



## Commentary

# Commentary on foresight and trade-off analysis for agriculture and food systems

Keith Wiebe <sup>1,\*</sup> and Steven Prager<sup>2</sup>

<sup>1</sup>International Food Policy Research Institute, Washington, DC, USA

<sup>2</sup>Alliance of Bioversity International and CIAT, Cali, Colombia

\*Corresponding author: 1201 Eye Street NW, Washington, DC 20005, USA. E-mail: [k.wiebe@cgiar.org](mailto:k.wiebe@cgiar.org)

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The papers and ideas on foresight and trade-off analysis presented in this issue are very timely. They come as our agriculture, food, and related resource systems are experiencing severe shocks (immediate as well as longer term) that call for unprecedented responses under a high degree of uncertainty. At the same time, a key part of the international agricultural research system is undergoing a fundamental restructuring that challenges us with both need and opportunity to rethink research priorities to inform decision making and improve agriculture and food system outcomes. These papers offer insights into how foresight and trade-off analysis can help us meet the complex, integrated changes that we are currently facing—and will continue to face for many years to come.

Thinking about the future and weighing alternative options are, of course, nothing new. We do both daily, often subconsciously. What is new in the context of agri-food systems in recent years is the scale, complexity, and interconnectedness of these systems themselves. In introducing this collection, Barrett *et al.* (this issue) note that these systems have largely evolved in an uncoordinated way, given that they are driven by the individual decisions of hundreds of millions of producers and billions of consumers around the world, not to mention countless intermediaries and highly heterogeneous environmental and economic contexts. These features pose massive challenges to identifying and implementing the needed policy responses to help balance multiple goals ranging from environmental sustainability and food security to equity in access to economic opportunities across the value chain.

The number of studies and reports on foresight and trade-offs related to agri-food systems has grown rapidly alongside these challenges—indeed to the point where it is difficult to keep up with them. One of the services that this collection of papers offers is to review a subset of those reports. Zurek *et al.* (this issue) focus particularly on a selection related to climate change and the environment, while Lentz (this issue) focuses particularly on foresight related to gender, poverty, and nutrition. Antle and Valdivia (this issue) in turn note the importance of analysis that explicitly recognizes and evaluates the trade-offs between multiple and diverse goals and outcomes at a range of scales.

## 1 On focus

Antle and Valdivia observe that many reports on the future of agri-food systems present ideas about *what* needs to be done, but fewer explore *how*. [Lentz \(this issue\)](#) finds that visioning studies tend to make strong assumptions about pathways to achieve desired future outcomes, while [Zurek et al. \(this issue\)](#) note the difficulty of reaching consensus on options for change, particularly when systems and stakeholder interests are complex and diverse. Other key findings of these reviews have been well summarized in the introduction by [Barrett et al. \(this issue\)](#), and we need only recall them briefly here. The authors find that foresight analysis of agri-food systems tends to focus on major trends in population, income, diets, and climate, but with much less attention to systemic shocks (such as those we are experiencing in 2020 related to COVID-19, pest and disease outbreaks, and short-term climate extremes). Foresight analyses also vary in their attention to different types of outcomes, with many models tending to focus more on commodity production, markets, and calories, and much less on livelihoods, inclusion, and nutrition (and the interactions between these and climate change, for example). Finally, the authors find insufficient attention given to innovation systems and particularly adoption pathways for new technologies, to the governance challenges that (among other things) shape and constrain those adoption pathways, and to trade-offs across diverse outcomes and scales.

These findings are broadly on target. Nevertheless—and understandably, given the breadth of the field and the pace at which it is evolving—they miss some important recent work that helps address these gaps. As it has changed everything else, the COVID-19 crisis has triggered numerous new foresight studies on the likely impacts of the associated health, policy, and economic shocks on employment, poverty, and food security at global, regional, and national scales (e.g. see [OECD 2020](#); [Laborde et al. 2020](#); [Thurlow 2020](#); [Arndt et al. 2020](#)). Other recent studies are advancing the field in other areas. Looking farther ahead, [Beach et al. \(2019\)](#) examined how the impacts of climate change (including changes in both temperature and CO<sub>2</sub>) on micronutrient availability are projected to vary by nutrient, crop, and region. [Brooks et al. \(2019\)](#) found that climate change will disproportionately affect job prospects in agriculture for young people in low-income countries, particularly in Sub-Saharan Africa, while [Frija et al. \(2020\)](#) found that investment in agricultural R&D, water management, and infrastructure can boost employment opportunities in agriculture, including for women.

## 2 On process

At least as important as the findings of [Zurek et al. \(this issue\)](#), [Lentz \(this issue\)](#), [Antle and Valdivia \(this issue\)](#), and [Barrett et al. \(this issue\)](#) on research gaps are their insights on processes for integrating foresight and trade-off analysis into decision making and research priority setting. Each of their papers highlights the importance of engagement with stakeholders in the identification of questions, goals, and challenges. Each highlights the importance of using a mix of qualitative and quantitative methods as appropriate for the particular question(s) of interest. Similarly, there is a common emphasis on transparency in analysis and discussion to enhance understanding, legitimacy, and credibility of results. Finally, the papers support using foresight and trade-off analysis to inform rather than to drive decision making.

Again, we broadly agree. Nevertheless, we also note that the papers seem to draw an artificial distinction between foresight and trade-off analysis. [Antle and Valdivia \(this issue\)](#) suggest that foresight's role is to identify pathways and scenarios that trade-off analysis then models, and [Barrett et al. \(this issue\)](#) suggest that foresight explores broad futures while trade-off analysis evaluates impacts of interventions (across multiple dimensions). In contrast, we argue that foresight and trade-off analysis are two parts of the same approach: systematically evaluating alternative futures and their impacts on multiple outcomes.

### 3 Moving forward on foresight

As with any research in the agriculture development arena, it is important to be intentional and clear about the impact pathway associated with foresight and trade-off analysis. Every analysis should begin with a clear understanding of why it needs to be done (i.e. what decision(s) it will support), who is potentially affected, and who should participate. Closely related factors include identification of the appropriate spatial, temporal, and institutional scales that are relevant for the systems of interest, the associated decision-making processes, and, ultimately, the corresponding choices regarding approaches to the analysis. These issues should be clearly articulated and revisited periodically throughout any analysis.

Foresight and trade-off analyses range from very general to highly specific approaches and applications. Regardless of the particular analyses, however, the value of their results is enhanced with ongoing engagement between research producers and research users as questions, methods, data sources, assumptions, interpretations, and implications are debated, clarified, and ultimately improved. For this reason, investment in foresight and trade-off analysis should be looked at in the context of overall mission performance, rather than (only) as occasional bespoke analyses for particular activities or projects. A shared process that integrates resources to fund foresight and trade-off analysis with ideas from a broad range of stakeholders has the potential to create economies of scale around relevance, understanding, and use of these approaches to support as broad a community as possible.

Putting foresight and trade-off analysis into practice, early and often, is especially relevant during the current reform process in the international agricultural research community. Working towards 'One CGIAR', in which multiple and diverse viewpoints and inputs are clearly required, will benefit from the diverse future-oriented perspectives that foresight can help bring together. Scientists within the CGIAR have first-hand experience related to the theories of change, possibilities, and limitations of the programs in their respective centers as well as the needs of their various partners and stakeholder groups. At the same time, scientists outside of the CGIAR bring complementary expertise and perspectives that originate from different, more general contexts. Both points of view offer value as well as potential bias, and for these reasons, a joint perspective on foresight and trade-off analysis—tailored to the problems at hand and the interests of the stakeholders involved—is typically needed to improve the development and implementation of appropriate solutions.

The need to deal with a complex and uncertain future is not new, and neither is our natural tendency to evaluate alternative options. However, the increased scale and interconnectedness of our global agri-food system today, combined with its inherent lack of coordination, requires that we in the international agricultural research community use foresight and trade-off analysis much more deliberately and systematically, drawing on multiple approaches and sources of expertise to address multiple options to achieve multiple goals at multiple scales. As a step in this direction, the papers in this collection recommend integration of foresight and trade-off analysis into ongoing, systematic, iterative processes including decision-makers, other stakeholders, and researchers—and on this point we fully agree. This will be difficult and costly—but less so than the alternative.

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