEM) to calculate slope and steepness factor-Select (Desmet and Govers 1996) as method LS and run the process.
* Calculation of Rainfall erosivity factor – Import precipitation data to QGIS. Choose the longitude column as ‘x field’ and the latitude column as ‘y field’ and click on add. Import the polygon of the study area. Then go to processing >> toolbox, search for Interpolate Your Data (IDW), and double click on it. Navigate to**Raster >> extraction >> clip raster by mask layer.**In the dialogue box enter the output raster of the interpolation algorithm as your input layer and select the polygon of the study area as the mask layer. Now calculate rainfall erosivity factor using the formula,

R factor = 0.55\*(MAP) – 24.7.

* Calculation of NDVI – Download the tiles from the Bhuvan website under the LISS III satellite. Import Band 4(RED) & Band 5(NIR) TIF files to QGIS and Calculate NDVI. The formula to Calculate NDVI is,

NDVI =

* Calculation of C factor – Import NDVI TIF file to QGIS.
* P-factor was derived based on Reference (1).
* K-factor was derived based on Reference (2).

## Complexities Involved:

* Limitation in the number of tiles that can be downloaded in Bhuvan.
* Amount of approval time taken in Mosdac.
* The frequent occurrence of signing in errors in both Mosdac and Bhuvan.
* Lack of relevant video and information regarding Land Degradation in Qgis.
* Lack of information for an efficient method used to calculate land degradation.
* Lack of relevant data for factors P and K.
* Downloading problems from Bhuvan caused difficulty in merging the tiles.
* Lack of information regarding wind, water, air erosion, and salt-affected areas related to Bangalore hence had to use the RUSLE formula and related data to calculate land degradation.

## Potential application of the map

* This map shows the data of degraded lands in a specific area which can be used to reduce future land degradation and try to recover the affected soil.
* Can consider both soil and vegetation degradation.
* Measures actual and potential degradation.
* Helps in analysing how annual rainfall plays a role in land degradation.
* Can explain the degree of vulnerability of the soil.
* To emphasize the urgency for new approaches that will likely require a combination of innovative satellite data analysis and extensive field inventories to reduce land degradation.

## References:

1. Panagos, P., Borrelli, P., Meusburger, K., van der Zanden, E. H., Poesen, J., & Alewell, C. (2015). Modelling the effect of support psractices (P-factor) on the reduction of soil erosion by water at the European scale. Environmental science & policy, 51, 23-34.
2. Biswas, S. S., & Pani, P. (2015). Estimation of soil erosion using RUSLE and GIS techniques: a case study of Barakar River basin, Jharkhand, India. Modeling Earth Systems and Environment, 1(4), 42.