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Nature Reports Climate Change

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LIVING ON THE LAND

One of the Earth's greatest carbon sinks, land has the potential to lock away a lot of greenhouse gas. But our land-based activities have collectively become one of the greatest contributors to planetary warming, accounting for almost a quarter of carbon dioxide and almost three-quarters of methane and nitrous oxide emissions. Although basic human needs — food and shelter — are at the heart of the problem, our insatiable demand for goods, services and protein from an under-resourced planet is now driving the destruction of the world's forests for clearance, cultivation and farming. Without intervention, emissions from both deforestation and agriculture will rise in coming decades.

In theory, rethinking our relationship with the land could prove one of the simplest and fastest ways of mitigating climate change. After all, halting deforestation — a goal worthy for reasons besides climate cooling — could single-handedly lop a whopping 20 per cent off global greenhouse gas emissions. Agriculture, which alone accounts for some ten per cent of global emissions, is — on paper, at least — another easy pick. Because most of its emissions are in the form of potent, short-lived gases such as methane, the sector represents a spectacular opportunity to slow warming quickly. In contrast, reducing carbon dioxide emissions from energy sources, though unequivocally important, will mean reshaping the entire economy. Moreover, it will take decades to have an effect on global temperatures.

In reality, reducing emissions from either deforestation (see page 101) or agriculture (see page 104) will be fraught with difficulties. For deforestation there will be few technical challenges other than those needed to ensure compliance. But changing long-established patterns of poor land management will require serious financial incentives and the assurance of equity. Both could potentially be achieved under a new climate treaty, if nations can agree on a means to do so in Copenhagen. Brazil's Amazon Fund — currently the world's largest forest-conservation initiative — is just one model that could serve as a global blueprint (*Nature* **460**, 936–937; 2009).

For agriculture, however, more basic technical challenges remain. Among the most trying will be breeding or rearing cows and sheep that emit less methane during flatulence and belching. Scientists are testing all means of solutions, from dietary manipulation to genetic engineering, but any advances are likely to be countered by the rapid worldwide growth in demand for meat and dairy products. In the short term, economic incentives could also do much to encourage emissions-saving behaviours across this sector.

In the long run, however, reducing these emissions will ultimately require a radical rethink of how much we can demand from the land and its services. While we will undoubtedly find effective ways to harness new and renewable sources of energy from wind, water or sun, the Earth's land — covering just 29 per cent of the planet's surface — is both limited and irreplaceable.

OLIVE HEFFERNAN, EDITOR

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RESEARCH HIGHLIGHTS

99 Ocean science

The acid test

Alicia Newton

Atmospheric science

Clear view

Anna Armstrong

Cryosphere

Seabed seepage

Anna Barnett

Climate prediction

Estimating uncertainty

Olive Heffernan

100 Biodiversity and ecology

Crossing the line

Anna Armstrong

Climate Impacts

Expanding sands

Alicia Newton

FEATURES

101 When money grows on trees

Mark Schroppe

104 Towards greener grazing

Kevin Morrison

POLICY WATCH

107 India makes headway on climate policy

Anna Barnett

Q&A

108 Interview: Dieter Helm

Anna Barnett