*Concept Note*

# Google Earth Engine Training

*Organized and supported by:*

The USAID & NASA supported SERVIR-Mekong Program, United States Forest Service – Remote Sensing Applications Center (USFS-RSAC), ADB – Core Environment Program, SilvaCarbon, and Google Earth Engine

***7-8 July 2016, Swissotel Nai Lert Park, Bangkok, Thailand***

**Background/Rationale:**

SERVIR-Mekong, a USAID-NASA partnership, helps decision makers in the Lower Mekong Region utilize GIS and Remote Sensing information to inform climate related activities. SERVIR-Mekong is now organizing an event that will bring the innovative Google Earth Engine platform to technical specialists in the region.

Google Earth Engine is a cloud based geospatial remote sensing processing platform, complete with an extensive public data catalog. It is available via a web-based JavaScript Application Program Interface (API) called the Code Editor. This platform is where users can write and execute scripts to share and repeat geospatial analysis and processing workflows, such as land cover mapping. In this two-day training session you will be introduced to and practice working in the Earth Engine Code Editor platform, explore some basic programming concepts, and learn about Earth Engine data structures and methods, functions, and algorithms. The course will be structured with presentations and demonstrations to introduce material, followed by hands on exercises that participants complete individually or in small groups.

**Course Objectives:**

- Build on your knowledge and understanding of:
  - The Google Earth Engine Code Editor platform by investigating a pre-written example JavaScript script.
  - Become familiar with geospatial Earth Engine Objects and their associated functions: images and image collections, features and feature collections, and geometries.
  - Available resources to continue learning Earth Engine concepts after the course has concluded.

**Skills Development:**

- Learn JavaScript and Earth Engine syntax.
- Learn how to access data from the public data catalog, add them to your map window and set the visualization parameters, process and analyze these, and export them to your hard drive.
- Learn how to write your own functions and map these over image collections.



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- Run some pre-programmed analysis algorithms. These include a cloud masking algorithm, reducers to generate a (cloud free) composite by calculating the median value of a time series of imagery, and supervised classification methods. We will integrate these algorithms to form a sample land cover mapping workflow.

**Required Materials**

- An approved Google Earth Engine Account (use your Gmail account)
- Google Chrome installation on your computer that you bring with you to the workshop
- High speed internet access (Workshop provided)

**Prerequisites**

Fundamental understanding of basic remote sensing. While no prior programming experience is required to learn Earth Engine, it will be helpful to mastering these concepts. If this is your first time working in a scripting environment, don't worry. Remember to be patient as you learn these concepts: if you learn the basics, you have a solid foundation to build on over time.

Sign up for Earth Engine: https://earthengine.google.com/signup/

**Optional Pre-workshop Webinars**

We will offer an introductory webinar prior to the training. The goals of the webinar are to make sure everyone gets registered for an Earth Engine account and briefly introduce the Code Editor platform. Working in the Code Editor requires scripting which might be a new experience for some. The webinar will offer participants a glimpse of the uses of Earth Engine, and an overview of the type of material that will be covered during the two day training session.

***Tentative dates:*** the morning of Monday, June 20th (and/or Monday June 27th)

**Organizers**

The workshop will be organized by SERVIR-Mekong in partnership with United States Forest Service-RSAC, SilvaCarbon**,** and ADB-CEP.

**SERVIR-Mekong:** The SERVIR-Global network of regional geospatial support hubs is an initiative of the United States National Aeronautics and Space Administration (NASA) and the United States Agency for International Development (USAID). SERVIR-Mekong, the newest hub in the network is a geospatial data for development program designed to respond to the needs of the Lower Mekong countries. It builds the capacity of governments and other key stakeholders in the Lower Mekong countries to employ publicly available satellite imagery and geospatial technologies for decision making related to climate change, environmental management, and disaster risk management. SERVIR-Mekong is implemented by the Asian Disaster Preparedness Center (ADPC) and its technical partners Spatial Informatics Group (SIG), Stockholm Environment Institute (SEI), and Deltares.

**United States Forest Service –RSAC:** The Remote Sensing Applications Center (RSAC) is a national technical service center of the United States Department of Agriculture Forest Service (USDA Forest Service). The mission of RSAC is to provide the Forest Service with the knowledge, tools, and technical services required to use remote sensing data to meet the agency's stewardship responsibilities. A



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structured program of work creating science-based information that supports the assessment and monitoring of natural resources is accomplished through the following program areas:

- Remote Sensing Evaluation, Application & Training – evaluates new remote sensing technologies and integrates promising ones into Forest Service business functions.
- Rapid Disturbance Assessment & Services – provides tactical and strategic support in response to disturbance events including fire, wind events, and natural disasters.
- Resource Mapping, Inventory & Monitoring – provides operational remote sensing support and analysis to meet interagency programmatic assessment and monitoring needs.
- Enterprise Data & Services – coordinates with Forest Service Central Imagery Office to provide enterprise remote sensing technology and data.

**SilvaCarbon:** SilvaCarbon is an interagency technical cooperation program of the United States Government (USG) to enhance the capacity of selected tropical countries to measure, monitor, and manage forest and terrestrial carbon, and more accurately estimate greenhouse gas (GHG) emissions resulting from changes in land use, forest cover, and forest degradation. SilvaCarbon helps advance Reducing Emissions from Deforestation and Forest Degradation (REDD+) and other climate change mitigation and development initiatives by working with technical teams at government agencies in partner countries to design and implement credible landscape monitoring systems and GHG inventories that feed into international reporting frameworks such as the United Nations Framework Convention on Climate Change (UNFCCC).

**ADB – CEP:** Facilitated by the Asian Development Bank as an integral part of the GMS Economic Cooperation Program, the Core Environment Program seeks to create a region where economic growth and environmental protection are approached in parallel, and in a way that benefits all who live there. It brings together the six countries of the Greater Mekong Subregion (Cambodia, People's Republic of China, Lao PDR, Myanmar, Thailand and Vietnam) to work towards this ambitious goal through the mainstreaming of environmental and biodiversity protection.

**Workshop Dates:** 7-8 July, 2016

**Venue:** Swissotel Nai Lert Park, Bangkok, Thailand

**Daily Workshop Topics and Outputs**

| Day | Topics / Themes |
|---|---|
| 1 | AM<br>● Introduction to workshop and participants<br>● Presentation and Demo: Overview of GEE<br>● Exercise: Hello World and Exploring Data Archive<br>● Exercise: image processing and analysis using in built in methods and algorithms (e.g. cloud masking)<br>PM<br>● Exercise: Writing custom functions and mapping across image collections |



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| | ● Exercise: Exporting Data and Videos |
| 2 | <u>AM</u><br>● Overview presentation and demo<br>● Exercise: Image processing (e.g., filtering, edge detection)<br>● Exercise: Spectral indices and transformations<br><u>PM</u><br>● Demo and Exercise: Supervised classification and regression<br>● Demo and hands on work: Review Scripting Norms and Template and Algorithm Repository organizational structure, explore supplied method snippets |



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