EU peatlands: An overview of current trace gas fluxes

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The CARBOEUROPE-GHG initiative aimed at compiling the present knowledge base on GHG-exchange of major EU-ecosystems. This presentation on the most up-to-date overview on GHG-exchange of EU-peatlands has three chapters: 1) a compilation of the state of the art up to 2004 (see Byrne et al. 2004), 2) the addition of recent studies to fill the research and knowledge gaps 3) an outlook to potential indicators for explaining the differences of the peatland GHG fluxes over the EU.

1) Major findings of Byrne-study were, that the GHG studies are unevenly distributed in terms of (i) representation of different land-use types of peatland ecosystems and (ii) inclusion of all three gases (CO_2, CH_4, N_2O). Mean emission factors were calculated for natural peatlands and a set of different land-use types, further differentiated in boreal and temperate climate zones. Mean emissions factors (calculated as GWP 100 CO_2-C equivalents) were multiplied with the areas of the different land-use types in the countries (EU-25 plus European Russia). The status of actual inventories of land cover types on peatlands within the member states is very different. This provokes, together with uncertainties in the mean emission factors, that the global warming effect of EU-peatlands (52 Tg CO_2-C equivalents) should be seen as best estimate. Apart from identified major knowledge gaps, some consistent findings are, e.g. that no EU-country is acting as GWP-sink concerning the peatland fluxes, and that NEE of restored fens is totally missing in the database.

2) With the inclusion of the recent studies, the database is more comprehensive. The bog related fluxes were widely confirmed. However, in the fens new studies especially from the temperate region (Netherlands: Dolman et al. and Veenendaal et al.; Southern Germany: Drösler, Freibauer et al., North-eastern Germany: Augustin et al., and Poland: Olejnik et al.) change the picture in terms of significant CO2 uptake (more than 100 g CO_2-C) and extremely high CH_4 fluxes (up to 200 g CH_4-C m^{-2} a^{-1}) from recently restored peatlands, as well as the record for the first GWP-sink from the Rzecin-site (Poland) with 100 g C-equiv m^{-2} a^{-1} uptake.

3) A concept and first results for the use of simple indicators (e.g. peatland type, latitudinal position, climate parameters, mean water table, pH, electric conductivity, peat degradation, aerenchyma a.s.o) to explain the gradient of the different fluxes over the EU via multivariate analysis will be presented.