Tackling the global farm crisis

» **Professor Julian Cribb BA FTSE**

Meeting over a mountain of caviar, sea urchin roe, Kyoto beef, conger eels, truffles and champagne in Japan recently, leaders of the G8 richest countries discussed spiralling grocery prices in the developed world and growing starvation in Africa, India and Asia. Between mouthfuls of an 18-course banquet prepared by 60 chefs, the world's eight most powerful men said they were 'deeply concerned'.

Four months earlier global food security wasn't even on the radar of world leaders. In their busy round of affairs it was an issue they rarely devoted a moment's thought to.

Yet, in each of the past seven years, the world has consumed more grain than its farmers have been able to grow. The warning signs have been plain to read for quite a while. Grain reserves are at their lowest level in half a century.

Like many people, the world leaders appeared perplexed at the sudden emergence of a food crisis. They blamed climate change, biofuels, oil prices and Chinese appetites – but there was little sign they fully grasped what was happening, down on the farm.

The present food crisis is a forewarning of what the world can expect in the decades ahead as civilisation runs low on water, arable land, nutrients and technology, as marine catches collapse, as biofuels expand, energy costs soar and as droughts intensify under climate change, and as global demand for food doubles.

The reasons are straightforward:

1. The human population is growing, towards 9.1 billion in 2050 – but demand for protein food, especially in China and India, is rising faster still. Total world food demand is forecast to rise 110 per cent in the next 40 years. By 2050 we will be feeding the equivalent of 13 billion people at today's nutritional levels.
2. We are facing a global water crisis. Cities will soon consume half of the world's fresh water – that was once mainly used to grow food. Groundwater levels are falling in every country in the world where it is used for agriculture. The volume of fresh water available to grow food is now in decline and it is quite likely we will have to double farm output using only two thirds of today's water volume.
3. The world may be facing 'peak land', meaning it has run out of good arable country – unless we wish to clearfell the Amazon. We are building cities, golf courses and resorts on our best soils. We are locking them in conservation reserves. We have degraded a quarter of the global stock of arable land to the point where it is scarcely usable.
4. We are haemorrhaging nutrients. Farmers apply 150 million tonnes of elemental fertiliser to their farms every year – but erosions strips away an estimated 1.1 billion tonnes of nutrient - six times the amount applied. Yields are now falling in some countries. From 10-60 per cent of all fertiliser applied is not used by the crop or pasture and goes to waste. Up to half of farm produce is discarded during processing. Up to half the food in our shops, restaurants and homes is thrown on the tip. Most of the nutrients in our sewage systems are lost.
5. Biofuels are eating into food production areas, in the US and Brazil especially. By 2020 the world will be burning 400 million tonnes of grain a year – which is the same as burning the entire rice harvest.
6. There has been a decades-long decline in global scientific research to lift farm production, in both developing and developed countries. This means farmers worldwide will soon hit a major technology pothole, where less new technology will be available to help them lift output, because the research has not been done. Already yields worldwide are starting to fall.
7. There is heavy inflation in the prices of fuel, fertiliser and chemicals driven by the oil surge. This is pricing these out of the reach of both poor and medium farmers in all countries.
8. Half of the world's major fisheries are in decline. Indeed sea catches are forecast to collapse completely by the 2040s, throwing demand onto land-based farming.
9. Politics and economics are acting against agriculture. Globalisation of the supply chain is driving down prices to farmers while the failure of trade talks is keeping them out of markets. Farm subsidies also continue to depress prices.
10. The climate is changing. UK Hadley Centre modelling suggests up to half the Earth may be in regular drought by the end of this century. "Unnatural disasters" will become more common.

The challenge facing today's farmers and farm workers is thus to double world farm output, using less land, far less water, fewer nutrients, and with the prospect of less technology to do so – in the teeth of increasing drought.

Professor Julian Cribb.

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Shanyn and Sam Andersen play in the creek at Dayspring, ACO certified organic property at Beaudesert, Qld.

This is not a challenge susceptible of 'silver bullet' solutions, but will require action on a global scale and by every individual and government on Earth. What the world's leaders, indeed all governments, including our own, have failed to grasp is that the farm crisis is not caused by one or two of these factors – but by all of them. It cannot be overcome by addressing one or two of them – only by tackling all of them together. While these obstacles to sustainable food production were building up, our leaders were asleep at the wheel.

This situation heralds the real likelihood of regional and global instability. It is already manifest in soaring food prices – international rice prices rose from $400 to $1000 a tonne in just 18 months – and food riots broke out in 37 countries.

The majority of conflicts and genocides round the world in the last 20 years have been driven, at their core, by disputes stemming from a scarcity of food, land or water. While the media and governments interpret them as clashes of religion, culture or politics, in reality the tensions which ignite these wars come from food insecurity – the primal fear that one cannot feed one's children and must fight someone else to obtain the means. According to UN secretary general Ban Ki- Moon, the tragedy unfolding in Dafour began as a squabble over rural water.

Food insecurity is a major driver of refugeeism and war. The United Nations High Commissioner for refugees recently reported there were 67 million refugees at the start of this year, the highest ever recorded, most of them displaced by conflict and famine. On top of this is surging immigrant pressure felt by all western countries as the educated or more affluent read the signs in developing countries and flee the gathering storm.

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In the 1850s a tenth of the Irish population quit their country due to famine. Imagine, for example, what the world might look like if a tenth of all Indians or Africans were to do the same.... regional food shortages or famines could precipitate refugee waves numbering in the tens or even hundreds of millions, leaving no nation on Earth unaffected.

If we wish to avoid these wars, riots and refugee tsunamis, the only answer is to secure the world supply of food and fibre.

This – rather than climate change – is the most urgent issue of the early 21st century. This is not to say climate change is not important. But merely to remind ourselves of the old Spanish proverb: Civilisation and anarchy are only seven meals apart.

Some of the answers to the global food challenge are laid out in the recent World Bank IAASTD.

This report makes it clear that farmers are not only to be supported as the producers of the world's food and fibre, but also as the stewards of its fresh water and its biodiversity. They care for 40 per cent of the earth's total land mass – and they need society's help to manage it more sustainably.

At the same time they need a great deal of knowledge and technology to lift their production using less water, land and energy. You cannot just kick-start R&D after letting it run down. It takes on average 15-20 years for a new piece of science and technology to be researched, developed and disseminated to most producers.

And we have let our R&D run down. In Australia there have been cuts to State agriculture departments for quarter of a century. CSIRO, after many cutbacks, recently announced a new round of cuts aimed almost exclusively at agriculture. Our universities have seen 20-40 per cent declines in enrolments in ag science. Many of our scientists are close to or past retirement age. The technology which our skilled agricultural workforce will rely on to achieve the next great production miracle is not being worked on, here or anywhere else.

This is nevertheless an exciting time for farming. For the first time in over 40 years, the terms of trade are swinging in farming's favour. Costs are rising – but so too are commodity prices. There has never been a better time in the last two generations to be a farmer, an agricultural scientist or someone who works in, or for, agriculture. Once more, young agricultural professionals are being challenged to feed and clothe the world. Once more governments are being forced to pay attention to their needs.

Australians are at the bow-wave of scientific farming. They are pioneers in techniques that make vastly more efficient use of land, water, fuel and. They have a major knowledge resource which is an exportable commodity in its own right. Mining knowledge already earns Australia $3 billion a year – and there is no reason why, in the current climate, agriculture shouldn't earn a similar sum.

After all the global market for knowledge, the world's most valuable traded commodity, is $5 trillion - a lot larger than the global market for food.

It is time to see agriculture as a knowledge industry, both based on knowledge and producing it as one of its essential commodities. It is time to value

An Australian organic soybean plantation.

what's between the farmer's ears, as well as what's in her or his back paddock. It is time to understand that the complexities of producing food amid uncertain times are no less great than running a business, a hospital or an airport. They require people of an especially high standard of education and training, who can manage not only the basics of production, but also sophisticated technologies, the agro-ecological environment, the sociology and economics of their business; who can make the right calls amid increasing complexity. It is time to bury, once and for all, the 'hick' image of rural labour and recognise that these are people who use their brains, every day, to keep the whole human race alive. And, in the resource constrained world of the future, that is going to be a bigger ask than ever.

Especially we need people who can devise new ways to produce food that involve less energy, fewer chemicals, make smarter use of the natural biological qualities of our soils to raise yields.

Low input farming is the way of the future – but it needs skilled pioneers to make it a reality, an excellent technology focus and a strong research base to take us into the future. We cannot be certain of there always being enough oil or water available to grow the food we need. Nutrients will be the oil of the 21st Century. Their prices are already soaring and the risk of scarcity is growing. The country that first finds ways to staunch the colossal loss of nutrients out of its farming, processing and urban systems and return them to the farm will be at a global advantage.

This will generate an entire new industry requiring skills in algal and bio-cultures producing food, feed, fuel, fertiliser, pharmaceuticals, fine chemicals – and practically anything else you can think of starting with 'f'.

Cities are traps for both water and nutrients. They collect – and they squander – vast amounts of both. We need a professional, the 'urban farmer' who can grow food on the roofs and sides of buildings, in intensive bio-cultures and by other novel methods to feed the megacities of 50 million plus inhabitants that will emerge.

I foresee a time when vegetables will play a very much larger role in both the global diet and the farm commodity mix. There are, after all, over 1000 vegetables most people have never even heard of still to be farmed. So, quaint though it may presently sound, broadacre vegies, even polycultures and urban horticulture must surely emerge as being among the most efficient ways to grow food per unit of energy, land or water.

I also believe that our deserts, well and sustainably managed, can yield far more foods from the wealth of Australian plant species we have completely ignored since the First Fleet dropped anchor.

Speaking personally, I doubt the world can produce enough protein from conventional farming systems to feed the equivalent of 13 billion people in the mid-century, year-in year-out. The consequences of failure may be dire for our children.

The scientific challenges of the coming decade are crystal clear. They include:

- The world will need a 200 per cent increase in irrigation water use efficiency across all crops. Who will lead this revolution is not yet clear – but Australian farmers have the skills, the science and the intelligence to do it.
- A global effort to exploit still-poorly understood soil biology to achieve major yield increases
- Development of low-input farming systems that require far less energy, nutrients, chemicals and water.
- A global effort to recycle and conserve all nutrients, on farm, in the food chain and at the sewage works.
- A worldwide effort to raise vegetable production and consumption. This will also address the problems of obesity and malnutrition.
- Large scale adoption of 'green cities' (urban horticulture) and vegetable protein biosynthesis using nutrients from recycled sewage and composted waste, to feed the megacities. Yes, the farm of the future may well be a factory.
- Development of farming systems, especially for the Third World, that protect native vegetation and biodiversity, cleanse water and sequester soil carbon.

These challenges are far from trivial. They require not only science but skills; the sort of skills we are presently pouring into our minerals sector – and reefing out of farming.

With its current run-down agricultural science effort and the loss or retirement of so many of its skilled workforce Australia is presently equipped to tackle few of these challenges. Half a century ago we shouldered similar global responsibilities with huge enthusiasm, skill and commitment – but that nation is no longer with us. We need to re-invent it. There must be a fundamental shift in understanding among our leaders and our society that farming still underpins our civilisation, and merits due attention, skilling and investment. That agriculture policy is defence policy – as well as immigration, health, trade and environment policy.

The current global food crisis mainly affects the poorest billion citizens on Earth. Yet it is a wakeup call to everyone, because of the risk of further famines, refugee crises and wars.

The drying Murray-Darling is a wake-up call about what could happen to us – and others – if our foodbowl fails.

Sustaining the earth's food supply is the greatest challenge of our age, more urgent even than climate change. If we fail, we sentence our grandchildren to famine, dislocation and war.

We must all be aware of the position, and if possible, alarmed by it. Then, we must act - as individuals, as communities, as industries, as countries and as a species.

Australia was a leader in the last Green Revolution and we need to rediscover that spirit and that determination to make a difference.

We need to replenish our science, our skills and our generosity. Not only because it is right – but because it is our destiny as a people to do so.

Professor Julian Cribb is a science communicator and Adjunct Professor of Science Communication at the University of Technology Sydney. This paper was presented at the Agri-Food National Conference in September 2008, Melbourne.