

Tutorial for SEPAL workshop

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INTRODUCTION AND OBJECTIVES

FAO Somalia uses Information and Communication Technologies to manage land and water resources in the extremely challenging environment of Somalia. It has been implemented as a continuum of activities designed to empower selected Somali institutions to achieve self-sufficiency in generating and managing information about the country’s natural resources.

The use of remote sensing and image analysis is a key part of FAO-managed SWALIM’s data gathering activities. Remote sensing refers to the acquisition of information without coming into physical contact with the object or area being studied. Since the high level of security risk present in Somalia creates major challenges in monitoring environment directly on the ground, remote sensing is used as one of a number of alternative systems to monitor natural resources, agriculture, and soil degradation. FAO Somalia team is continuously working at the national level to inventory the spatial distribution of the land resources (landform, land cover/vegetation, soils, land use, etc) and to assess the land degradation extent and status.

Through a partnership agreement with Norway, FAO-HQ has developed a System for Earth Observation Data Access, Processing and Analysis for Land Monitoring (SEPAL), which helps countries access and process satellite data, for use in forest resources monitoring, offering unparalleled access to granular satellite data and computing power and paving the way for improved climate change mitigation plans and better informed land-use policies.

SEPAL is a big-data processing platform that combines super-computing power, open-source geospatial data processing software and modern geospatial data infrastructures like Google’s Earth Engine. SEPAL overcomes barriers of poor internet connections and low computing power or storage space on local computers and can also connect to and use data and outputs from FAO’s free and open-source software tools Open FORIS. The SEPAL platform is open source, free of charge and can be accessed at <https://sepal.io>.

Given the above, FAO Somalia is organizing a training to learn about SEPAL capabilities in respects of the following tasks:

· Segmentation and LCLU classification (Sentinel-2/Landsat)

· Change assessment analysis (Sentinel-2/Landsat)

· Temporal profile calculation and plotting (e.g. NDVI)

· Flood monitoring using Sentinel-1 backscatter data

· Processing of high-resolution images (DG, UAV) owned by FAO Somalia

The main objective is to train the core of the FAO Somalia team together with the FAO Kenya GIS and RS team and some relevant members of RCMRD to the various techniques of mapping / assessing land cover and land use change using the SEPAL cloud computing platform.

REQUIREMENTS  
All necessary data for the completion of this tutorial is available at <https://github.com/lecrabe/ws_swalim_20190429>

Background information on the OpenForis initiative [www.openforis.org](http://www.openforis.org/)

You can request Access to SEPAL with the following

1/ have-open a GMAIL account (in order to access Google Earth Engine functionality)

2/ get the account registered and white listed in Google Earth Engine <https://earthengine.google.com/signup/>

3/ open an account in SEPAL <https://tinyurl.com/sepal-access>

For a swift use of SEPAL, you should also install a FTP SSH client such as FileZilla (<https://filezilla-project.org/>) on your computer to allow for upload and download of data from and to the platform.

All materials in this tutorial are linked to the individual Standard Operating Procedures (SOP) that can be found under the [docs/](https://github.com/lecrabe/liberia_activity_data/tree/master/docs) section of the repository.

Workshop Activities

**Day 1**

Presentation of SEPAL

Presentations focused on the single date approach (hands-on with mosaic generation + classification) versus time series approach for land cover monitoring

Explore profile drawing on single points

This step refers to **sop\_sepal\_bfast\_explorer**

Look at the behaviour of BFAST, BFAST01 and BFASTMONITOR algorithms on several points in the country

Run BFAST Spatial on the test dataset

This step refers to **sop\_sepal\_analyze\_ts**

Run the bfastspatial algorithm on the test dataset and download the results.

Run BFAST Spatial on a customized area of interest

This step refers to **sop\_sepal\_generate\_ts** and **sop\_sepal\_analyze\_ts**

Hand-draw areas of circa 5km side and gather data to feed in the bfastspatial process.

Clone the repository

This step refers to **sop\_sepal\_terminal**

Create a tiling system

This step refers to **sop\_sepal\_rstudio**

Run **scripts/s0\_parameter.R** to initialize your folders

Run **scripts/scripts\_tiling/b1\_tiling\_system.R** to create a tiling system covering the country.

Download the KML results (under data/tiling) using FileZilla (**sop\_sepal\_filezilla**)

**Day 2**

Convert the KML into a Fusion Table

This step refers to **sop\_sepal\_fusion\_table**

Generate time series for one tile

This step refers to **sop\_sepal\_generate\_ts**

Use the fusion table identifier for one tile as specified in the file located under **docs/list\_fusion\_tables.txt**

Find a fusion table corresponding to a tile in the country

For example: 16ADAWOJt3IsMvUq7TOFonB7PEquaQUog6OC86CTh

Use 2007 as start date and 2016 as end date

Use NDMI as index

Analyze the time series

Start an instance #6

Follow the steps in **sop\_sepal\_analyze\_ts**

Leave all parameters as default

Test different indexes (NDMI, EVI, SAVI)