Strategic foresight analysis for high impact interventions in agriculture and food security

A mix of demographic, technological, climate and environmental changes make anticipating and planning the future a complex - but critical step - to increase our food supply while sustaining natural resources. Successful interventions which meet these twin objectives are a priority for governments, multi-lateral banks, NGOs, and the private sector.

It is vital that we articulate the potential impacts of climate change, different interventions, and policy decisions on the most strategic areas of investment to achieve the best economic and social benefits. The question remains: how to articulate these complex factors to support policy and decision making by governments and organizations?

What is strategic foresight?

Strategic foresight is a collection of tools and methodologies that use historical and current data to map future scenarios, taking climate and demographic changes, technology innovations and policy decisions into account, together with their likely impact on agricultural production, food security and sustainability[1]. This tool helps to identify tradeoffs in investment options. It allows for the assessment of outcomes in an array of likely scenarios with appropriate policy and socio-economic narratives to guide investment in the phase of uncertainty. Through strategic foresight, we are able to answer questions such as:

- Which area of research or development should be given priority: infrastructure development, markets, increasing productivity, conservation?
- Which factors can facilitate the occurrence of the most preferred scenario? For instance, what factors can enhance technology adoption by farmers, or which development option can lead to reduction in emissions?
- What is the expected outcome if a certain investment option is pursued?

Foresight analysis promotes collaboration among actors from different disciplines, and is a strong tool to guide policy, laying out priorities and actionable alternatives. It helps design interventions in both the short and long-term; and can be used as a diagnostic tool to track current interventions.

What CIAT is doing

With a dynamic team and with a wide range of partners across public and private sectors from across disciplines: agronomy; food security; economics; climate change; environmental sustainability; resource management; GIS mapping and statistics – we can provide foresight on the impact of technologies on yield; the impact of climate on agricultural production; or possible impacts of the different interventions on food security, or supply and demand for major commodities.

1. Scenarios are narratives/stories set in the future that explain how the world could behave if some trends persisted or diminished.

Our strategic foresight tools include[2]:

- Global and partial equilibrium models such as the International Model for Policy Analysis of Agricultural Commodities and Trade (IMPACT) developed by International Food Policy Research Institute (IFPRI).
  - This model helps determine the yield changes associated with a new technology under different management practices through crop modelling[3].
  - It also shows how yields are likely to be affected by different factors such as water availability, climate change and socio-economic factors[4].
- Quantitative, static methods based on economic surplus and cost benefit analysis:
  - These tools make use of historical data from which projections for the future are made. The analysis can be expanded to consider changes in policy, for example, or the impact of climate change under different adoption scenarios for a particular technology.

Sample cases where strategic foresight has been used:

In East Africa, our foresight analysis found that if improved forage varieties like Brachiaria were adopted by farmers on a large scale, they could have a significant impact on milk production across the region, (Gonzalez et al., 2016)[5]. The analysis found that 40% more milk and tens of millions of dollars in revenue could be possible for African farmers adopting new drought-resistant pasture grass. The study provided evidence that improved varieties and adoption of these varieties can enhance milk production and economic development in the region. The same is true in Latin America and the Caribbean (LAC) and Africa for the case of an improved common bean variety[6]. In this analysis, we find that adoption of a drought tolerant common bean variety can mitigate climate change-induced yield losses by at least 6%.

We use different models to answer questions like:

- What is the impact of climate change on crop yields?
- What is the impact of climate change on the area under production?
- What is the impact of climate change on net trade (is climate change likely to make the subject country a net buyer for a certain commodity or a net seller)?

The current state and future of foresight

Despite the pivotal role that foresight can play in mapping the future, the concept is underutilized, especially in developing countries. Working closely with partners, CIAT is taking the lead to mainstream strategic foresight analysis into agricultural development, in order to promote high impact investment prioritization now and in the future. A small investment in strategic foresight can pay huge dividends in guiding large investments that best address the challenges of today and the future.

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2. See https://ccafs.cgiar.org/foresight-and-priority-setting-0
3. We use the Decision Support System for Agro-technology Transfer (DSSAT). See http://dssat.net/
4. More detail on the IMPACT model is available at https://www.ifpri.org/program/impact-model.
5. Global Panel on Agriculture and Food Systems for Nutrition. 2016. Food systems and diets:
6. Facing the challenges of the 21st century. London, UK.
7. CIAT. 2016. Ex-ante Assessment of Drought Tolerant Bean Technology. A case study in the series: Economic Foresight for Understanding the Role of Investments in Agriculture for the Global Food System. CIAT Working Paper. Centro Internacional de Agricultura Tropical (CIAT). Cali, Colombia. 25 p