Questions & Answers Part 1

Please type your questions in the Question Box. We will try our best to get to all your questions. If we don't, feel free to email Siti Maryam Yaakub (smaryam@conservation.org), Adia Bey (contact@adiabey.com), or Lola Fatoyinbo (lola.fatoyinbo@nasa.gov).

Question 1: How can blue carbon data be effectively integrated into ecosystem valuation frameworks for wetlands, especially for assessing historical land use changes and wetland loss over decades?
Answer 1: Using Spaceborne and airborne imagery (from satellites, Space Shuttles, the International Space Station or from aircrafts) is going to be the most effective way of assessing historical land use and wetland loss over decades. The Landsat data archive will give you the longest timeframe and highest quality data that can be used to compare extent and changes in land cover and land use over time.

Question 2: How can insights from blue carbon assessments help secure funding through mechanisms like carbon credits or Payments for Ecosystem Services for wetlands outside traditional coastal ecosystems?
Answer 2: Many of the mapping and modeling techniques that we present and use for blue carbon ecosystems are also transferable to, or come from applications in other ecosystems. There are similar techniques, datasets and products on forest carbon stocks and change for example as well as other wetland ecosystems.

Question 3: Can tools and datasets used for mangroves, such as Global Mangrove Watch (GMW), be adapted to evaluate ecosystem services like carbon sequestration and biodiversity support in non-mangrove wetlands?
Answer 3: The Global Mangrove watch focuses exclusively on mangrove ecosystems, for other wetlands, there are other platforms and products that are wetland specific.

IPCC wetlands supplement that was linked in the first of part one includes coastal wetlands. GMW focuses on mangroves.

Question 4: How did you define training data for the model? Did you acquire them from the field? What about areas that were difficult to reach?

Answer 4: Training data is basically data that can be used to train an algorithm to identify specific land cover classes based on their spectral signatures. The location of training sites (points or polygons) can be generated in the field or through visual interpretation of very high resolution satellite imagery. In the second part in this demo we generated polygons on the fly in GEE. This is important because we want to be really sure mangroves are actually there. Map the date of your training data with factual presence in that region. Google Earth Pro has more data you can use. Ideal, is in situ samples.

Question 5: Mangrove species have varying capacity to store carbon. Therefore a finer classification into mangrove species may be important to have a more accurate estimate of mangrove ecosystem biomass and carbon storage capacity. Can the Google Earth Engine be used for mapping mangrove extent to provide finer classification of the different mangrove species?
Answer 5: Your ability to map different strata of mangroves and/or different species will depend upon the training data you have and the type of satellite imagery you use. One relatively easy way to stratify mangrove areas into different classes with different ranges of aboveground biomass is to stratify based on a certain vegetation index (that you know from in situ data to correspond well to different AGB).

A second way is to stratify mangrove areas based on canopy height. For example, dense Rhizophora mangroves, which tend to grow very tall, have high AGB values; while Avecenia mangroves tend to be short, sparse and have lower ABG values. For a more advanced approach, you use hyperspectral imagery to try to map specific mangrove species. You could potentially do all of this work in Google Earth Engine (or other remote sensing software), but hyperspectral imagery may not be readily available within the GEE data catalogue. You'll need to import your own rasters / geotiffs as GEE assets.

Question 6: Considering the importance of diameter at breast height (DBH) of mangrove species in improving the accuracy of above-ground biomass calculation, are there databases that provide estimates of DBH of various mangrove species at various heights or stages of growth?
Answer 6: The allometric models (or equation) that help us relate mangrove measurements like DBH and Height etc to estimate biomass or carbon are active areas of research. These relationships are often species and region specific. Although there is not one single database, there are some reviews on mangrove allometry that may be a

good place to start. Estimates of DBH based on mangrove height are used to estimate volume of the tree and estimate carbon.
Allometry, biomass, and productivity of mangrove forests: A review
https://www.sciencedirect.com/science/article/abs/pii/S0304377007001829

Question 7: How can I identify restored mangrove sites by using SAR data?
Answer 7: If your restored site has undergone structural changes detectable with SAR, you can begin with a simple two time point change analysis using one image prior to restoration and post-restoration.
Another approach to use multiple images prior to restoration to assess trends over time to build and average over multiple years

Question 8: I would like to know if the generic allometric equation that uses basal area weighted height and SRTM data is recommended for time series analyses. The SRTM data became available in the year 2000, but topographic conditions may change over time. In this case, is SRTM data still reliable for estimating aboveground biomass (AGB)?
Answer 8: You are correct that SRTM is now very old and therefore often outdated. There are newer DEMs and measurements of canopy height that can be used instead - including GEDI data , the TanDEM-X DEM or the Copernicus GLO30 DEM. However in that case you have to develop the relationship between Mangrove canopy height and the height measurement you get from the DEM. The equations we use from SRTM to mangrove height may not be the same. Dataset specific models should be used.

Question 9: Though Sentinel 2 is good for subnational level, how do I approach it at subnational level where other data is required to support granular analysis e.g gender roles, but still developing in African context?
Answer 9: Yes, since it has a higher resolution. It really depends on what your application is.

Question 10: Is the data on species wise mangroves standard spectral signature available for identifying the different species of mangroves in the study area? If yes, then from which platform can we download?
Answer 10: I do not think that is available on a global scale, maybe on a site specific scale. Mangroves are tidally inundated which can affect spectral signatures so you would have to take that into account.

Question 11: What about the CO2 sequestration? How can we get it from mangrove mapping?
Answer 11: In the presentation today, you have 20-40% aboveground and 60% in the soil. Canopy height will also give you good information to estimate aboveground biomass. Add this to data on extent, density, etc. This is a challenge but models (root to shoot rations, etc) are being used to estimate this given field (in situ) data. Basically, creating proxies.

Question 12: How can we consolidate the difference in satellite data with ground proof data if there's a significant difference between the two and the difference is not consistent?
Answer 12: Doing an accuracy assessment here is important to account for potential inconsistencies and errors. Almost all measurements also have some sort of margin of error (i.e. +/- 10%).

This is where an accuracy assessment will give you a sense of error (e.g. 90% accuracy). There will almost always be some form of error.