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A UNEP RAPID RESPONSE ASSESSMENT

THE NATURAL FIX?

THE ROLE OF ECOSYSTEMS IN CLIMATE MITIGATION

EXECUTIVE SUMMARY

Very large cuts in emissions of greenhouse gases are needed if we are to avoid the worst effects of global climate change. This report describes the vital contribution that the management of ecosystems can and must make to these efforts.

To keep average temperature rises to less than 2°C, global emissions have to be reduced by up to 85% from 2000 levels by 2050 and to peak no later than 2015, according to the IPCC.

But rather than slowing, the rate of greenhouse gas emissions is going up. The most recent estimates indicate that human activities are currently responsible for annual global carbon emissions of around 10 Gt, of which around 1.5 Gt is a result of land use change and the rest from fossil fuel use and cement production (Canadell *et al.* 2007). This has led to an average annual rate of increase of carbon dioxide concentrations in the atmosphere of just under 2 ppm for the years 1995–2005 compared with around 1.25 ppm for the years 1960–1995 (IPCC 2007b).

Vigorous efforts are needed to reverse this trend and doing so will be impossible without addressing carbon losses from ecosystems such as forests and peatlands. Managing ecosystems for carbon can not only reduce carbon emissions; it can also actively remove carbon dioxide from the atmosphere. Restoring some of the large amounts of carbon lost from soils, particularly from agricultural soils and drylands has the greatest potential here. A challenging but achievable goal is to make agriculture carbon neutral by 2030. Currently, this natural fix is the only feasible option for removing carbon from the atmosphere at large; carbon capture and storage technologies are appropriate only for concentrated point sources such as power stations.

Ecosystem carbon management can be a cost-effective approach too. Without perverse subsidies to support alternative land uses, the opportunity cost of reducing deforestation and restoring peatlands can be low. Overall, costs are modest relative to clean energy options.

In many cases there is great scope for achieving other societal goals alongside carbon storage such as improving agricultural soil fertility, creating new employment and income-generating opportunities, and contributing to biodiversity conservation. A clearer understanding of the benefits and costs of ecosystem carbon management is needed to inform land use decisions. ▸

Main report available at http://grida.no/publications/rr/natural-fix
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There are risks and uncertainties that need to be taken into account. Some ecosystem carbon stores can be lost through the impact of climate change itself and changes in land use. All stores, except perhaps peat, will eventually reach saturation. There is still uncertainty about the amounts sequestered under different management regimes and considerable variability between areas and much work to be done on how best to manage and monitor carbon. While forests, agriculture and peatland have been highlighted as urgent priorities, the role of other ecosystems is also important and needs to be taken into account.

Implementation of widespread ecosystem carbon management policies presents great challenges, raising significant institutional and regulatory issues and complex political and socio-economic dilemmas. In particular, an effective policy will need to achieve a balance between rural livelihoods and carbon management policies that may threaten those livelihoods. It is often difficult to ensure that the rewards for good carbon management reach the communities involved. It is crucial that the voices of the rural poor and indigenous people are not lost in a rush to secure carbon gains.

The key messages from this report are:

- It is vital to manage carbon in biological systems, to safeguard existing stores of carbon, reduce emissions and to maximise the potential of natural and agricultural areas for removing carbon from the atmosphere.
- The priority systems are tropical forests, peatlands and agriculture. Reducing deforestation rates by 50% by 2050 and then maintaining them at this level until 2100 would avoid the direct release of up to 50 Gt C this century, which is equivalent to 12% of the emissions reductions needed to keep atmospheric concentrations of carbon dioxide below 450 ppm.
- Peatland degradation contributes up to 0.8 Gt C a year, much of which could be avoided through restoration. The agricultural sector could be broadly carbon neutral by 2030 if best management practices were widely adopted (equivalent to up to 2 Gt C a year).
- It is essential that climate mitigation policy is guided by the best available science concerning ecosystem carbon, and decisions should be informed by the overall costs and benefits of carbon management.
- Developing policies to achieve these ends is a challenge: it will be necessary to ensure that local and indigenous peoples are not disadvantaged and to consider the potential for achieving co-benefits for biodiversity and ecosystem services. Drylands, in particular, offer opportunities for combining carbon management and land restoration.
- The adoption of a comprehensive policy framework under UNFCCC for addressing ecosystem carbon management would be a very significant advance.