Food and farming research for the public good

The global food system is literally killing us, writes **Molly D. Anderson**. Here's what we need to do to fix it.

At least 815 million people across the world suffer from chronic severe undernutrition[1] because they cannot access sufficient food. Approximately one in five deaths globally is due to eating poor diets.[2,3]

Agriculture and other food system practices are huge contributors to environmental degradation. Considered as a whole, the food system emits up to 57% of greenhouse gases.[4] Agriculture uses about 70% of the global freshwater supply[5], and about one third of arable soil has been acutely degraded by agricultural practices.[6,7]

Can research mitigate these social and environmental costs?

To imagine and design a better research system, one must understand how research has contributed to the system we have now. In the International Assessment of Agricultural Knowledge, Science & Technology for Development (IAASTD), over 400 scientists from 52 countries painstakingly investigated the outcomes of investment in science, knowledge and technology since the middle of the 20th century, to determine where future investments should be directed in order to achieve sustainable development.

As we unravelled past investment patterns, we found that 'business as usual' (i.e. increasing investment in industrial agriculture in developing and industrialised countries) clearly could not produce healthy food sustainably into the future. The IAASTD documented decades of negative social, environmental and health consequences due to the spread of industrialised food systems. Too much of past investment had focused on single sectors of the food system (e.g. agricultural production) or single goals (e.g. maximising productivity), rather than considering systemic trade-offs and the multifunctionality of food systems.

Private sector funding of agricultural research has grown rapidly, while public sector research has correspondingly become increasingly less prevalent (particularly in the United States, once a leader in agricultural research). Between 2008 and 2013, for example, real (inflation-adjusted) public food and agricultural research and development in the US fell by about 20% while real private research and development increased by 64%.[8] The interests of the private sector are quite naturally in goods and services that will return profits to companies, including strong protection of intellectual property rights; there is little appetite for research that is simply good for people and the planet.

The kind of development the world needs has more recently been articulated in 17 Sustainable Development Goals (SDGs) and their 169 targets, including SDG 2 which aims to end hunger, achieve food security and improved nutrition, and promote sustainable agriculture.

Whether the world reaches this goal will be determined by many actors, but whose voices should dominate discourse, and who should set research priorities? The stakes are high: ecological integrity, public health and decent livelihoods for marginalised people on one hand, versus greater profits for and control by the private sector on the other. Research funded through public sources must support the former, and governments must set limits on the ways in which the latter further enhances political power through campaign contributions and lobbying at the national and international scales.

IAASTD authors found that some kinds of research, including participatory research with farmers and women's organisations, furthered sustainable development. Research on agroecology, crop diversification and their implementation helped achieve better environmental quality and health outcomes.

Small-scale farmers are the largest category of people suffering from chronic undernutrition. The tools and knowledge that they need are low- or no-cost, focused on minimising waste, recycling all useable materials for nutrients or energy, restoring or enhancing soil fertility, and growing the greatest amount of nutritious food sustainably on small parcels of land. Such practices are the essence of agroecology, but promise very little profit to those purveying farm inputs and marketing agricultural products across the world. That is why public sector research for the public good must lead in this area. Likewise, research into developing local and national markets where small-scale farmers can sell extra produce needs to happen, to counterbalance extensive research on international trade.

Research for the public good would pay greater attention to low-income consumers and those whose health has been severely compromised by poor diets, such as colonised indigenous

peoples. At present, these groups are targeted as potential markets for the junk food that has already saturated markets in the Global North.[9] Research could help illuminate how to encourage consumption of traditional healthy foods, and innovative ways to distribute food, such as those piloted in sharing and solidarity economies or through right-to-food policies that provide healthy food at minimal cost.

The focus must be on the expressed needs of marginalised people. They have not benefitted from the global food system. Rather, they have suffered under the practices of a few elite players who have become fabulously rich by extracting wealth from the relatively powerless people and countries whose plights continue to worsen. Their lands and waters have been grabbed by speculators or wealthier governments for their own benefit, evicting users who lack secure tenure rights. Their agricultural future is threatened by industries that are allowed to pollute the atmosphere and cause climate change, which exacerbates conflict within and between countries and has led to famine conditions in several countries in 2017.[10]

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Focusing research on improving the health and well-being of marginalised people, or on producing food while enhancing soil fertility, sequestering carbon and maintaining biodiversity, will benefit all people by helping to create food systems that serve the public good. It puts those who have been largely excluded from the benefits of food system research and development centre stage, redressing wholescale human rights violations. And it helps reverse several decades of environmental degradation and deleterious health impacts related to diet. This is the opposite of Green Revolution research, which allowed relatively wealthy farmers who were able to adopt Green Revolution seeds and technologies to become more prosperous.

Specific policy levers will depend on country context. In countries where the private sector has overrun public sector research, increased funding for public competitive research on topics that directly benefit agroecosystem quality and human well-being is essential. This may require extensive revision of existing programmes. Opening up the laws for licensing and patents of the products of private sector research to allow wider access may also be needed, to ensure that public corporations actually provide public goods. Research on climate change mitigation is needed to avoid global breakdowns of food systems, from the provision of essential ecosystem services to crop production under conditions of severe stress. Research on mitigating food systems' contributions to any of the 'planetary boundaries' identified by the research group at the Stockholm Resilience Centre will additionally help to keep food systems sustainable.

Every country and region requires a process for gathering and synthesising broad citizen input into research priorities. Advisory groups dominated by industry voices are not adequate to this task. The 'people's food policy' plans that many countries have developed (e.g. Canada, Australia) give rise to immediate research needs for how the will of the people can be implemented most effectively, at the lowest cost, whilst providing good jobs to citizens.

While we know from the IAASTD and many subsequent reports that 'business as usual' will not suffice, the path forward into a sustainable and equitable food system is not yet clear. Research is needed to compare different transformational strategies that are being piloted, to examine their results on the ground.

At the international level, an institution that focuses on agroecological research, with the imprimatur and funding levels of the largest CGIAR institutes, is long overdue. Communication and outreach to poor farmers, including peer-to-peer sharing of practices about what is already known, is vital to the success of such an endeavour. International UN agencies must continue to monitor and document the status of world health and the environment. This monitoring should include input from those whose livelihoods are being destroyed by environmental degradation, in addition to the technical teams which are usually tasked with data gathering.

Through renewed attention to the social contract between governments and their citizens, a new 'Social Contract for Science'[11] and integration of knowledge from the public into science, publicly funded research can help point the way toward a sustainable future for all.

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1 FAO (Food and Agriculture Organization), IFAD, UNICEF, WFP and WHO (2017) The State of Food Security and Nutrition in the World 2017. Building resilience for peace and food security. Rome, FAO.
2 The Lancet (2017) Special Issue on the Global Burden of Disease Study. The Lancet 390 (10100).
3 Boseley, Sarah. 14 September 2017. Poor diet is a factor in one in five deaths, global disease study reveals. The Guardian www.theguardian.com/society/2017/sep/14/poor-diet-is-a-factor-in-one-in-five-deaths-global-disease-study-reveals Accessed 27/11/2017
4 GRAIN. 11 September 2011. Food and climate change: The forgotten link. www.grain.org/article/entries/4357-food-and-climate-change-the-forgotten-link Accessed 27/11/2017
5 World Bank (2014) World Development Indicators: Annual freshwater withdrawals, agriculture (% of total freshwater withdrawal) [link]
6 UNCCD (United Nations Convention to Combat Desertification). 2017. Global Land Outlook. [link]
7 Watts, Jonathan. 13 September 2017. Third of earth's soil is acutely degraded due to agriculture. Euractiv. www.euractiv.com/section/agriculture-food/news/third-of-earths-soil-is-acutely-degraded-due-to-agriculture Accessed 27/11/2017
8 Clancy, Matthew, Keith Fuglie and Paul Heisey. 10 November 2016. U.S. agricultural R&D in an era of falling public funding. Amber Waves. Economic Research Service, US Department of Agriculture.
9 Jacobs, Andres and Matt Richtel. 16 September 2017. How big business got Brazil hooked on junk food. New York Times, Section A1.
10 Food Security Information Network (2017) Global Report on Food Crises [link]
11 Keeler, Bonnie, Rebecca Chaplin-Kramer, Anne D. Guerry, Prue F.E. Addison, Charles Bettigole, Ingrid G. Burke, Brad Gentry, Lauren Chambliss, Carrie Young, Alexander J. Travis, Chris T. Darimont, Doria R. Gordon, Jessica Hellmann, Peter Kareiva, Steve Monfort, Lydia Olander, Tim Profeta, Hugh P. Possingham, Carissa Slotterback, Eleanor Sterling, Tamara Ticktin and Bhaskar Vira (2017) Society is ready for a new kind of science– Is academia? BioScience 67(7): 591-592