

## Public Sector Agricultural Research Priorities for Sustainable Food Security: Perspectives from Plausible Scenarios

Three priorities for the CGIAR and FAO in scenario development and strategic foresight were identified by paper authors Gerald Nelson (IFPRI) and Dominique van der Mensbrugghe (FAO):

- Cooperative quantitative modeling: identify best possible data and tools across the CGIAR and FAO, including FAO's ENVISAGE model, IFPRI's IMPACT suite and biophysical models from other centers (including ILRI and ICRAF), integrate as appropriate, and share them as open source public goods.
- Cooperative use of institutional and outside substantive expertise: put in place a joint, regular, systematic review process by internal and external subject matter experts of model inputs (e.g., biological potential in response to management and climate changes) and outputs (e.g., location-specific yields, planting and harvest dates, production levels).
- Sustained cooperation with model intercomparison efforts: cooperation by FAO and CGIAR and through the AgMIP project with other advanced research institutes that produce global models that capture dimensions not reflected in ENVISAGE and IMPACT in order to compare and improve all models and provide policy makers with more insightful analysis.

These recommendations were endorsed by session participants. The paper reviewers and participants also identified priority areas for model improvement, including suggestions for attention to:

- Modeling the increasing frequency of extreme weather events, mapping regions more likely to be affected by resulting volatility in production, prices and trade flows, and regional impacts of changing trade flows and potential policy responses
- Modeling crop and livestock systems and systemic elements affecting productivity, including soil health and fertility, water and carbon, and cropping intensity
- More incorporation of geospatial and place specific data (e.g., hydrological profiles) that will allow models to move between aggregate and local applications
- Model post-harvest loss and waste throughout the value chain, from farm to consumer behavior
- Incorporate both short- and long-run supply response considerations by producers to sustained higher prices and higher profits, including incentives for technology adoption and more intensive management, and other spillover impacts of higher prices including on land values and other costs of production
- Impacts of policies and regulations on technology adoption and effects of biofuels requirements
- More sophisticated aspects of nutrition, including nutritional contributions of non- staples and orphan crops, diversified diets and impact of over nutrition
- Increasing collaboration with private sector on data and modeling approaches, and facilitating multidisciplinary collaboration among biophysical, engineering, food science and socioeconomic specialists to create flexible models.

Participants also recommended greater investment to improve the quality of national data systems, consultations with local farmers and experts to refine data as well as to help connect global scenarios to relevant policy options, and increasing transparency on key model assumptions, e.g., price and income elasticities.

## Priorities for Public Sector Research on Food Security and Nutrition

Both international and national consensus is placing greater priority on tackling malnutrition and making agriculture and other key development sectors more nutrition sensitive. In the paper by Howarth Bouis (CGIAR), Terri Raney (FAO) and John McDermott (CGIAR) the requirement for the CGIAR and FAO to place greater priority on dietary quality in new initiatives. Some specific proposals included:

- Invest at higher rates in sustained productivity increases (including extension to farmers) for a range of non-staple foods – vegetables, fruits, pulses, animal products.
- Make the mineral and vitamin content of the edible portions of new crop varieties as core breeding objectives, not just yields and other agronomic characteristics that contribute to farm profits; scientific breakthroughs are reducing the cost of including these additional nutrition breeding objectives.
- Consider dietary quality in economic policy analysis related to food security, not just energy intake.

Beyond priorities, the CGIAR and FAO must learn to work cooperatively across disciplinary and institutional boundaries to make agriculture more nutrition-sensitive, for example by:

- Expanding the number of nutrition and health professionals and how they are engaged to work across disciplinary divisions including topics such as new methods of storage, processing, and cooking to preserve nutrients and enhance bioavailability and how breeding strategies could complement these efforts.
- Engaging with NGOs who focus on improved nutrition and health in rural areas, in developing and implementing food-based strategies to achieve their goals – for example in the area of home gardening and livestock production.
- Engaging with health ministries to achieve a joint understanding of how agricultural policies can either hinder or help achieve nutrition and health goals – for example, by discussing cost-effective safety improvements for particular food value chains.

These recommendations were supported and enhanced by session participants. The paper reviewers and participants made some important suggestions including the following:

- Making agriculture and food systems more nutrition-sensitive is vital. Agriculture and food systems can provide multiple direct and indirect benefits for nutrition. Improved food systems can provide improved diets. For current good practice, research should close important evidence gaps in better enabling and implementation of interventions. Reductions in stunting will require coordinated multi-sectoral (agriculture, social protection, gender, water and sanitation) actions. Agreed impact pathways and theories of change, better evidence on tradeoffs and inspired leaderships are all necessary in supporting needed cross-sectoral coordination.
- Emphasize gender considerations across the portfolio and through all planning, implementation, evaluation and learning functions.
- “Health begins with soil” was a recurring theme throughout the two days, first emphasized in this session.
- Skills and capacity to improve nutrition and health through agriculture are a major constraint. The gaps are in the individual sectors – agriculture, nutrition and public health – and also in the capacity to span across sectors from planning through implementation and policies.
- Capturing the multiple benefits of agriculture and food on improving nutrition and health will require innovative and effective partnerships. In the past there have been major conflicts and important differences in goals and perspectives of civil society, private and public sectors. In more recent discussions, there has been greater recognition of shared goals and perspectives. A number of specific areas for partnerships were suggested.

## Priorities for Public Sector Research on Food Security and Natural Resources

The capacity of natural resource systems to satisfy an increasing food demand is of great concern. The report, coordinated by Frank Place of the CGIAR and Alexandre Meybeck of FAO, covers the breadth of resources needed, from land and water to nutrients and genetic resources. It considers that while at global levels resources seem to be able to satisfy growing needs today, there are many “systems at risk” where there are risks that resources would be able to ensure food security, especially of the more vulnerable populations.

The reviewers considered that the paper was comprehensive and provided a wealth of recent evidence on natural resources for food production.

There was support for the report’s breadth of scope and in particular for emphasizing the multifunctionality dimension of agriculture and agricultural landscapes and also the importance of the inter-relationships between agriculture and ecosystem services. Some commentators mentioned areas for further emphasis such as livestock systems, bee keeping, recycling of waste for soil fertility management, and eco-regional issues.

The reviewer comments and ensuing discussion focused on next steps given existing knowledge. Among recommendations were the following:

- Identify and promote areas for quick development wins: for example, there is already a good knowledge base on good agricultural and natural resource management practices that increase productivity and resilience, and sustain or restore the resource base, which could be better disseminated through research-development-policy-private sector partnerships.
- Advance cooperation and collaboration between key actors to address more complex problems at landscape and other scales. This includes better integration across sectors. Another opportunity is to support integrated landscape management initiatives that could benefit from technical support and which also represent good learning opportunities. There is need to stay the course on an integrated approach and not to respond to crises with a purely sectoral focus.
- Focus more attention on restoration opportunities as an alternative to the clearing of new land for agriculture. Examples are the restoration of degraded land, as observed in Tigray, Ethiopia, or in the rehabilitation of irrigated areas suffering from salinization.
- Design new financing models for NRM investments. Such investments are difficult to finance because they have returns that (a) accrue over longer periods of time and (b) accrue in various forms of benefits to different beneficiaries.
- As for research, it was not possible to quickly prioritize this by theme, but two points can be emphasized: (a) the need for more resource assessments and (b) the need for integrated biophysical and socio-economic research for tackling the complexity of NRM challenges.

## Public Sector Agricultural Research Priorities for Sustainable Food Security: How Does Climate Change Alter Agricultural Strategies to Support Food Security

The focus of this report, identified by lead authors Philip Thornton (CGIAR) and Leslie Lipper (FAO), is vulnerable small holder agricultural households that do not consistently and fully meet household nutritional needs. Climate change poses great risks to this group because it is dependent on agricultural production to meet both income and nutritional needs. Climate change also poses additional challenges to meet the individual and collective ambitions of development.

The responses to climate change are varied, ranging from increasing resilience by development and adoption of new cultivars, maintaining eco-systems services such as soil health and water quality, diversification, and improved risk management tools. Climate change increases the value of “no-regrets” technologies that enhance flexibility and potentially enable transformative changes.

Some technologies exist that can help with adaptation; others need to be developed. But while technology availability is a first step condition, adoption by farmers is the essential outcome. Adoption requires greater emphasis on building local institutions to support information dissemination, risk management and collective action. Two other important enabling conditions are building coherence across agriculture, food security and climate change policies and increasing the available financing, including from climate finance sources.

Priorities include:

Better links with the global climate change research community are needed to address the nature of the vulnerability and uncertainties. This has to include better understanding of the likely changes in climate variability in the coming decades and its impacts on food systems and food security at all levels. Improving tools and guidelines for risk management, including better knowledge of the role of assets (physical, human and social capital), the role of collective action and increased engagement of civil society to improve participatory approaches and communication. Additional views from the reviewers and participants follow.

There was a lively debate on the relative priorities between technology development and improving systems for technology adoption, and the optimal division between the public and private sectors. How can we better use the new technologies available today for information dissemination? Allocation of water among various users, including agriculture, as well as competition for land use from biofuels merits greater attention. What should be the relative roles of mitigation versus adaptation? How much mitigation can be expected from small holder farmers? What are the equity concerns? How can development be made compatible with mitigation? Should we focus on a ‘climate justice’ approach (analogous to the ‘right-to-food’ approach) given the inability of the global community to take effective action to limit greenhouse gas emissions. Attention to gender differences in the way information is absorbed and transmitted is important for technology adoption and mitigation. More collaboration is needed with a focus on data collection and dissemination and links across the different modeling platforms (across disciplines, e.g. climate to crop to economic, and across dimensions, household/farm to sub-region to country to global).