

Training Report

Program Name:

Training program through Distance Learning on “**Introduction to Google Earth Engine & Its Application in Water Resources Management**”. Information Brochure regarding the same is enclosed at **Annex-1**

Duration:

The program was organised during 16th-23rd August 2021.

Introduction:

Google Earth Engine (GEE) is a cloud-based platform for planetary scale analysis and utilization of Remote Sensing Datasets and translating these data into meaningful analytics and decisions. It combines a multi-petabyte catalogue of satellite imagery and other geospatial datasets to detect changes, map trends and quantify differences on the Earth's surface. The beauty of it lies in the fact that the platform is free and there are no additional software licenses or hardware that is required for the same to be leveraged. This also makes remote sensing satellite data analytics accessible to a much wider audience as all you need to get started is a browser with an internet connection. GEE leverages Google's extensive cloud infrastructure to present several varied applications.

Given that a vast number of satellite data sets are made available on GEE, there are a plethora of applications from the perspective of Water Resources and Natural Resource Management. For example, this platform can be utilized to map surface water trends using the Landsat archive, do flood detection using Sentinel 1 radar data and SRTM terrain information or understand seasonal land cover dynamics such as wetlands. Other applications have included mapping global deforestation for past 20 years, understanding water dynamics in lakes and reservoirs over last 30-35 years and other complex applications such as understanding cropland dynamics.

The goal of this training program was to introduce the training participants to the potential of the Google Earth Engine platform through some specific examples showcasing its utility for water resources management.

Program Contents

The program covered the following topics:

1. Introduction to Remote Sensing
2. Overview of Google Earth Engine
3. Introduction to Google Earth Engine Code Editor
4. Working with Raster data using Google Earth Engine
5. Working with Vector data using Google Earth Engine

6. Applications of GEE – Waterbodies Extraction using NDVI and NDWI using GEE
7. Applications of GEE – Semi-Supervised Landcover classification using GEE
8. Applications of GEE – Flood Mapping & Monitoring using GEE
9. Applications of GEE – Agricultural Water Management & Drought Monitoring using GEE
10. Extraction of Bathymetry using GEE and Python
11. Applications of GEE – Water Quality Mapping & Change Detection
12. Extraction of Water Quality using GEE and Python

Program Format

The Training Program comprised of recorded sessions and live webinars through Cisco Webex . Online lecture modules (series of voice PPTs, Videos of practical hands-on, Assignments and Discussions) were delivered using “Google Classroom”. To facilitate the participants to join the training, they were asked to register themselves in the “Google Classroom” using their “Gmail Account “. Registered participants were given the Class Code for accessing the training modules. Whatsapp groups for each batch of participants were created for clarification of technical and miscellaneous issues. Towards the end of the program participants were asked to complete an online Assessment test consisting of MCQs which were based on the topics covered during the program. Sufficient time was provided to review the video lectures and submit the assessment test. Based upon level of participation in the ‘Google Classroom’, submission of Assessment Test and feedback/evaluation form, e-certificates were provided to eligible participants.

Participants List:

<p>Total Registered Participants: 562</p> <p>Number of participants who attended the program in Google Classroom: 524 (in 3 batches in 3 separate classrooms)</p> <p>Certificates issued to 298 participants</p>

List of registered participants is enclosed at **Annex -2**.

Training Program Schedule &Lecture Material:

A document on Session Plan and Training Material is enclosed at **Annex-3** which has youtube links for the corresponding video lecture/Hands-on sessions and the same are downloadable. Other material circulated during the training program include four presentations on ‘Overview of GEE’, ‘Introduction to GEE Code Editor’, ‘Flood Monitoring using Microwave Data in GEE’ and ‘Agricultural Water Management & Drought

Monitoring in GEE'. They are enclosed at **Annex-4, Annex- 5, Annex-6** and **Annex-7** respectively.

Assessment:

During the training program two assignments were given to the participants to (a) execute a script on GEE for computing NDVI using MODIS Surface Reflectance (MOD09GA product) and print a chart of daily NDVI for selected points representing various ground conditions as well as NDVI averaged over Pune District and (b) execute a script on GEE to estimate the water spread area of reservoirs in a 'Region of Interest' which was provided to the participants in the form of a shape file. After the completion of the training program, an online Assessment test consisting of 30 MCQs was circulated through google form for submission within two weeks period after revising all the video lectures and the training material.

The average score in the Assessment Test was 20.8/30 for **281** no. of participants.

Assessment Test Questions and the Answer Key are attached at **Annex-8**. Responses of the participants are attached at **Annex -9**.

Feedback:

Feedback was collected from the participants through a google form. Total **285** participants have given the feedback. Feedback responses of the participants is attached at **Annex-10**.