

Assessing peatlands productivity

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Living plants are capable of fixing atmospheric carbon through photosynthesis by utilizing solar energy. The product is called gross primary product (*GPP*). At the same time the plants are also releasing energy through autotrophic respiration (R_a) causing the reduction of *GPP* into net primary product (*NPP*) that will be stored as biomass in the plant tissues:

$$NPP = GPP - R_a$$

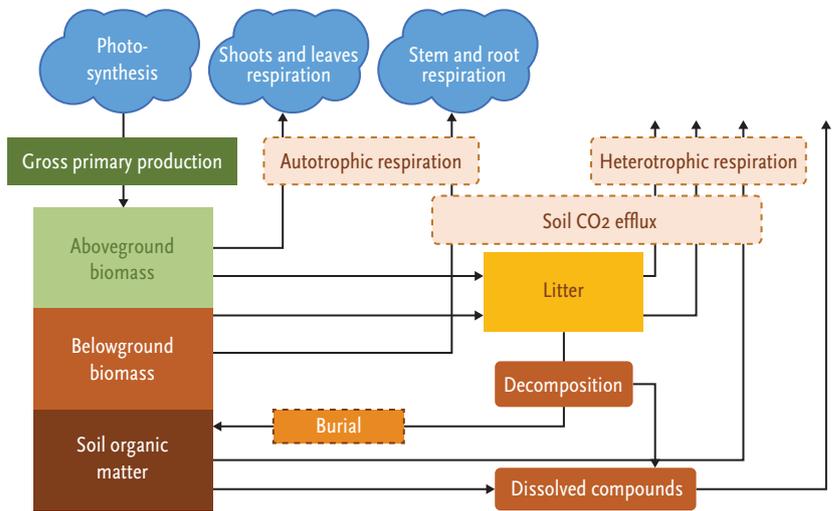


At ecosystem level, like peatlands, *NPP* will be further reduced due to heterotrophic respiration (R_h) as the organic materials stored in the soil are decomposed or oxidized. As a result net ecosystem product is lowered and expressed as:

$$NEP = GPP - R_a - R_h$$

Estimating NPP and NEP

NPP is estimated by summing up tree growth components: (1) tree diameter increment measured using dendrometer; (2) litter production collected from traps over a certain period of time; and (3) root mass growth. Heterotrophic respiration (R_h) is measured in trenched plots that separate living roots. Root respiration (R_a) is calculated by differentiating the measured total soil respiration and measured R_h .



Facts and figures

NPP is limited by the availability of soil nutrients, such as phosphate (P) and nitrogen (N), and depends on climatic conditions such as precipitation and temperature, and soil moisture.

In West Kalimantan, the *NPP* of logged-over peat swamp forests was $40.6 \pm 1.0 \text{ Mg CO}_2 \text{ ha}^{-1} \text{ yr}^{-1}$ higher compared with oil palm ($13.6 \pm 0.2 \text{ Mg CO}_2 \text{ ha}^{-1} \text{ yr}^{-1}$) or *NPP* of lowland tropical rain forests in Malaysia ($45.9 \text{ Mg CO}_2 \text{ ha}^{-1} \text{ yr}^{-1}$) and Brazil ($30.8 \text{ Mg CO}_2 \text{ ha}^{-1} \text{ yr}^{-1}$).

References

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Dendrometer



Litter trap



Total and heterotrophic respiration devices



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