

A DIVERSITY OF BENEFITS

The social benefits of agricultural research

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This talk takes a historical approach, looking at why continued investment in agricultural R&D really matters, and also how it is evolving over time, and why it matters because of the resulting social benefits.

The key pathway is R&D, which raises agricultural productivity (value added per worker) and rural incomes, which means you need less labour for agricultural production, by definition. Therefore, you end up with surplus labour, which becomes available for doing something else.

The ideal is that the surplus labour moves into manufacturing and into services and other things that grow incomes and create a diversity of other income sources. That then promotes urbanisation, which is essential for supporting growing populations. The rural areas cannot simply expand agriculture to absorb a very large growing population, and the result is urban populations – which have both positive and negative aspects, in social terms – ultimately reducing food insecurity, but with less civil unrest as a result.

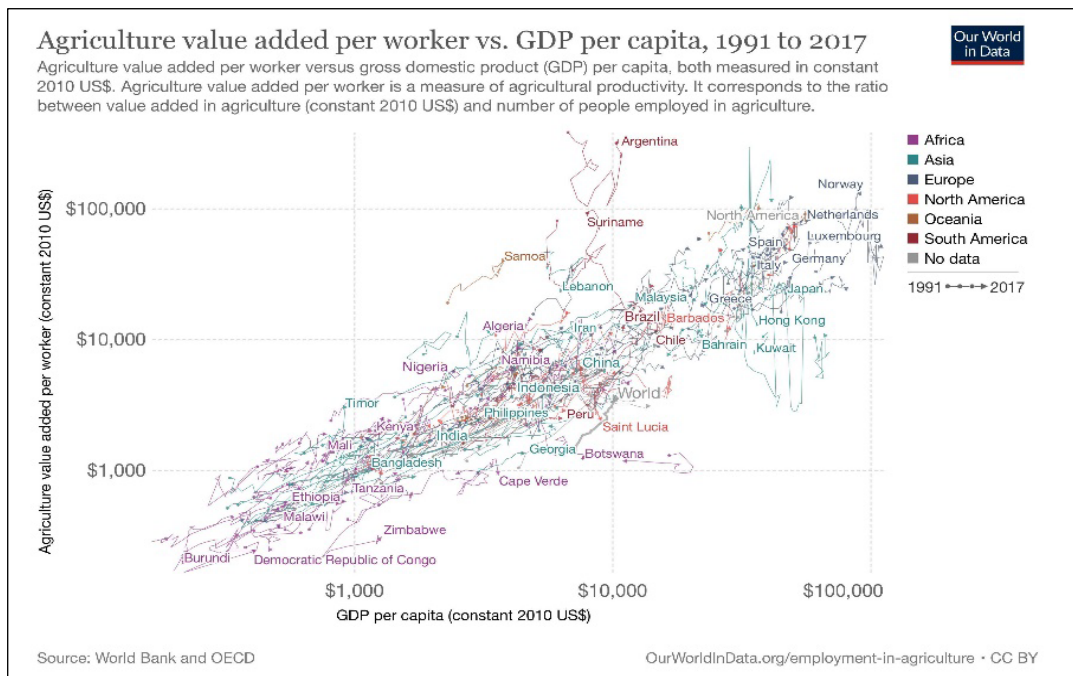


Figure 1.

Overall, agricultural R&D now is looking for better ways to protect the environment. It is valuing and raising the profile of indigenous knowledge in agriculture and in water management, and supporting greater gender equity and minority equity. That is essentially what this talk will show, in pictures.

Figure 1 is an amazing chart that tracks agricultural-value-added per worker versus GDP per capita over time from 1990 to 2017. There is a very clear pattern, showing that GDP per capita is very highly correlated to high agricultural-value-added per worker. It is a key component of income growth, and it is absolutely unavoidable that the share of labour in agriculture must fall to support this growth. The lines in the chart bounce around between countries, sometimes going backwards, sometimes forwards, but there is an interesting and overwhelming pattern. Agricultural productivity is, I think, causally related to GDP per capita in a very important way, and R&D has been the key factor behind that.

When there is high GDP per capita, the share of agriculture in employment falls (Figure 2). Much of that agricultural productivity is labour saving: you need fewer people on the land to produce the products. Nutrition has to be thought of not just as the farmer who grows their own food but also as the nutrition of urban populations and how to get nutritious food into those urban populations as well: otherwise, we are going to be failing. That brings us to the reasons why it is food systems that really matter, rather than just food production. The challenge is to get that nutritious food to the people who need to eat it.

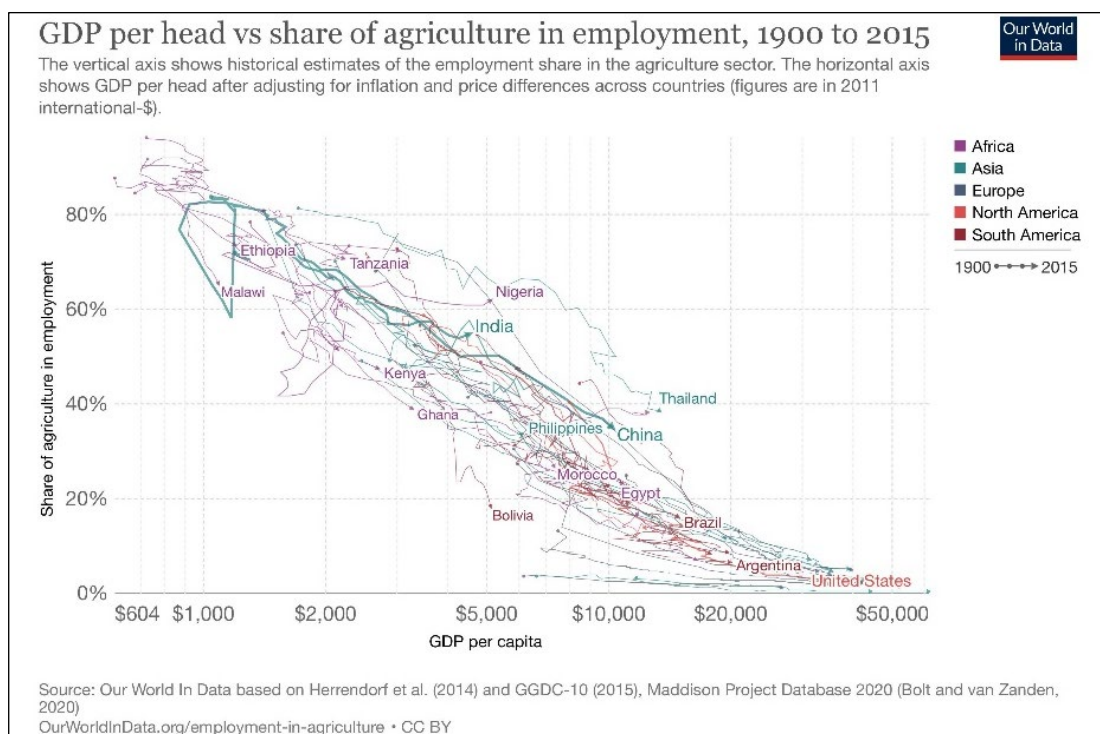


Figure 2.

Figure 3 plots the share of the population living in urban areas. Until 1800 there was not much urbanisation, and there was a lot of surplus, or underemployed, labour. If agricultural productivity is increasing, and labour has nowhere else to go and nothing else to do, they stay in rural areas. That is happening in India today where it is quite difficult to increase agricultural productivity if there are a lot of workers still working smaller and smaller plots of land. You can bring in new technologies, but you still need to be thinking about that broader system, and where that labour is going to go, where it is going to be absorbed, and what it is going to do.

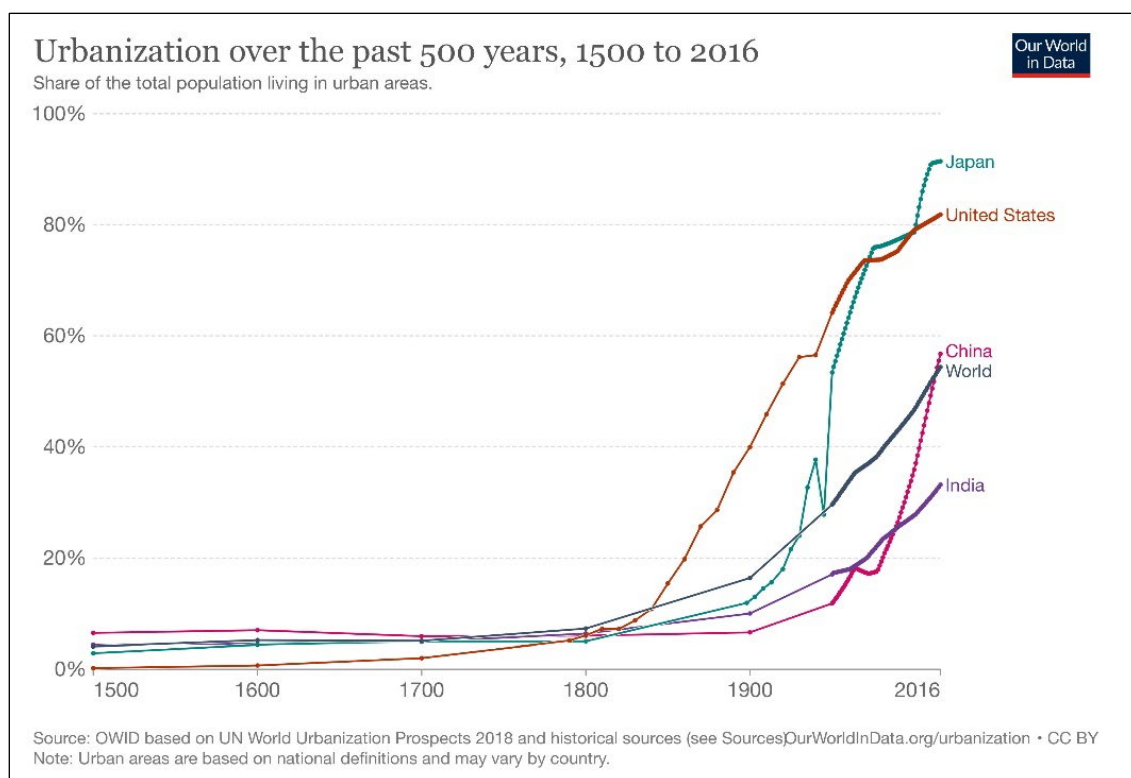


Figure 3.

Therefore, you cannot think about a food system without thinking about a political system, without thinking about industry policies and how those all fit together. The urbanisation in Japan is interesting (Figure 3). Japan still has lots of small plots growing food, but incredibly high productivity because a lot of the work is mechanised and they are using extremely good technology there.

Is urbanisation bad? The answer depends on your personal preferences. I was listening to the person who wrote *Sapiens: A brief history of humankind*, saying 'Well, actually, it's really terrible we ever had agriculture at all, because our diets are not nearly as diversified as when we were hunter gatherers.' However, I think most of us would agree that our lives are somewhat better than when we were hunter gatherers, and slightly less risky – for most or many of us, anyway.

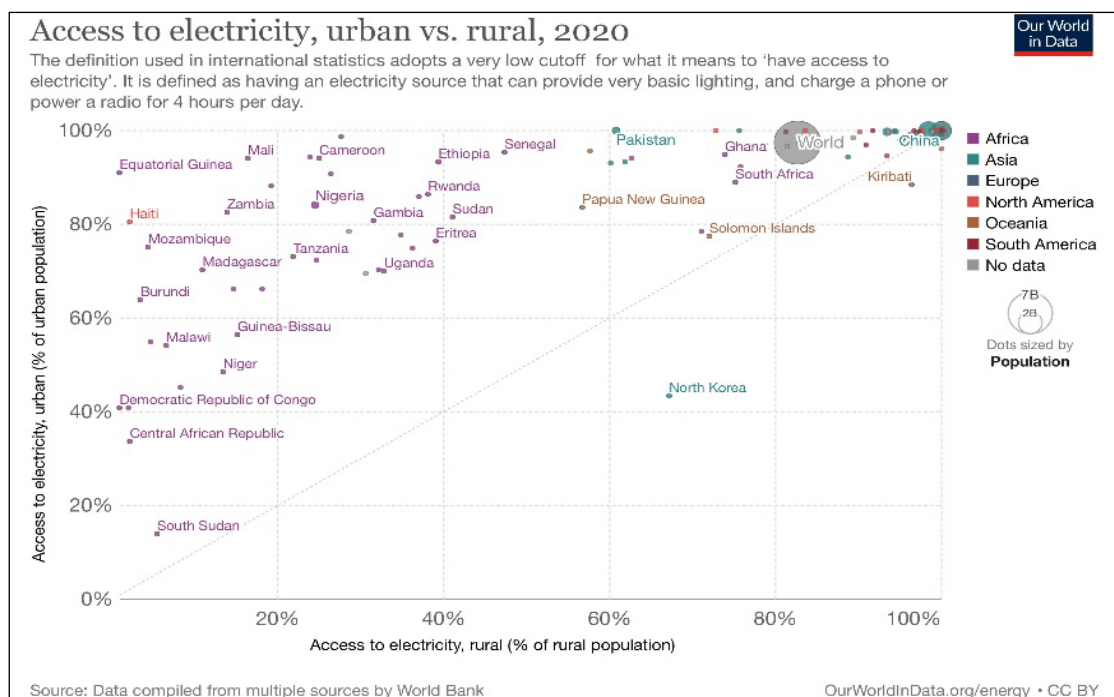


Figure 4.

Figure 4 plots access to electricity, urban versus rural in 2020, and it shows a pattern that is true for many services, such as access to education and to health services and similar benefits. There is a strong correlation between urbanisation and access to those services, largely because it is much more efficient to provide these services in urban areas than in rural areas. There is good justification for providing these services in urban areas, because there is a concentration of people there that need to be healthy, to have skills, to have something to do, to be valued. These services are an investment in human capital, and that is part of that broader system. Agricultural productivity is the starting point, but all these things flow from it.

We need to think about the whole system as it works together, and particularly about absorbing rural people into urban areas, in ways that can enhance their quality of life, even if they are living in slums: often being among the urban poor is actually less bad for people than being among the rural poor. We need to be very aware of that. Obviously, we want to reduce poverty in both urban and rural areas, and improve the quality of life.

Already this conference has acknowledged how COVID-19 has made situations worse – in food security, for instance – and how we've been heading in some wrong directions recently. Figure 5 shows the share of population experiencing moderate and severe food insecurity, by region. You can see in 2021 that COVID had increased food insecurity relative to 2019. The data in this chart are from before the Russian invasion of Ukraine, and I think things would be looking more dire now, with the difficulty of exporting grain and the disruptions to production in both Ukraine and Russia, which are both major grain producers.

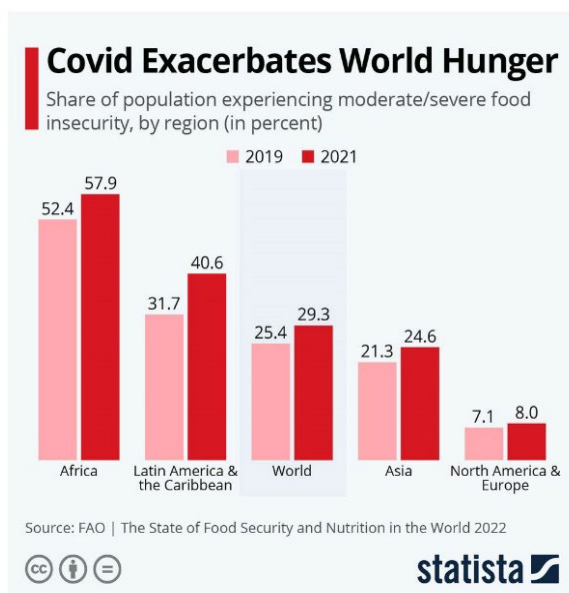


Figure 5.

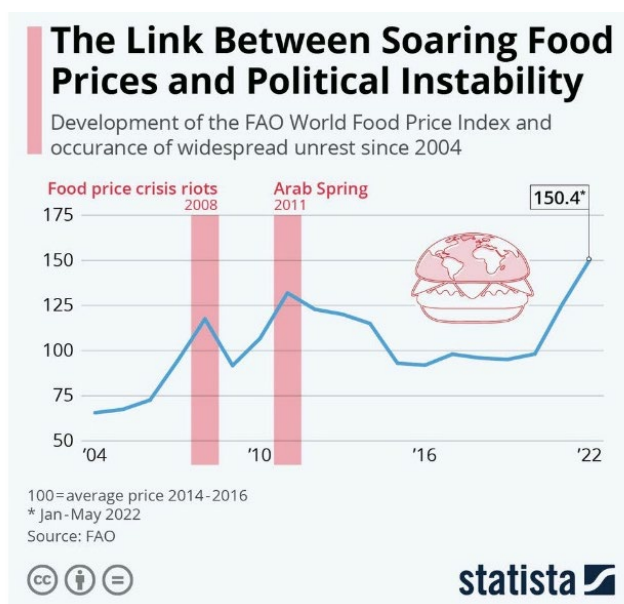


Figure 6.

The challenge in Figure 6 – an immediate challenge – is that link between soaring food prices and political instability. There are many reasons for food insecurity other than lack of agricultural productivity, but clearly food prices and political instability are highly correlated, so agricultural productivity does matter. Food security also depends on getting food to places, which then involves another system – transport. You cannot think about one without thinking about the other.

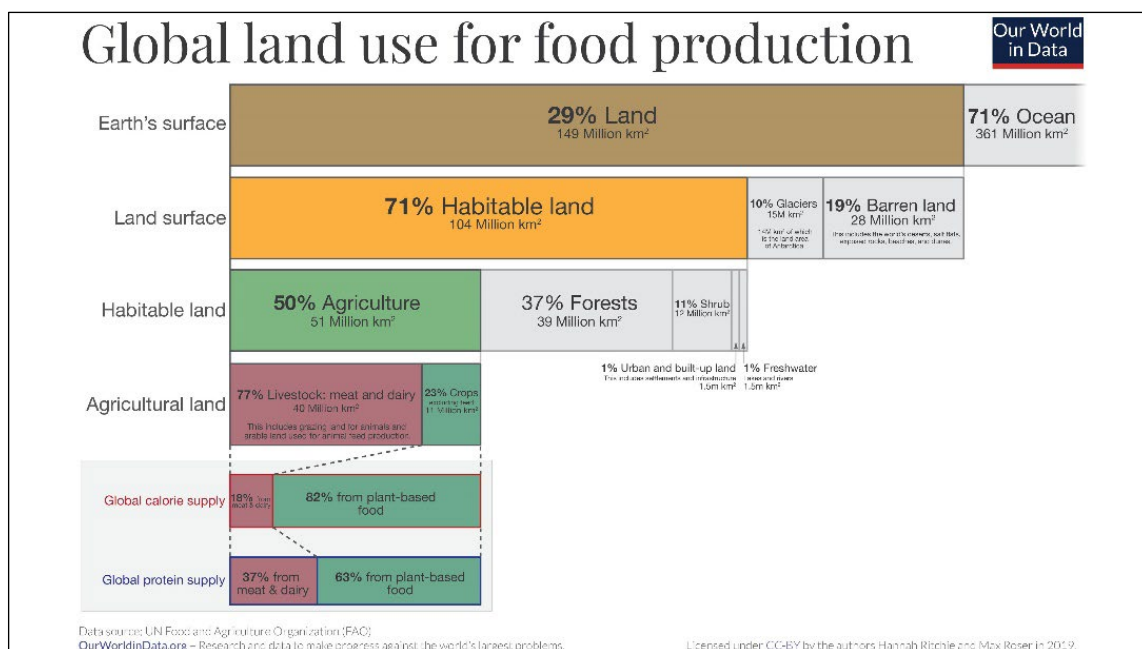


Figure 7.

Finally, Figure 7 explains why we must do agriculture well. In its work, ACIAR has been focusing not just on productivity and yield in actual farming and production, but also on the systems, such as the water systems. They are thinking about how to have more inclusive agricultural systems and food systems, and the environmental impacts as well.

Agriculture occupies 50% of habitable land, so if your agriculture is not looking after your environment, you really are not going to have a lot of habitable land in the future. We have been mining our environment since industrialisation, and that is leading to all sorts of challenges. We are going to have to start replacing the free environmental services we have had in the past with ones that we invest in ourselves. Doing that well is a research challenge.

Now is not the time to be satisfied with rather good agricultural productivity and think that we don't need to worry. Instead, we have a new set of problems that agricultural R&D is starting to tackle. For instance, how do we make a move away from monoculture?; how do we move to multiple plantings and diversify?; how do we use mangroves for multiple purposes, such as shrimp farming as well as protecting the coastal areas? These are just a few of the things we need to be thinking about for our research in the future.

We also need to use our scientific-based systems to enhance and understand the core reasons why indigenous knowledge is so valuable and how it can contribute to directing research in much more productive areas than would be researched otherwise. I think we are starting to see recognition of the value of that indigenous knowledge – not just in Australia, but all through countries that have surviving indigenous populations.

In summary, those are reasons why agricultural R&D matters for society, and why there are many social benefits from it.

Dr Jenny Gordon is an Honorary Professor at the Centre for Social Research and Methods, at the Australian National University. She is also a non-resident fellow at the Lowy Institute, one of Australia's leading think tanks on foreign policy. Jenny is a member of the Australian International Agricultural Research Centre's Monitoring, Evaluation and Learning Advisory Panel, and is on the Asian Development Bank Institute's Advisory Committee. Until recently Jenny was the Chief Economist at DFAT, joining DFAT in November 2019 from Nous Group, where she was the Chief Economist. Jenny spent 10 years with the Australian Productivity Commission as Principal Adviser (Research). Prior to this she was a partner at the Centre for International Economics (TheCIE). She has a PhD in Economics from Harvard University and started her professional career at the Reserve Bank of Australia.