CO2 sequestration from forest and bogs - Flow/Supply

General description

This indicator represents the **annual rate of CO2 sequestration by forests at the municipal level (t CO$_2$ ha^{-1} y^{-1})**. This value is calculated on the basis of the IPCC equations used to estimate the **annual increase in biomass carbon stock due to biomass increment**. This method allows above and below ground estimation of biomass increase in tonnes of carbon per year. The application of a standard constant converts the result into the amount of CO$_2$ being sequestered. **Figure 1** describes in detail the calculation procedure to derive the amount of CO$_2$ sequestration (t CO2 ha^{-1} y^{-1}) per local administrative units (LAU2) of the Alpine Space.

Input data

- DEM
- Forest Type Landcover
- Forest Biomass increment factors (above and below ground)
- Climate zones

Calculation processes

(1) Create Forest Classification

The classification is based on three criteria:

- Forest typology: coniferous or broadleaved * Altitude, three classes have been taken into consideration: 0 - 600m; 600m-1200m; >1200m. * Climatic regions: the Alpine space has been divided in different macro-climatic areas basing on different climatic classifications: the Central Alps, Northern Alps and Southern Alps.

(2) IPCC Equations Calculation: application of the IPCC equations (2.9 and 2.10 of the IPCC guidelines, vol. 4, ch. 2, modified to obtain the results as quantity of CO$_2$) with proper factors derived from different sources:

- **Above ground biomass:** Values for above ground biomass were derived from the dataset created by Busetto et al. (2014). As this dataset did not cover the entire Alpine Space, two additional methods were used to calculate these factors for the remaining area:

- **Interpolation of the values:** interpolation of the factor value from (Busetto et Al. 2014).
- **Calculation based on factors from National Forest Inventories**: application of the factors derived from the Swiss National Forest Inventory, scaled

on the base of forest typology, altitude and climatic macro-area using the results from **(1)**.

- **Below ground biomass:** The factors to be used in the equation are derived from the Swiss National Forest Inventory and scaled based on forest typology, altitude and climatic macro-area using the results from **(1)**.

(3) Calculate Forest Sequestration per Municipality: calculate statistics of the tonnes of CO_2 sequestered by hectare of forest in the single municipalities using the forest area and the sum of sequestration per municipality.
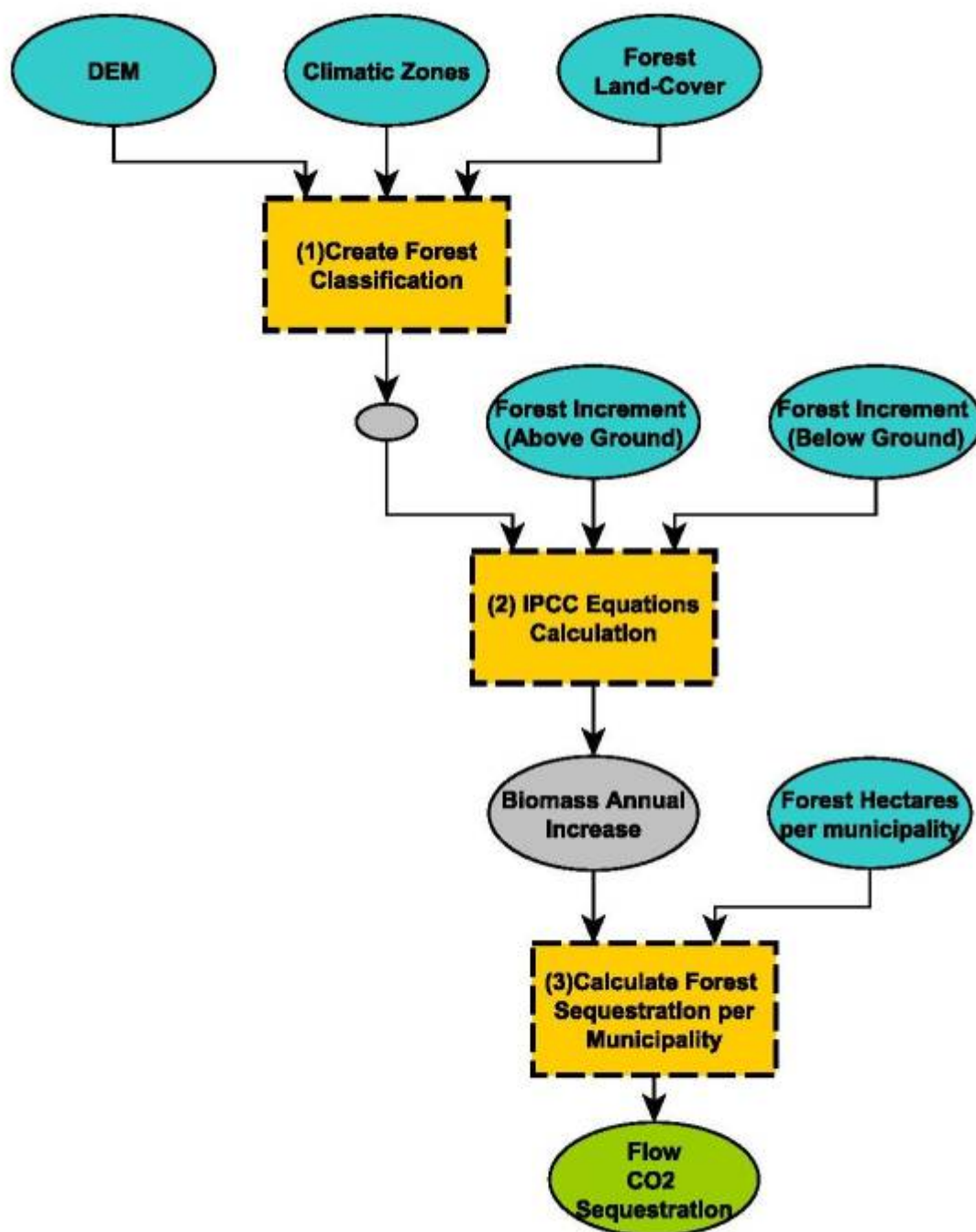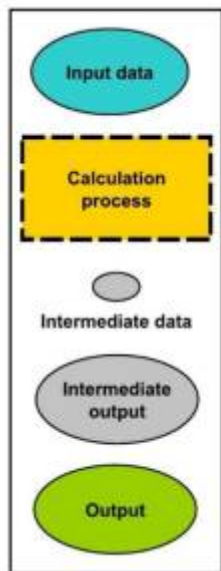
Input data→elements that hold a value or a reference to data stored on disk. It is usually a spatial explicit information coming from official sources.

Calculation process→ the actual operation performed on the data. The number preceding the item refers to the number in the model description.

Intermediate data→ for each calculation process intermediate data is generated. This data, however, is usually not significant itself, but is used as an input for the next calculation step.

Intermediate output→ is intermediate data that has a significance for the ES evaluation.

Output→ is the result of the calculation process. It is typically one of the ES indicators, either Supply, Demand or Flow.

References:

IPCC, (2006) IPCC guidelines for national greenhouse gas inventories, prepared by the national greenhouse gas inventories program, Vol. 4, Ch. 2-4, Forest Land)

Busetto, L., J. I. Barredo, and J. San-Miguel-Ayanz. "Developing a spatially-explicit pan-European dataset of forest biomass increment." (2014): 41-46

Brändli, U.-B. (Red.) 2010: Schweizerisches Landesforstinventar. Ergebnisse der dritten Erhebung 2004–2006. Birmensdorf, Eidgenössische Forschungsanstalt für Wald, Schnee und Landschaft WSL. Bern, Bundesamt für Umwelt, BAFU. Pag. 111 Tab. 094-095

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