

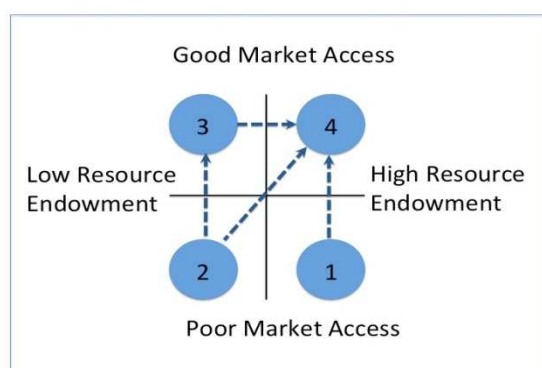
## Planning and Implementing Action for Sustainable Agriculture

*By the Thematic Group on Sustainable Agriculture and Food Systems \**

For global agriculture systems to produce enough food to sustainably feed nine or ten billion people by 2050, there will have to be a shift in consumer and producer behavior and a structural change toward more sophisticated technologies, information and knowledge management systems, and policies that promote market-based incentives for growth.

### **Structured assessments for local solutions**

High-level SDGs for the post-2015 era will galvanize the global community, while each country and locality must choose a customized agricultural transformation path that is scalable and measurable at all levels. National and local governments need to take the lead in designing and implementing roadmaps and business plans for development that are goal-oriented and appropriately account for priorities, feasibility, and costs.



**Figure 1** Different solutions will be required for large and small farms with

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Developing such a plan typically includes five steps: background analysis of past trends and future projections; definition of key problems and opportunities; assessment of different technology and policy options; estimation of outcomes and effects; and modeling of impacts on development goals and targets, including the costs and benefits across sectors. Such an assessment should devise strategies for both large commercial farms and millions of smallholders. Two primary factors that will shape tailored solutions for future agricultural development are resource endowment and access to markets (see Figure 1). Decisions should be based on a thorough understanding of the socioeconomic and biophysical factors that drive the needs of farmers, agribusinesses, consumers, and many other actors.

### **Guiding principles for implementing Sustainable Intensification of Agriculture (SIA)**

Although pathways will vary around the world, there are several guiding principles. Most importantly, governments and international agencies must make the sustainable development of agriculture a policy and investment priority. Moreover, though there will be tradeoffs between viable options for SIA, agricultural productivity growth in staple food crops cannot be compromised, as it is essential to eradicate poverty and hunger.

SIA is an ongoing, iterative process that requires the engagement of civil society, public, and private sector stakeholders. Stakeholders must be willing to continue learning and change their behavior. While all opportunities for information and technology sharing among countries and regions should be encouraged, ultimately tools and solutions must be locally tailored and context-specific.

The domestic private sector, composed of millions of farmers and other local businesses, is by far the largest investor in agriculture. Programs and policies should encourage business development and public-private partnerships so that farming and agribusinesses can provide more social and economic development

opportunities for rural communities. There must also be greater equity in access to land, inputs, and markets, especially for women and youth.

Multi-faceted approaches are needed to appropriately and successfully respond to the diversity of farmers' environments, objectives, constraints, and incentives. Integrating agriculture with other sectors such as health, natural resource management, disaster risk reduction, gender, education, and energy will bring greater impact.

Accelerated progress on SIA will require better support systems on the ground, including more professional extension systems and greater access to mobile phone technology. It will also necessitate higher coverage and quality of data on soils and weather, as well as sharing of reference research and crop information. Biophysical, economic, social, and environmental metrics must be collected in a comprehensive, reliable manner to assess different policy and technology options and evaluate their performance over time. Countries should further adopt open data policies to share lessons learned.

Countries must invest in increasing the resilience of crop and livestock systems to potential shocks, adapting agriculture systems to climate changes, reducing water usage, improving nutrient management and animal health, and preventing further expansion of agriculture into natural ecosystems.

Small-scale food production offers a direct route to ending hunger and reducing poverty. Food producers – especially those with land tenure – are an army of potential environmental stewards who can protect natural resources and ecosystem services better than any government or large company.<sup>1</sup> Ultimately, people are the primary agents of change. Farmers, service providers, processors, marketers, and other local entrepreneurs must be central to the planning of any new solution.<sup>2</sup>

### ***Designing solutions for action***

Practical solutions for transforming global agricultural systems must address obstacles to innovation, markets, people, and political leadership.<sup>3</sup> Solutions should enable concrete action that works toward

meeting one or more of the targets enumerated under the Sustainable Development Goals.

Some solutions will involve new technologies, business models, institutional mechanisms, and policies. Some will be globally applicable while others will be designed for a specific local context. In either case, countries must be committed to implementing solutions themselves, with the support of other countries and international agencies, and to engaging in information and technology sharing.

Solutions should focus on critical areas where improvements in crop, livestock, and fish productivity and natural resource management can be made relatively quickly. For example, significant gains can be realized by providing better seeds, incentivizing more efficient irrigation practices, and improving nutrient management. Equal weight should be given to solutions at the farm level and to post-harvest improvements along the food chain to the consumer.

Examples of solutions for early action include: increasing access to new, stress-tolerant crop varieties and/or more nutritious staple crop foods; implementing new models of agricultural extension; promoting better nutrient management, environmental stewardship, and integrated landscape management; increasing access to micro-irrigation for smallholders; strengthening livestock markets, promoting vaccinations, and doubling animal productivity; implementing climate-smart agriculture; increasing resilience to pests and diseases; bringing innovative technologies to smallholder farmers to increase crop value, reduce post-harvest losses, and improve food safety; designing new business models for smallholder farming and marketing; and developing digital technologies for agricultural data collection and monitoring.

### ***Policy requirements for successful SAI***

Policy and institutional reforms are necessary to align the incentives of producers and consumers toward greater sustainability. Transparency, inclusiveness, monitoring and evaluation, and continuous adaptation to changing contexts are key. Sharing policy experiences and aligning relevant policies across countries and regions will also help overcome barriers to developing and adopting new technologies.

Critical policy areas to address include: agricultural trade and market access, agricultural financing, food processing and safety, consumer behavior, agriculture inputs and subsidies, land tenure, water rights and use, access to knowledge and technology, rural infrastructure and labor, agricultural research and extension systems, protection and use of ecosystems, gender equity, rural education, and health. In regions where the poorest households spend a large share of their income on food, stabilizing food prices and establishing or reinforcing social safety nets are important. Some countries will require substantial reforms in many areas.

Regulation is an important part of good governance, but it should be focused on specific areas such as protecting the poor, ensuring food safety, or protecting vulnerable natural resources like forests, water, and fish stocks.

### ***Investing in long-term change***

Accelerating progress requires large, sustained investments in agricultural research.<sup>4</sup> The rates of return on investments in agricultural research and development are high in both developed and developing countries; spillover across countries is substantial, and investments often have large, long-lasting, cross-sectoral growth benefits.<sup>5</sup> Therefore, investments in public agricultural research should be doubled within the next ten years.<sup>6</sup> Public sector funding (as opposed to private) supports both basic and applied research and ensures equal access to intellectual property.<sup>7</sup> While international donors should invest more in both international and national agricultural R&D systems, most low- to middle-income countries should aim to spend at least one percent of their agricultural GDP on public agricultural R&D.

Private sector engagement in R&D can be stimulated through results-based financial incentives that reward the creation and adoption of successful innovations. Barriers that slow down or increase the cost of bringing a new technology to the market need to be removed.<sup>8</sup>

Another essential piece is investing in creating and retaining a new generation of agricultural scientists and professionals – especially women – to develop

new technologies, make sure they meet farmers' and businesses' needs, and turn them into applied tools.

### ***Role of private sector and government***

Strong political will is needed to implement a coordinated, business-centered transition to SAI. One challenge will be the alignment of many actors to ensure strategic planning translates into real improvements in food security and nutrition. Currently there is little coordination among the many stakeholders in most developing countries.

Innovation Platforms have shown some success in fostering linkages between many actors to contribute to local innovation and stronger value chains. The range of actors with whom to coordinate includes national and local governments, agricultural research and extension systems, universities, civil society organizations, businesses and industry associations, United Nations organizations, global and regional food and nutrition initiatives, business-led development initiatives, donors, international agricultural research centers, and other global and regional organizations. Partner mapping will be essential for coordination and reducing duplication.

Strengthening infrastructure, providing security, reducing corruption, protecting human rights, and promoting education will also encourage private sector investment.

### ***References***

1. Adolph, B. & Grieg-Gran, M. Agriculture and food systems for a sustainable future: an integrated approach (Briefing). (IIED, London, UK, 2013).
2. FAO. The state of food and agriculture. (FAO, Rome, 2012).  
Vorley, B., Cotula, L. & Chan, M.-K. Tipping the balance. Policies to shape agricultural investments and markets in favour of small-scale farmers. (IIED & Oxfam, Oxford, 2012).
3. Conway, G. One billion hungry: can we feed the world? (Comstock Publishing Associates, Ithaca, London, 2012).
4. Bertini, C. & Glickman, D. Advancing global food security: the power of science, trade, and business. (The Chicago Council on Global Affairs, Chicago, 2013).

Anderson, J., Roseboom, J. & Weidemann Associates Inc. Towards re-engaging in supporting National Agricultural Research Systems in the developing world. (USAID, Washington,DC, 2013).

5. Stevenson, J.R., Villoria, N., Byerlee, D., Kelley, T. & Maredia, M. Green Revolution research saved an estimated 18 to 27 million hectares from being brought into agricultural production. *Proc. Natl. Acad. Sci.* 110, 8363-8368 (2013).

Bertini and Glickman, 2013.

Renkow, M. & Byerlee, D. The impacts of CGIAR research: A review of recent evidence. *Food Policy* 35, 391-402 (2010).

Maredia, M.K. & Raitzer, D.A. Review and analysis of documented patterns of agricultural research impacts in Southeast Asia. *Agric. Syst.* 106, 46-58 (2012).

Alston, J.M., Andersen, M.A., James, J.S. & Pardey, P.G. The economic returns to U.S. Public agricultural research. *Am. J. Agric. Econ.* 93, 1257-1277 (2011).

6. Bertini and Glickman, 2013.

7. Fuglie, K., Heisey, P., King, J., Pray, C.E. & Schimmelpfennig, D. The contribution of private industry to agricultural innovation. *Science* 338, 1031-1032 (2012).

8. Koo, B., Nottenburg, C. & Pardey, P.G. Plants and intellectual property: An international appraisal. *Science* 306, 1295-1297 (2004)