

Current climate change predictions far too high because of nitrogen ignorance

Forests play an important role in reducing the green house gas CO₂, which has a major impact on global warming. For the period 2000-2007, it has been estimated that from the 8.9 billion ton of carbon released by man, approximately 46% is found back in the atmosphere. The removed 54% is due to an estimated equal amount absorbed in oceans and taken up by forests and other natural vegetations.

The role of the forests is assumed to increase in the future, as an important buffer of climate change and increasing CO₂ concentrations. So-called Earth System Models, computer systems making predictions for the globe, estimate that this effect can be very large. However, new research results, based on measurements at hundreds of European forests, indicate that predicted effects by these models are overestimated because they ignore the limitation of nitrogen. It makes the current predictions by earth system models more than twice as high as they most likely will be. The effects of climate change and CO₂ increase are thus overestimated when neglecting the limitation induced by low nitrogen availability. Low availability of other nutrients, such as calcium and magnesium, can also limit the growth. This is one of the results of a study, carried out under the lead of Alterra, Wageningen University and research Centre and published in a special issue of *Forest Ecology and Management* of September.

Despite nutrient limitation, it is expected that future environmental change up to 2100 may lead to an average increase in carbon pool changes in trees of 35-40%. An increased growth is specifically expected in boreal climates due to the dominating effect of an increase in temperature, but in large parts of Southern Europe, the effect is opposite due to increased drought stress. Research at the forest monitoring plots has also shown that for 1 kilogram of nitrogen deposited from the atmosphere, approximately 30-70 kg of carbon will be sequestered in both forests and forest soils. This corresponds to an annual global carbon sink of 0.15 – 0.35 billion ton, being 2-4 % of the estimated release by man.

More information

[Link to] Article Forest Ecology and Management of September

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