Independent Science and Partnership Council

CGIAR ISPC SCIENCE FORUM 2018
Win more, lose less: Capturing synergies between SDGs through agricultural research
10-12 October 2018
Stellenbosch, South Africa

BACKGROUND: EMERGING SCIENTIFIC LITERATURE AND GLOBAL POLICY DISCOURSE

Global food systems produce enough food, yet 815 million people go hungry every day[1]; 2 billion people lack key micronutrients such as iron, zinc and vitamin A, while 2 billion adults are overweight or obese[2]. To meet the projected global food demand in 2050, agricultural production will need to increase by 50% from a 2012 baseline[3], even as pressure on scare land and water resources continues to intensify and impacts of climate change become more adverse. Increased productivity, both of land and labor, is also a significant contributor to reducing poverty through raising rural incomes.

However, a narrow focus on maximizing yield of energy-dense and nutrient-poor crops is not enough; the availability of nutrient-rich foods at affordable prices is necessary to address malnutrition, which today is the leading contributor to the global burden of disease. Protein from animal sources is a key means of improving dietary diversity and nutrition, but overconsumption of animal-based protein is associated with increases in non-communicable diseases (NCDs). Consumption of livestock products is indeed on the increase, with animal-source foods accounting for 18% of the global calorie intake and 39% of the global protein intake[4]. Intensifying livestock production systems to cater to the changing dietary preferences of a progressively affluent and urbanized population entails risks and can enhance human vulnerability to diseases through zoonoses as well as increased anti-microbial resistance (AMR). AMR is now a worldwide public health threat and it is estimated that every year 700,000 people die of AMR infections[5].

Rapid conversion of native habitats into croplands and pastures in combination with unsustainable agricultural practices, to meet escalating global demands, has been a major contributor to land degradation. Worsening land degradation is in turn exacerbating climate change, while land degradation and climate change together are predicted to reduce crop yields globally by approximately 10% by 2050[6]. Within the larger context of the nine planetary boundaries[7], a concept developed in 2009 to delineate environmentally defined limits within

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[1] FAO, IFAD, UNICEF, WFP and WHO (2017). The State of Food Security and Nutrition in the World 2017. Building resilience for peace and food security. http://www.fao.org/state-of-food-security-nutrition/en/
[2] Development Initiatives (2017). Global Nutrition Report 2017: Nourishing the SDGs. Bristol, UK: Development Initiatives. https://www.globalnutritionreport.org/files/2017/11/Report_2017.pdf
[3] FAO (2017). The future of food and agriculture – Trends and challenges. http://www.fao.org/3/a-i6583e.pdf
[4] FAO (2018). Shaping the future of livestock sustainably, responsibly, efficiently. http://www.fao.org/3/i8384en/I8384EN.pdf
[5] UK's O'Neill Commission (2016). Tackling drug-resistant infections globally: Final report and recommendations. https://amr-review.org/sites/default/files/160525_Final%20paper_with%20cover.pdf
[6] IPBES (2018). Summary for policymakers of the thematic assessment report on land degradation and restoration of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. https://reporterre.net/IMG/pdf/sols-ipbes_re_sume_pour_les_de_cideurs-mars_2018.pdf
[7] http://www.stockholmresilience.org/research/planetary-boundaries/planetary-boundaries/about-the-research/the-nine-planetary-boundaries.html

which humanity can continue to develop and thrive for generations to come, two are at high risk (biosphere integrity and biogeochemical flows) and agriculture has been the chief driver. Indeed, the Earth is in the midst of its sixth mass extinction posing grave threats to the planet's biological diversity, including agrobiodiversity; total crop diversity is narrower than in the past, with about 75% of the genetic diversity found in agricultural crops having been lost over the last century. Three further planetary boundaries are at increasing risk – again agriculture is the key contributor to land system change and freshwater use, as well as a substantial one to climate change (Campbell et al., 2017[8]).

Increasing shortage and degradation of water supplies in key production areas, and where large populations of poor people are dependent on agriculture for their livelihoods, is a major problem facing agriculture already and is only likely to get more acute in the near future. While rain-fed agriculture is the predominant production system globally, irrigated agriculture accounts for 70% of freshwater withdrawals[9] and these water withdrawals are the chief source of groundwater depletion[10]. Water and food are also critically linked with energy for sustainable development. Energy is essential for food security, with the food sector accounting for about 30% of global energy consumption[11], and the energy sector responsible for 10% of global water withdrawals[12]. Energy and food production are major drivers of climate change; at the same time, agriculture and water are among the most climate vulnerable sectors.

It is evident that many of the issues that agricultural research needs to address are inextricably intertwined, so that changes to achieve impacts towards one objective have consequences – either positive or negative – on achieving another. This implies the need for systems thinking in informing the research agenda, considering the interactions in the overall context of agri-food systems and farming systems. The summary provided above gives some clear indications of priority interactions for CGIAR to consider, given the System's strategic goals and comparative advantage. The first set of interactions is based upon research to increase the productivity of major staple crops with other objectives. This includes the positive and negative linkages between increasing productivity of major staple crops and increasing the resilience of poor smallholder farmers to climate change and the need to sustainably utilize and conserve agrobiodiversity and/or improve nutrition and diets. Likewise, the interdependencies between the water, energy and food sectors is a prominent issue, as are the interlinkages between improving human health and animal production intensification.

[8] Campbell, B., D. J. Beare, E. M. Bennett, J. M. Hall-Spencer, J. S. I. Ingram, F. Jaramillo, R. Ortiz, N. Ramankutty, J. A. Sayer, and D. Shindell (2017). Agriculture production as a major driver of the Earth system exceeding planetary boundaries. Ecology and Society 22(4): 8. https://doi.org/10.5751/ES-09595-220408
[9] FAO (2017). Water for Sustainable Food and Agriculture. http://www.fao.org/3/a-i7959e.pdf
[10] WWAP (United Nations World Water Assessment Programme)/UN-Water (2018). The United Nations World Water Development Report 2018: Nature-Based Solutions for Water. http://unesdoc.unesco.org/images/0026/002614/261424e.pdf
[11] FAO (2011). Energy-smart food for people and climate. Issue Paper. http://www.fao.org/docrep/014/i2454e/i2454e00.pdf
[12] OECD/IEA (2016). Water energy nexus. Excerpt from the World Energy Outlook 2016. https://www.iea.org/publications/freepublications/publication/WorldEnergyOutlook2016ExcerptWaterEnergyNexus.pdf