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There is an intrinsic link between the challenge we face to ensure food security through the 21st century and other global issues, most notably climate change and the need to sustainably manage the world's rapidly growing demand for energy and water.

All four are also connected by their impact on global poverty, most acutely in the developing world, and on achievement of the Millennium Development Goals.

The FAO has estimated that 854 million people globally are undernourished, the great majority in developing countries. With the soaring cost of food and energy, the World Bank has estimated that a further 100 million people risk falling into extreme poverty. These are stark facts, even if commodity prices have declined again recently as a result of the global economic downturn, a development that will bring its own challenges for the world's poorest.

However many of the underlying drivers impacting on food security are long term. Global population is set to increase to around 9 billion by mid-century, rising at a rate of 6 million people per month. Africa's population alone is projected to double from 1 billion to 2 billion.

Where will these people live? In all parts of the world, but now accelerating in particular in the developing world, a transformational change is taking place as people move from rural livelihoods to cities, cities that will need to be serviced with food, water and energy.

Total world water demand is projected to increase by over 30% by 2030, and energy demand by over 50%. Agriculture is by far the largest user of water, at approaching 70% to total supplies.

Economic advances projected for the developing world will help lift people from poverty, but in other ways will add to the challenges. As incomes rise to between £1 - £5 per day people eat more meat and dairy products, causing a rapid growth in demand for agricultural commodities to feed livestock. Driven by population increases and growing prosperity, world food production will need to increase by some 50% by 2030 to meet this increasing demand.

The backdrop against which this must be met is one of rising global temperatures, impacting on water, food and ecosystems in all regions, and with extreme weather events becoming both more severe and more frequent. Rising sea levels and flooding will hit hardest in the mega-deltas, which are important for food production, and will impact too on water quality for many.

The need both to mitigate climate change and to adapt to that which it is too late already to avoid is clear. Global greenhouse gas emissions must be reduced by at least 50-60% by 2050 compared to current levels. The UK has set a lead be agreeing to an 80% domestic reduction.

What does this mean for agriculture? The world must produce 50% more food, on less land, with less water, using less energy, fertiliser and pesticide - by 2030 – at the same time as bringing down sharply the level of greenhouse gas emissions emitted globally. It is a non-trivial challenge, but one we *can* meet.

We need a new and greener revolution, a revolution that science and technology will help deliver. History demonstrates the huge increases in yield growth that were possible in Asia during the latter half of the 20th century, enabled by modern farming practices, including irrigation, use of fertilisers and pesticides, and the development of new more productive crop varieties. The contrast with Africa is marked, where the absence of such approaches has contributed to a stagnation in yields that has endured for several decades.

Crop protection is crucial. Around 30% of crops are lost even before harvesting due to pests and diseases, with the figure far higher in some cases, and substantial further losses are experienced post-harvest. Pesticides play a vital role in safeguarding yields, a fact that must be recognised as new EU regulations are considered. The withdrawal of pesticides without alternatives to replace them would result in a significant reduction in crop yields across Europe, with the potential also to impact beyond Europe's boundaries.

The scientific approach is to consider the risk of a given product in real world use, not the theoretical hazard in unfeasible or laboratory conditions.

Genomics has a major contribution to make, e.g. to improve crop varieties for yield, sustainability and quality. Successes to date have included salt resistant durum wheat and more disease resistant oil seed cassava. Looking ahead, GM will be one of the technologies to offer solutions, such as for drought and saline resistance, as well as resistance to pests and disease.

Another development at the forefront of science is nano-technology sensors, with the potential to relay real-time information about the precise requirements of crops in the field for water and nutrients, with the potential to bring both economic and environmental gains.

In summary, the key questions for policy makers and scientists are these:

- Can 9 billion people be fed equitably, healthily and sustainably?
- Can we cope with the future demands on water?
- Can we provide enough energy to supply the growing population coming out of poverty?
- Can we do all this whilst mitigating and adapting to climate change?

With the issues so inextricably linked, the questions must be addressed together. Science has contributed greatly in the past to finding solutions, and it can do so into the future if the investments are made.