

# *CEOS South-East Asia Workshop*

## *Mangroves Mapping and Biomass Estimation*



## *Background*

Under the CEOS umbrella, the Japan Aerospace Exploration Agency (JAXA), the USGS SilvaCarbon Program, the Food and Agriculture Organization (FAO), and the European Space Agency (ESA) are collaborating with the Cambodia's Ministry of Environment to organize a workshop that aims to integrate global AFOLU (Agriculture, Forestry and Other Land Use) datasets into national carbon inventory and reporting mechanisms. The workshop will establish and strengthen connections between Southeast Asian national forest inventory agencies and the Committee on Earth Observation Satellites (CEOS) space agencies, enhancing the integration and utilization of Earth Observation (EO) datasets.

The workshop will use a mangrove forest site to explore the relationships and synergies between ground-based and spaceborne datasets.

The workshop will address regional capacity-building needs, particularly in conducting mangrove carbon accounting. Mangrove ecosystems are known for their ecological significance and vulnerability, presenting unique challenges and opportunities in data acquisition and analysis. Attendees will gain practical skills and insights for conducting comprehensive mangrove forest assessments through targeted field training sessions and hands-on exercises.

Cutting-edge technologies and methodologies for improving emission factor estimation, explicitly focusing on utilizing space-based LiDAR data, will be explored in the workshop. Participants will discuss innovative approaches to refining emission factor estimates, thereby enhancing the accuracy and reliability of national inventory and reporting systems.

## *Dates*

- Mangrove Mapping and Monitoring: June 25 - 28, 2024 (Preah Sihanoukville Province)
- Biomass Estimation Using Earth Observations Data: July 01 - 03, 2024 (Phnom Penh)

## *Organizers:*

Cambodia Ministry of Environment (MOE)

Sylvia Wilson: US Geological Survey SilvaCarbon Program

Paul Berkowitz: US Geological Survey SilvaCarbon Program

Osamu Ochiai: JAXA

Yuko Nakamura: JAXA

Erik Lindquist: Food and Agriculture Administration (FAO)

Inge Jonckheere: European Space Agency (ESA)

*Suggested Attendees:*

- Government officials from Cambodia's Ministry of Environment (MOE)
- Government officials from Cambodia's Ministry of Agriculture
- Royal University of Agriculture - Cambodia
- Representatives from Laos, Vietnam, Cambodia, and Thailand

<b>(Tue) June 25, 2024 (Preah Sihanoukville Province)</b>		
<b>Time</b>		
09:00 am	Registration	
<b>Moderator: Ake Rosenqvist</b>		
09:30 am	Opening Remarks.	USGS - Sylvia Wilson Cambodia MOE - H.E Chea SamAng FAO - Erik Lindquist
10:30 am	Framing of the workshop Mangrove Mapping and Monitoring in the context of REDD+ IPCC Guidance for Mangroves	Sylvia Wilson, Paul Berkowitz
11:00 am	Coffee Break	
11:30 am	Intro to mangrove forest ecosystems, mangrove carbon accounting, natural and human threats, restoration	Carine Bourgeois, Sahadev Sharma
12:30 pm	Lunch	
<b>Moderator: Paul Berkowitz</b>		
02:00 pm	SWAMP protocol to measure carbon: • sampling design, plot layout, carbon pools, special considerations • Aboveground & belowground protocols	Carine Bourgeois, Sahadev Sharma
03:00 pm	Coffee Break	
03:30 pm	SWAMP protocol to measure carbon: • sampling design, plot layout, carbon pools, special considerations • Aboveground & belowground protocols	Carine Bourgeois, Sahadev Sharma
04:00 pm	Demonstrate protocol. Divide into 3 teams. Mangrove sampling to measure aboveground and belowground carbon	Carine Bourgeois, Sahadev Sharma, Paul Berkowitz
05:00 pm	Closing	
<b>(Wed) June 26, 2024 (Preah Sihanoukville Province)</b>		
<b>FIELD DAY: Mangroves visit</b>		

(Thu) June 27, 2024 (Preah Sihanoukville Province)		
<b>Moderator: Erik Lindquist</b>		
09:00 am	Data processing spreadsheets Biomass calculations	Carine Bourgeois, Sahadev Sharma
11:00 am	Coffee Break	
11:30 am	Google Earth Engine Applications: Hands-on Global Mangrove Mapping presentation	Noel Gorelick
12:30 pm	Lunch	
<b>Moderator: Katelyn Tarrio</b>		
02:00 pm	Google Earth Engine Applications: Hands-on Global Mangrove Mapping presentation	Noel Gorelick
03:30 pm	Coffee Break	
04:00 pm	Google Earth Engine Applications: Hands-on from Global Mangrove Mapping presentation	Noel Gorelick
05:00 pm	Global Mangrove Mapping, including mangrove extent, height, and biomass	Adia Bey (remotely)
05:30 pm	SEPAL set up and closing	
(Fri) June 28, 2024 (Preah Sihanoukville Province)		
<b>Moderator: Carine Bourgeois</b>		
09:00 am	Global Estimates (Global Mangrove Watch)	Ake Rosenqvist
09:30 am	Downscaling to local estimates (SEPAL)	Erik Lindquist
11:30 am	Accuracy estimation methodology	Katelyn Tarrio
12:30 pm	Lunch	
<b>Moderator: Sylvia Wilson</b>		
02:00 pm	Integration of space-based (remote sensing) and ground based data (activity data and emission factors)	Erik Lindquist
04:30 pm	Closing, certificates, and travel to Phnom Penh	
<b>Check in at Sofitel Hotel</b>		
(Mon) July 01, 2024 (Phnom Penh)		
08:30 am	Registration	
<b>Moderator: Erik Lindquist</b>		
09:00 am	Opening Remarks	ESA - Inge Jonckheere Cambodia MOE - Jaxa - Osamu Ochiai
09:30 am	Welcome and Introductions – Framing the workshop	Robert Kennedy
10:00 am	JAXA CEOS Chair Program, JAXA Biomass map	Osamu Ochiai

11:00 am	Coffee Break	
11:30 am	Cambodia NFI and sampling protocol	Hout Naborey
12:00 pm	Vietnam NFI and sampling protocol	Hai Pham Ngoc
12:30 pm	Lunch	
<b>Moderator: Robert Kennedy</b>		
02:00 pm	Thailand NFI and sampling protocol	
02:30 pm	Lao NFI and sampling protocol	Keoka Somphavy
03:00 pm	Coffee Break	
03:30 pm	Deriving Biomass Estimation - Cambodia case (FAO)	Gael Sola
04:00 pm	Allometric equation development in Cambodia	Kim Soben
04:30 pm	Q&A session	
05:00 pm	Closing	
<b>(Tue) July 02, 2024 (Phnom Penh)</b>		
<b>Moderator: Carine Bourgeois</b>		
09:00 am	Introduction to GEDI	Laura Duncanson
09:30 am	OBIWAN Introduction and Hands-on demonstration (coffee break in the middle)	Sean Healey (remotely) Ashraful Islam and Yang Zhiqiang
11:30 am	The provisional/expected L4A improvements and what lies ahead	Laura Duncanson
12:00 pm	Lunch	
<b>Moderator: Noel Gorelick</b>		
02:00 pm	SERVIR project, REDD+nesting, storyline	Robert Kennedy
02:30 pm	SERVIR project - Vietnam case study	Robert Kennedy
03:00 pm	Earth Observations-NFI integration examples (Mexico and Ghana cases)	Neha Hunka
03:30 pm	Coffee Break	
04:00 pm	Geostatistical model-based estimation for the National Park in East Cambodia	Neha Hunka
05:00 pm	Closing	
<b>(Wed) July 03, 2024 (Phnom Penh)</b>		
<b>Moderator: Laura Duncanson</b>		
09:00 am	GFOI Guidance on biomass estimation assisted with remote sensing	Daniela Requena
10:00 am	Hands-on for GEE and SEPAL (including coffee break in the middle)	Erik Lindquist, Noel Gorelick
12:00 pm	lunch	
02:00 pm	Hands-on for GEE and SEPAL - continued	Erik Lindquist, Noel Gorelick
04:00 pm	Closing and certificates	