Markku Kanninen

CarboScen and CO2FIX training – Helsinki 3 May 2023

Schedule

The training session consists of two parts

1. CarboScen – introduction to software and training session (morning)
2. CO2FIX – introduction to software and training session (afternoon)

Preparations

1. Bring your laptop - participants are using their personal laptops in the training.
2. Download CarbonScen and CO2FIX and install them to your laptop (see instructions below)
3. Read the scientific papers on CarbonScen and CO2FIX
4. Bring your own data set to the training (optional)

Download and install the software

Download CarbonScen and CO2FIX and install them to your laptop

CarboScen:

The CarboScen software was released through CIFOR, and it is available in their website (https://www.cifor-icraf.org/gcs/knowledge/toolboxes/carboscen/)

CO2FIX:

The CO2FIX software was released through European Forest Institute (EFI), and it is available in their website (http://dataservices.efi.int/casfor/models.htm)

Read the scientific papers on CarbonScen and CO2FIX

1. Read these two papers to understand how the models have been used (a must)

Larjavaara, M., Kanninen, M., Gordillo, H., Koskinen, J., Kukkonen, M., Käyhkö, N., Larson, A.M., Wunder, S. 2018. Global variation in the cost of increasing ecosystem carbon. Nature Climate Change 8, 38-42. (attached)

Arvola, A.M., Ha, H.T., Kanninen, M., Malkamäki, A., Simola, N. 2021. Financial Attractiveness of Wood Production in Smallholder Plantations of Central Vietnam in the Context of Developing Carbon Markets. Journal of Tropical Forest Science 33, 137-148. (attached)

2. Read these two papers for the description of the models/software (voluntary)

Larjavaara, M., Kanninen, M., Alam, S.A., Mäkinen, A., Poeplau, C. 2017. CarboScen: a tool to estimate carbon implications of land-use scenarios. Ecography 40, 894-900. (attached)

Masera, O.R., Garza-Caligaris, J.F., Kanninen, M., Karjalainen, T., Liski, J., Nabuurs, G.J., Pussinen, A., de Jong, B.H.J., Mohren, G.M.J. 2003. Modeling carbon sequestration in afforestation, agroforestry and forest management projects: the CO2FIX V.2 approach. Ecological Modelling 164, 177-199. (attached)

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Bring your own data set to the training (optional)

CarboScen:

- The model simulates changes in ecosystem carbon pools (aboveground carbon and soil carbon) in a large landscape and in the presence of a land use change, e.g. deforestation (conversion of natural forest to farm land) or restoration (conversion of monoculture coffee into coffee agroforestry system by adding trees).
- Bring the data of carbon pools (aboveground and soil carbon) (Mg C ha^{-1}) of your case study. In minimum, you will need four values: 1) aboveground carbon pool (Mg C ha^{-1}) and 2) soil carbon pool (Mg C ha^{-1}) of your land use type 1 (e.g. natural forest), and 3) aboveground carbon pool (Mg C ha^{-1}) and 4) soil carbon pool (Mg C ha^{-1}) of your land use type 2 (e.g. farm land).

CO2FIX:

- The model simulates changes in carbon pools of one land use type (e.g. tree plantation) over several rotations. It is commonly used for ex-ante estimation of carbon sequestration benefits of the planned intervention. These interventions can be e.g. a) establishment of plantation or agroforestry system, b) sustainable management of existing forest.
- CO2FIX uses tree volume growth (m^3 ha^{-1} $year^{-1}$) as the main input data for the simulations.
- Bring the data described above in the form of a table, e.g. as follows (required fields are marked in red)

Table 4. Yield table developed in the present study for *Acacia* hybrid plantations in Vietnam. Diameter at breast height (DBH), basal area (BA), mean height (H_m), dominant height (H_{dom}), number of trees per hectare (N_{ha}), volume per hectare (V_{ha}), and current annual increment (CAI) were calculated against stand age using the growth models developed in this study.

Stand Age (Years)	DBH (cm)	BA (m^2 ha^{-1})	H_m (m)	H_{dom} (m)	N_{ha} (Trees ha^{-1})	V_{ha} (m^3 ha^{-1})	CAI (m^3 ha^{-1} yr^{-1})
1	1.6	1.4	0.5	0.5	2877	4	4
2	3.3	5.9	3.9	4.3	3663	21	17
3	4.9	11.7	7.3	8.5	4345	49	28
4	6.4	17.5	9.8	12.6	4803	86	37
5	7.8	22.7	11.9	16.2	4946	128	42
6	8.9	26.8	13.8	19.1	4747	174	46
7	10.0	30.1	15.3	21.3	4245	220	46
8	11.0	32.6	16.6	23.0	3537	265	45
9	11.8	34.5	17.7	24.3	2746	309	44
10	12.5	35.8	18.6	25.2	1986	351	42

Data: Lee, S.-H., Kim, D.-H., Jeong, J.-H., Han, S.-H., Kim, S., Park, H.-J., Kim, H.-J. 2022. Developing a Yield Table and Analyzing the Economic Feasibility for Acacia Hybrid Plantations in Achieving Carbon Neutrality in Southern Vietnam. Forests 13.