**Though climate change is a crisis, the population threat is even worse**

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 ‘Approximately 70% of all usable water on Earth is now used for food production.’ Illustration by Nate Kitch

The perennial cry: we need to talk about climate change. Andthisweek, with world leaders in Paris,we have been. But only up to a point. For the likely impact of the rising global population is almost entirely absent, not only from the debate about climate change, but also from that about loss of biological diversity, food and water security, disease, pollution and energy.

Let’s just remind ourselves of the population statistics of the past half century. In just over half my lifetime, the world’s population has more than doubled, from 3 billion people to now more than 7 billion. The ability to feed some of this growing population has in no small part been a consequence of the advent of the green revolution: that is, the industrialisation and intensification of agriculture and the entire food production system.

Producing all this food requires a lot of water. In fact, approximately 70% of all usable water on Earth is now used for food production. And almost 40% of the entire (ice free) land surface of the planet is now dedicated to agriculture.

The green revolution made more food, and that made food much cheaper. As a result of this – and increasing industrialisation and globalisation over the same period – those of us in Europe, North America and Japan have had much more money to spend on consumption. In fact, we embarked upon the creation of an unprecedented consumer culture – of clothes, televisions, electronics, mobile phones, cars and holidays.

All the food and other things we have been producing and consuming require a lot of energy – to generate the basic materials, manufacturing, transport, use, and disposal. As a result our use of oil, coal and gas has increased dramatically to meet rocketing demand for energy consumption.

We are now starting to see the first signs of the impact this is having on our life support system: Earth. Agricultural intensification is causing serious soil degradation and depletion of groundwater in some of the most agriculturally intensive and important areas of the planet. Land use for agriculture, urbanisation and infrastructure (eg roads) continues to cause loss of habitat for much of the world’s biodiversity. It is not just terrestrial ecosystems that are being degraded. Many of the world’s marine ecosystems are being rapidly degraded by overfishing, pollution and ocean acidification.

Demand for energy by our increasing population over the past half-century has led to an accumulation of atmospheric carbon dioxide, the concentration of which – now 400 parts per million – has not been present on this planet for several million years.

And yes, the result of this – of all our activities and consumption – is the emerging change in our climate apparent in the rise in global average temperature and, more importantly, the frequency of extreme weather events: heat waves, floods, droughts. The climate change now emerging is predominantly a consequence of the past activities of fewer than 3 billion people; not the current activities of 7 billion of us.

Critics of the book in which I lay out this problem, Ten Billion, have sought to remind me that, in fact, the fertility rate has been declining since the 1960s. And that we will in any event technologise our way out of the problems we now face. And that I am therefore being alarmist in my claims that climate change, ecosystem degradation, land degradation, and risks to food and water security are going to get worse. I know the global fertility rate has been dropping. Yet the global population has more than doubled over the 50 years in which the fertility rate has been declining, and the UN projects that there are set to be at least 10 billion of us in just a few decades.

Moreover, population growth in many counties is rising rapidly. According to the United Nations, the population of Afghanistan is projected to grow by 242% in the next 80 years; the population of Iraq by 344%; Nigeria by over 400% – to possibly more than 900 million people – and that of Malawi and Niger by more than 700%. This is not just a “developing countries” issue. The United States is projected to grow by more than 50% from 315 million to 450 million people in the next 80 years.

According to the Office for National Statistics, the UK population is projected to grow from 64 million in 2014 to 85 million in the next 80 years. That is like adding the inhabitants of 20 new cities the size of Birmingham to the UK.

Most of the evidence points to our current “business as usual” trajectory of growth and consumption, leading to all of our problems getting worse; potentially much worse.

According to the US government’s Energy Information Authority, global energy demand is likely to triple this century, as both population and energy demand per capita increase sharply, with much of that energy demand continuing to be met chiefly by oil, coal and gas, even under optimistic scenarios of growth in “renewable” energy technologies.

Demand for food is set to double by 2050 as a result of increasing population and consumption per capita – especially as more people move to an increasingly meat-based diet. So-called “rational optimists” are quick to claim that this demand will be easily met without significant further appropriation of land for agricultural use thanks to the ongoing “miracle” of the green revolution.

This ignores the fact that soil degradation and erosion are increasing rapidly in many parts of the world; that many of the world’s crops are increasingly at risk from novel (primarily) fungal pathogens; and that climate and crop models showing the number of extreme weather events associated with predicted future climate change are projected to have potentially devastating effects on crops in significant parts of the world.

Indeed, there are ample reasons to be concerned that we may be heading towards unprecedented food crises over the coming decades, with consequent extremely deleterious risks to the health of hundreds of millions, perhaps billions, of people. Furthermore, in many parts of the world where population is increasing rapidly, there is a rise in the number of people living in close quarters with pigs and poultry (not to mention the increasing consumption of “bush meat”). And as a consequence we are greatly increasing

the risk of a novel pathogen crossing the species barrier and creating a truly terrifying global pandemic.

Remarkably, collectively, we seem to want to deny all of this: that we are the drivers of the main problems facing us this century; and that, as we continue to grow, these problems are set to get worse. Climate change, extreme weather events, pollution, ecosystem degradation – the fundamental alteration of every component of the complex system we rely upon for our survival – are due to the activities of the rising human population.

There are no simple solutions: but leaders at the Paris summit cannot even begin to tackle climate change unless they recognise that its parent – our increasing population – is creating a greater looming crisis.