FAO's SEPAL Cloud Computing Platform:
How to Access Imagery, Generate Activity Data, and Analyze Land Cover Dynamics

11-14 November 2024
Manila, Philippines

Background

Satellite data allows users to monitor land cover dynamics at global, regional, national, and local scales for a variety of purposes. The Philippines Forest Management Bureau (FMB) relies on satellite data to generate national maps of land use change that serve as a critical input to carbon reporting under the U.N. REDD+ Initiative, while the National Mapping and Resource Information Authority (NAMRIA) produces detailed national land cover maps on a regular basis.

After finalizing its first Forest Reference Level submission in May 2023, FMB has taken steps to build in-house capacity to produce future REDD+ documents without reliance on expensive proprietary data. These REDD+ documents require both Emissions Factor (EF) calculations based on design-based field inventories and Activity Data (AD) generated from satellite imagery. In this workshop, we will focus on how to use the SEPAL cloud computing platform to generate AD from freely available satellite imagery. This workshop represents one of many workshops organized by a technical support team led by USFS International

Programs and that includes members from USGS SilvaCarbon, Spatial Informatics Group, FLINTpro, and Environmental Accounting Services.

SEPAL (or System for Earth Observation Data Access, Processing and Analysis for Land Monitoring) represents one of the two main open-source options for accessing and processing satellite data efficiently. The advantage of SEPAL in comparison to its alternative Google Earth Engine (GEE) is that SEPAL has a windows-based interface that enables users to perform nearly all the same sophisticated analysis without needing to write code or navigate a steep learning curve.

In this workshop, we will begin with a general introduction to the SEPAL platform, including how to link it to GEE (for combined workflows and data transfers) and how to incorporate high-resolution data from Planet/NICFI (Norway's International Climate and Forest Initiative). Next, we will cover a range of fundamental to advanced tasks including procedures to access satellite data and GEE assets, exporting analysis results to GEE assets or personal computers, creating cloud-free optical mosaics and radar composites, image classification (for general classes and specific subclasses), and creating CCDC (Continuous Change Detection and Classification) assets. Based on CCDC assets (which contain time-series model parameters for each pixel), participants then will learn to extract CCDC slices or synthetic snapshots from a particular point in time. By taking slices from two or more different time periods, the difference or change between slices can be classified to obtain Activity Data such as deforestation or forest gain.

In addition to workshop's primary emphasis on generating AD, we will cover how to use SEPAL to perform other operations of interest to forest managers such as producing forest/non-forest masks, updating land cover maps periodically using 'Masking' and 'Index Change' recipes, creating maps of forest loss in near-real time, and mapping carbon-rich forest subclasses like mangroves.

Dates and Location

November 11–14, 2024

Location to be determined (Manila or Quezon City)

Organizers:

Paul Berkowitz, USGS SilvaCarbon / University of Hawai`i. WhatsApp: +1 808 936 3051.

Robert Szabo, USFS International Programs. WhatsApp: +1 202 941 3353.

Trina Isorena, USFS International Programs. WhatsApp: +63 928 506 9400.

Erik Lindquist, Food and Agriculture Administration (FAO). WhatsApp: +39 331 250 4227.

Suggested Attendees:

- Government officials from the Philippines FMB.

- Government officials from the Philippines NAMRIA.
- Government officials from the Philippines Space Agency.
- Officials from related government offices who work with satellite imagery.

Expectations:

At the end of the training, participants will know how to do the following:

1. Access SEPAL.
2. Link SEPAL with GEE.
3. Access NICFI/Planet high-resolution imagery.
4. Link NICFI/Planet data with GEE and SEPAL.
5. Access GEE assets.
6. Make a Landsat, Planet, Sentinel-2, and Sentinel-1 optical and radar data composites.
7. Classify forest, non-forest, plantation forest, mangrove forest, commodity crops, and other IPCC land cover classes.
8. Construct a CCDC time-series asset and extract CCDC slices.
9. Perform change detection for land cover/land use over a time series – i.e., generate Activity Data.
10. Transfer results from SEPAL to GEE assets and to personal computer files.

Suggested Pre-work:

SEPAL online course, at least Module 2 and 3:
https://elearning.fao.org/local/search/infocourse.php?id=965

SEPAL documentation for signup instructions and workflow examples:
https://docs.sepal.io/en/latest/index.html

SEPAL videos:
https://www.youtube.com/playlist?list=PLzp5NgJ2-dK7BKt79Hi7CMUxgvVei21cS

Compulsory equipment for participants:

Each participant should bring a laptop with capability to connect to the internet.

Monday, November 11, 2024.		
Time		
10:00 am	Registration	
10:30 am	Opening Remarks Welcome and introductions	Arleigh J. Adorable, CESO III The OIC Assistant Secretary for Field Operations – Mindanao and Director in concurrent capacity Resource Persons and Participants
11:00 am	Framing the workshop	Paul Berkowitz, UHH / USGS SilvaCarbon Program
11:20 am	Participant Introductions	
11:30 am	Philippines FMB: Current Uses and Applications of Satellite Imagery	Larlyn Aggabao, Philippines FMB
11:45 am	Philippines NAMRIA: Current Uses and Applications of Satellite Imagery	Raul Magabo, Philippines NAMRIA
12:00 pm	Philippines Space Agency: Current Uses and Applications of Satellite Imagery	TBD, PHILSA
12:15 am	Introducing SEPAL	Erik Lindquist, FAO
12:45 pm	Lunch	
02:00 pm	Introducing SEPAL (continued) ● Signups and links to GEE & NICFI/Planet ● SEPAL Interface Image Analysis in SEPAL: ● Optical Mosaic ● Radar Mosaic	Erik Lindquist
03:00 pm	Coffee Break	
03:30 pm	Image Analysis in SEPAL (continued)	Erik Lindquist
04:30 pm	Closing	
Tuesday, November 12, 2024.		
09:00 am	Image Analysis in SEPAL (continued): ● More optical and radar mosaics, including high-resolution NICFI/Planet data ● Access to and uses for daily Planet data	Erik Lindquist
10:30 am	Coffee Break	

11:00 am	Image Classification: methods for inputting training data; ML algorithms; mapping land cover/land use classes – forest/non-forest, mangrove forest, plantation forest, commodity crops, etc.	Erik Lindquist
12:00 pm	Lunch	
01:30 pm	Image classification and mapping (continued)	Erik Lindquist
02:45 pm	Coffee Break	
03:15 pm	CCDC asset construction and exploration	Erik Lindquist
04:30 pm	Closing	
Wednesday, November 13, 2024.		
09:00 am	CCDC image slices and change detection, the basis for generating Activity Data.	Erik Lindquist
10:30 am	Coffee Break	
11:00 am	Workflows for generating activity data (e.g., deforestation, forest enhancement, degradation) for REDD+ reporting, based on Masking and Index Change recipes. Activities in near-real-time.	Erik Lindquist
12:00 pm	Lunch	
01:30 pm	Workflows for updating land use/land cover maps on an annual basis.	Erik Lindquist
02:45 pm	Coffee Break	
03:15 pm	Unbiased area estimation methods using probability-based strata.	Erik Lindquist (or Andreas Vollrath - virtual)
04:30 pm	Closing	
Thursday, November 14, 2024.		
09:00 am	Administering SEPAL accounts and adding resources. When, how, and where to export SEPAL maps and analysis. Interactions with other FAO tools.	Erik Lindquist
10:30 am	Coffee Break	
11:00 am	Review of existing concepts and participant-requested themes.	Eric Lindquist
12:00 pm	Lunch	
01:30 pm	Participant-requested themes (continued). The way forward.	Erik Lindquist
02:30 pm	Coffee Break	
03:00 pm	Se.plan decision-support tool in SEPAL	TBD (virtual?)
04:00 pm	Certificates and closing remarks	Paul Berkowitz Erik Lindquist

		Trina Isorena TBD, FMB and/or NAMRIA
04:30 pm	Close of workshop	
Friday, November 15, 2024.		
09:00 am	FMB/NAMRIA strategic meeting to coordinate generating Activity Data and mapping land cover.	Trina Isorena
10:30 am	Coffee Break	
11:00 am	FMB/NAMRIA strategic meeting (continued).	Trina Isorena
12:30 pm	Closing	