Intensive land management leaves Europe without carbon sinks

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A new calculation of Europe's greenhouse gas balance shows that emissions of methane and nitrous oxide tip the balance and eliminate Europe's terrestrial sink of greenhouse gases.

Of all global carbon dioxide emissions, less than half accumulate in the atmosphere where it contributes to global warming. The remainder is hidden away in oceans and terrestrial ecosystems such as forests, grasslands and peat-lands. Stimulating this "free service" of aquatic and terrestrial ecosystems is considered one of the main, immediately available ways of reducing climate change. However, new greenhouse gas bookkeeping has revealed that for the European continent this

service isn't free after all. These findings are presented in the most recent edition of *Nature Geoscience* (Advanced Online Publication, November 22, 2009).

Researchers from 17 European countries cooperating in the EU-Integrated Project CarboEurope, led by Detlef Schulze, of the Max Planck Institute for Biogeochemistry in Jena, Germany have compiled the first comprehensive greenhouse gas balance of Europe. They made two independent estimates: one based on what the atmosphere sees and one based on what terrestrial ecosystems see.
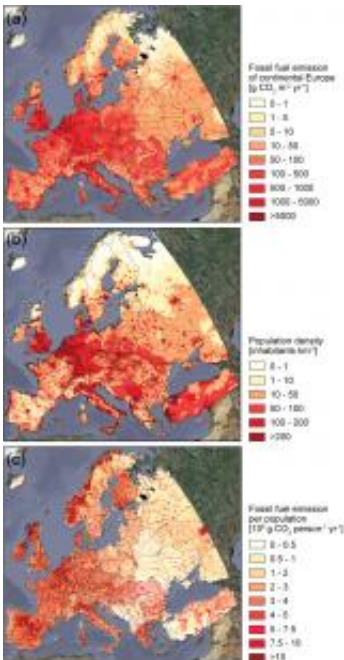
The new bookkeeping effort confirmed the existence of a strong carbon sink of -305 Million tonnes of carbon per year in European forests and grasslands. A sink of this magnitude could offset 19% of the emission

from fossil fuel burning. However, agricultural land and drained peat-land are emitting carbon dioxide, which cancels part of this sink. The resulting net carbon dioxide sink of the European continent is 274 Million tonnes of carbon per year - only 15% of the emissions from fossil fuel burning.

But this balance is still incomplete, because all European ecosystems are managed and as a by-product of land management other powerful greenhouse gases are released - for example nitrous oxide from fertilizers applied to grassland and crops, and methane from ruminants and from peat-lands. These previously neglected emissions of greenhouse gases from land-use cancel out almost the entire carbon sink, leaving the landscape offsetting only some 2% of the carbon dioxide emissions from households, transport and industry.

Compared to Europe as a whole, the situation is even worse for the 25 states of the European Union. Here, although forests and grasslands can compensate for 13% of the carbon dioxide emitted by fossil fuel burning, emission of powerful greenhouse gases from agricultural emissions and peat mining reduces the effectiveness of the land surface sink to 111 Million tonnes of carbon per year, which is only 11% of the carbon dioxide emitted by fossil fuels. However, since the emissions of methane and nitrous oxide are relatively higher in the European Union the land surface emerges as a greenhouse gas source of 34 Million tonnes of carbon per year. This effectively increases the emissions from fossil fuel burning by another 3%.

Prof Schulze said "These findings show that if the European landscape is to contribute to mitigating global warming, we need a new, different emphasis on land management. Methane and nitrous oxide are such powerful greenhouse gases; we must manage the landscape to decrease their emissions."

Source: Max-Planck-Gesellschaft (news : web)

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