Pastures new

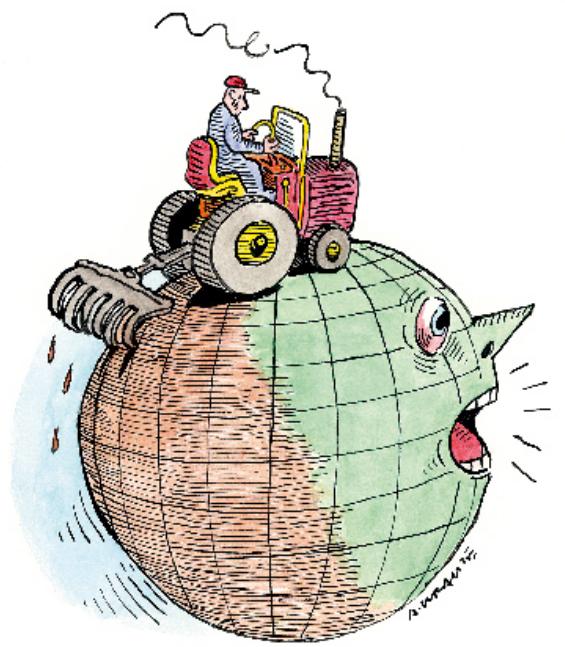
Farming the planet without destroying it is a huge challenge. We must urgently rethink what counts as "sustainable", say **Chris Pollock** and **Jules Pretty**

SUSTAINABLE development is the mantra of the 21st century. It is applied to just about everything from energy to clean water and economic growth, and as a result it has become difficult to question either the basic assumptions behind it or the way the concept is put to use. This is especially true in agriculture, where sustainable development is often taken as the sole measure of progress – always a dangerous notion – without a proper appreciation of historical and cultural perspectives.

To start with, it is important to remember that the nature of agriculture – its benefits and its impact on the environment – has changed markedly throughout history, and will continue to do so. Medieval rotational agriculture in northern Europe fed, clothed and sheltered a predominantly rural society with a population density at least an order of magnitude lower than it is today. It had minimal effect on biodiversity, and any pollution it caused was typically localised. However, in terms of energy use and the nutrients captured in the product it was relatively inefficient.

Contrast this with farming since the start of the industrial revolution. Competition from overseas led farmers to specialise and increase yields. Throughout this period food became cheaper, safer to eat and more reliable. However, these changes have also led to habitat loss or degradation, and to diminishing biodiversity on farmland and in the surrounding countryside. Flora and fauna in the UK are now in remarkably poor condition, and according to the Environment Agency, farming is the most significant cause of serious pollution incidents.

To make matters worse, certain agricultural practices considered sustainable may have unexpected downsides. For example, planting nitrogen-fixing legumes can lead to excess nitrogen leaching from the soil, causing eutrophication; ploughing can causes soils to lose carbon; and zero tillage (minimising soil disturbance when managing crops) requires herbicides.



What concerns us is that pressure on land the world over is likely to increase for at least the next half-century, making it even harder to make agriculture truly sustainable. The global population is likely to rise by at least another 2 billion to around 9 billion by 2045 or 2050. Demographers think it will then stabilise and probably fall over the subsequent century, but we are not there yet. It is likely that climate change will significantly reduce crop and animal yields, particularly in the subtropics and tropics, where reductions of between 5 and 10 per cent are predicted by 2050.

At the same time, demand for animal products in developing countries is growing so fast that meeting it will require an extra 300 million tonnes of grain a year by 2050. Yet the growth of cities and industry is reducing the amount of water available for agriculture in many regions. In the UK, farmers are still wondering how they can make a living producing food without subsidies, while ideas about paying farmers for environmental services such as flood protection, carbon sequestration and biodiversity have not yet translated into farm incomes.

"There are many ways to measure agricultural performance besides food yields"

All this means that agriculture in the 21st century will have to be very different to how it was in the 20th. This will require radical thinking. For example, we need to move away from the idea that traditional practices are inevitably more sustainable than new ones. We also need to abandon the notion that agriculture can be "zero impact". The key will be to abandon the rather simple and static measures of sustainability that have become common, which centre on the need to maintain production without increasing damage.

Instead we need a more dynamic interpretation, one that looks at the pros and cons of all the various ways land is used. There are many different ways to measure agricultural performance besides food yield: energy use, environmental costs, water purity, carbon footprint, biodiversity. It is clear, for example, that the carbon cost of transporting tomatoes from Spain to the UK is less than that of producing them in the UK with additional heating and lighting (unless this comes from renewable sources). But we do not know whether lower carbon footprints will always be better for biodiversity.

What is crucial is recognising that sustainable agriculture is not just about sustainable food production. In biodiversity terms, the two largest changes in the UK landscape in recent decades occurred following the shift from spring-sown to winter-sown cereals, and the shift from hay-making to silage production. Although these were just simple management changes, they altered the balance between the farmed and the non-farmed elements in the landscape and had considerable consequences for farmland birds. Seeing this kind of broad picture is crucial; without it we will continue to pay lip service to sustainability without ever developing ways to improve it.

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