
Can the planet feed us?

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As part of *Planet Under Pressure*, a BBC News series looking at some of the biggest environmental problems facing humanity, Alex Kirby explores the challenge of feeding the world without destroying the planet.

More of us are eating more and better than ever before.

World cereal consumption has more than doubled since 1970, and meat consumption has tripled since 1961.

The global fish catch grew more than six times from 1950 to 1997.

None of this happened by magic, though, but only by giving Nature a massive helping hand.

The World Resources Institute said in 1999 that half of all the commercial fertiliser ever produced had been applied since 1984.

So one question is whether the world can go on increasing its harvests at this rate - or even faster, to cater as well for the extra 75 million people born annually.

Crop increases

Our recent achievements are impressive - while global population doubled to 6 billion people in the 40 years from 1960, global food production more than kept up.

The proportion of malnourished people fell in the three decades to the mid-1990s from 37% to 18%. But we may not be able to go on at this rate.

For a start, much of the world's best cropland is already in use, and farmers are having to turn to increasingly marginal land. And the good land is often taking a battering - soil degradation has already reduced global agricultural productivity by 13% in the last half-century.

Many of the pesticides on which the crop increases have depended are losing their effectiveness, as the pests acquire more resistance.

A key constraint is water. The 17% of cropland that is irrigated produces an estimated 30-40% of all crops, but in many countries there will be progressively less water available for agriculture.

Many of these are poor countries, where irrigation can boost crop yields by up to 400%. There are ways to improve irrigation and to use water more effectively, but it's not clear these can bridge the gap.

Biotechnology, in principle, may offer the world a second Green Revolution, for example by producing drought-resistant plants or varieties that withstand pest attacks.

But it arouses deep unease, not least because of fears it may erode the genetic resources in thousands of traditional varieties grown in small communities across the world.

Nobody knows what the probable impacts of climate change will be on food supplies.

Modest temperature increases may actually benefit rich temperate countries, but make harvests even more precarious across much of the tropics.

Too little space

Another question concerns the huge cost to other forms of life of all the progress we've made in securing our own food supply.

The amount of nitrogen available for uptake by plants is much higher than the natural level, and has more than doubled since the 1940s.

The excess comes from fertilisers running off farmland, from livestock manure, and from other human activities. It is changing the composition of species in ecosystems, reducing soil fertility, depleting the ozone layer, intensifying climate change, and creating dead zones in the Gulf of Mexico and other near-coastal seas.

The sheer amount of the Earth we need to produce our food is having an enormous impact.

Globally, we have taken over about 26% of the planet's land area (roughly 3.3 billion hectares) for cropland and pasture, replacing a third of temperate and tropical forests and a quarter of natural grasslands.

Another 0.5 billion ha has gone for urban and built-up areas. Habitat loss from the conversion of natural ecosystems is the main reason why other species are being pushed closer to the brink of extinction.

Food security comes at a high price. In any case, it is a security many can only envy.

Increasing hunger

At the moment we are not on course to achieve the Millennium Development Goal of halving world hunger by 2015.

Although the proportion of hungry people is coming down, population increase means the actual number continues to rise.

In the 1990s global poverty fell by 20%, but the number of hungry people rose by 18 million. In 2003, 842 million people did not have enough to eat, a third of them in sub-Saharan Africa, according to the UN's Food and Agriculture Organisation.

Hunger and malnutrition killed 10 million people a year, 25,000 a day - one life extinguished every five seconds.

The world does produce enough to feed everyone. But the food is often in the wrong place, or unaffordable, or can't be stored long enough. So making sure everyone has enough to eat is more about politics than science.

But whether we can go on eating the sort of diet we've grown used to in developed countries is far from clear.

Much of it travels a long way to reach us, with the transport costs adding hugely to the "embodied energy" it contains. There's a lot to be said for eating local, seasonal food where we can.

And meat usually demands far more than grain - water, land, grain itself (34% of world grain supplies are fed to livestock reared for meat). Yet, worldwide, the richer we grow the more we turn to meat.

Something's got to give - and not only our waistbands.

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