

Greenhouse Gas Budget of Soils under Changing Climate and Land Use (COST 639 BurnOut)

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Greenhouse gas (GHG) emissions are a topical issue in the current discussion about climate change. The importance of forests and soils for the greenhouse gas budget cannot be ignored in this context. The Action [COST-639 \(BurnOut\)](#) focuses particularly on the role of soils and investigates how land-use changes may raise or reduce the release of GHG.

Carbon stored in soils represents the largest terrestrial organic C pool. The biogeochemical cycle of carbon is closely connected with that of nitrogen and as a result of mineralization processes, both elements are liberated from soil organic matter. Both C and N occur in terrestrial ecosystems in several chemical forms and are potentially emitted as GHG. Changing land use due to deforestation, biomass burning, conversion of natural ecosystems to agricultural use, drainage of wetlands and soil cultivation may increase these GHG emissions.



'Drainage of peatland invokes an insufficiently understood release of greenhouse gases.'
Photo: Courtesy of Maurizio Mencuccini,
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However, soils can also act as GHG sinks, although considerable uncertainty exists regarding the sink strength of soils under different forms of land use, especially under future climate conditions and under regional disturbance regimes. Recognizing that soil monitoring for a periodic assessment of soil C and N stocks is extremely expensive, the COST action focuses on the identification of sites where changes in C and N are most likely, because these are the areas where monitoring efforts can be concentrated. The focus will be placed on the interfaces of different land uses and ecosystem disturbances that are typical of specific regions.

In Northern and Western Europe, for instance, peatland currently retains large quantities of C and N, because the decomposition of soil organic matter is slow. Global warming and drainage of these wetlands releases GHG into the atmosphere. Drying of peatlands therefore is a slow, but extremely significant ecosystem disturbance and peatlands are therefore assumed to be hotspots of future GHG releases. Temperate region forests are presently GHG sinks, but the future development of disturbances is hard to predict. The GHG sink strength of Mediterranean ecosystems is currently under-exploited, because degraded landscapes are widely spread. Reversing the effect of past land disturbances is on the political agenda as a mitigation activity. This land-use change is believed to have a great potential for the sequestration of GHG. Principally, the maintenance of the current sink activity of forest soils, agricultural forms of management that turn arable soils into GHG sinks, and the protection of pristine landscapes such as wetlands and old forests are of crucial importance.

In the course of COST Action 639 (Dec 2006 - Dec 2010) several open-call workshops will be held. Contributions from colleagues in the IUFRO network are highly welcome as the topic fits into the scope of the Carbon Sequestration Task Force and of IUFRO Division 8.

Interested colleagues are invited to look up the current program of events at <http://www.cost639.net>.

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[Terminology](#)