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## Greenhouse gases and soil nutrient cycling

**Keywords:** Carbon dioxide, methane, nitrous oxide, nitrogen, soil

The research focus in the Wetlands project is on soil nutrient dynamics, mainly of nitrogen, and the quantification of trace gas fluxes as sustainability indicators. Soil nitrogen dynamics are determined frequently to be able to detect seasonal changes in soil nitrogen availability. Soil-atmosphere gas fluxes are utilized as sustainability indicators, with CO<sub>2</sub> as an indicator of soil organic matter stability, NH<sub>3</sub> and N<sub>2</sub>O as indicators of the closeness or openness of the nitrogen cycle (nitrogen retention), and CH<sub>4</sub> as an indicator of the redox status of the soil. In the central field experiments in Tanzania and Uganda soil-atmosphere CO<sub>2</sub> fluxes are quantified with a portable analyzer/dynamic chamber system, whereas N<sub>2</sub>O and CH<sub>4</sub> fluxes are determined from gas samples taken with syringes from static chambers on a weekly/fortnightly basis and transferred to evacuated vials, which are analyzed in the laboratory by gas chromatography. NH<sub>3</sub> losses will be estimated with passive samplers at selected sites where high fluxes can be expected, and with empirical equations for all sites. The turnover rates of SOC and the N supplying capacity as well as gaseous soil C and N losses are determined in incubation experiments under controlled conditions with intact soil cores taken at the field sites. The effect of wetland conversion to agricultural land on N volatilization will be also tested by stable isotope analysis of the soil <sup>15</sup>N signature, as high N emission rates lead to an increase in the <sup>15</sup>N content of the mineral soil N pools.



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Cluster	A, B
Work Package	A1, A5, B2
Countries of work	Tanzania, Uganda
Institute	Institute of Bio- and Geosciences - Agrosphere (IBG-3)
University/Organisation	Forschungszentrum Jülich (Jülich Research Center)