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## Limited contribution from land based carbon mitigation to climate stabilization

**Protecting, cropping and enhancing carbon in vegetation and soils can have a limited contribution in achieving climate stabilization by the end of this century. However, future land-management will be crucial to fulfill human needs. Both objectives, climate mitigation and fulfilling human needs, can only be achieved by sustainable and integrated land management, says Prof. Dr. Ernst-Detlef Schulze from Max Planck Institute for Biogeochemistry in Jena, Germany and co-author of a new study published today in Nature Communications.**

Land-based climate mitigation requires land and vegetation biomass that is in competition with a growing demand for food, wood products, energy, bio-economy, and biodiversity conservation.

Prof. Schulze states: “Up to 38 pentagrams\* carbon (C) avoided emissions and carbon sequestration are feasible until 2050 if moderate economic incentives are put in place, where mitigation from bioenergy is equivalent to 3 to 8% of the estimated energy consumption in 2050. This estimated contribution towards climate mitigation is smaller than previous estimates, which considered limited sustainability safeguards in the deployment of large-scale mitigation activities, and which avoided accounting of associated emissions of non-CO<sub>2</sub> greenhouse gases (methane and nitrous oxide).”

Reducing tropical deforestation is one of the most attractive (yet challenging) activities, followed by the substitution of fossil fuels by bioenergy, increasing soil carbon in rangelands and afforestation of degraded land, and reducing methane and nitrous oxide emissions in agriculture.

Dr. Pep Canadell, lead author and research scientist in the Commonwealth Scientific and Industrial Research Organization (CSIRO) in Australia, says that “current expectations for land demand to fulfill all the needs for food, wood products, energy, bio-economy, and climate mitigation until 2050 surpass the actual land that is available by factor of 3 to 7. Thus, future requirements of the various sectors in the society are incompatible with the available land. A partial fulfillment for those land and biomass expectation would require humankind to move into areas currently considered remote and low-productivity lands”.

The assessment was based on strong sustainability safeguards, did not rely on improbable global carbon markets or on high carbon prices based on what has happened over the past 20 years of climate negotiations; and it accounted for all greenhouse-gas emissions by land-use.

The study indicates that the present and future high needs for land-based products can only be reached by sustainable intensification of land-use. This includes a continuation of searching for increased yields, and the increase of the number of crops used on a piece of land over time. Critical to the sustainable intensification of biomass production is an improvement of nitrogen management to minimize nitrous oxide emissions. Emissions of non-CO<sub>2</sub> greenhouse gases from agriculture and an-

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imal husbandry presently counteract the global natural carbon sink capacity of global vegetation. (P.C.)

\*1 petagram (Pg) is equivalent to 1 billion tons

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