

new ideas through farmer experimentation and evaluation to intensify production systems; and importantly, monitoring the process through lesson learning and experience sharing to facilitate adoption. The activities include testing and dissemination of improved crop varieties (drought and Striga resistant, food–feed crops) and livestock breeds (dairy goats and sheep); appropriate agronomic (planting density, intercropping and cereal–legume rotations, multiple cropping, and agroforestry) and animal husbandry practices (semi-intensive and intensive management, dry- season supplementation, vaccination and deworming, housing, intensive feed gardens, fodder banks, dry-season supplementation, deworming); value-addition, reducing pre- and postharvest losses, linking farmers to input and output markets, and ensuring better integration of the crop and livestock enterprises.

Approaches to improve household nutrition, especially that of women and children, are being tested. They include diversifying household nutrition by using locally available ingredients from crops, trees, and livestock; introducing new nutritious crops; and food preparation techniques for more nutritious meals and weaning food. Nutrition field schools are being used to promote knowledge exchange on best practices for processing and storage of cereals, legumes, and vegetable-based diets.

Group and individual training and short courses are being used to strengthen the capacities of all actors (farmers, research and extension staff, input and output dealers, policy makers) not only in production, utilization, and processing skills but also in leadership, marketing, and communication skills to encourage farmer-to-farmer learning and extension. Academic training at the MSc and PhD level is being explored to address important knowledge gaps, and to develop “second generation” technologies that may be suited specifically to particular recommendation domains. Information exchange is being promoted through field days, exchange visits, and video shows. The project gives special attention to gender and underprivileged groups within society. Enabling policies and institutions to improve access to input and output markets, build effective partnerships, and access to knowledge and information are being advocated.



Participants of a short course on experimental design and data analysis for female scientists in Ghana. Photo: Africa RISING, Ghana.

Partners

Ghana

International Agricultural Research Centers: International Centre for Tropical Agriculture (CIAT), International Crops Research Institute for the Semi-arid Tropics (ICRISAT), International Food Policy Institute (IFPRI),

International Institute of Tropical Agriculture (IITA), International Livestock Research Institute (ILRI), International Water Management Institute (IWMI), The World Vegetable Centre (AVRDC), and Wageningen University (WU), in the Netherlands. **National Research and Extension System:** Council for Scientific and Industrial Research (Institutes: Animal Research, Crops Research, Food Research, Scientific and Technological Information, Soil Research, and Water Resources). **Universities:** Kwame Nkrumah University of Science and Technology, University for Development Studies, and University of Ghana. **Ministries:** Ministry of Food and Agriculture and Ministry of Health.

Non-governmental Organizations: Heifer International, Wienco, Seed Producers Association of Ghana, Community-based Organizations (CBOs), and the Guinea Fowl Farmers Association, farmers

Mali

International Agricultural Research Centers: ICRAF, ICRISAT, IFPRI, ILRI, AVRDC, WU. **National Research and Extension System:** Institut d’Economie Rurale. **Non-governmental Organizations:** Afrique Verte, Association Malienne d’Eveil et de Développement Durable, Mouvement Biologique du Mali, CBOs, farmers.



Tree establishment - Sirakele1, Mali. Photo: I. Hoeschle-Zeledon, Africa RISING.

“Through this project we want to increase the productivity of smallholder farms while paying careful attention to avoid any negative environmental impacts and also address some of the challenges smallholder farmers are currently facing due to climate change. We want to use science to bring about a Green Revolution but avoid the negative consequences that are often overlooked.”

--- Jerry Glover, USAID Senior Sustainable Agricultural Systems Advisor

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Sustainable Intensification of Crop-Livestock Farming Systems in the Guinea and Sudano Savanna Zones of West Africa

Transforming African agriculture through sustainable intensification

Africa RISING Program

As part of FtF, USAID is supporting an innovative multi-stakeholder agricultural research program, the Africa Research in Sustainable Intensification for the Next Generation (Africa RISING). The program's main objective is to identify and validate scalable options for sustainable intensification of key African farming systems to increase food production and improve livelihoods of smallholder farmers and at the same time conserve or improve the natural resource base.

Africa RISING is a three-in-one, five-year, research program launched in 2011. It brings together a wide range of research-for-development (R4D) partners from the international and the national agricultural research systems, farmers, community-based organizations, input and output dealers and policy makers to form R4D platforms. Through the platforms, farming systems and extension approaches are used to develop and disseminate management practices and technology combinations that better integrate crops (cereals, legumes and vegetables), livestock (including poultry), and trees and shrubs in mixed-farming systems with the aim to increase whole-farm productivity, improve nutrition, and increase farm incomes while preserving the environment. It will also develop innovations that effectively link farmers to markets and input suppliers.



Sheep and goats fed on legume shrub fodder. Photo: A.Larbi Africa RISING, Ghana.

The three projects are:

- Sustainable intensification of cereal-based farming systems in the Guinea-Sudano-Savanna Zone of West Africa – led by the International Institute of Tropical Agriculture (IITA)
- Sustainable intensification of crop-livestock systems to improve food security and farm income diversification in the Ethiopian highlands – led by the International Livestock Research Institute (ILRI)
- Sustainable intensification of cereal-legume-livestock integrated farming systems in East and Southern Africa – led by IITA

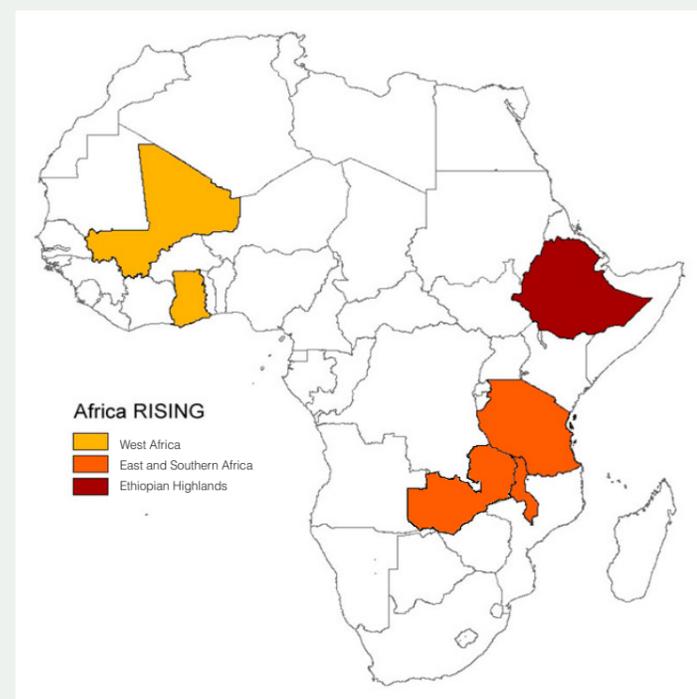
The International Food Policy Research Institute (IFPRI) is responsible for monitoring, evaluation, and impact assessment across all three projects.

The program is organized around four research outputs that are logically linked in time and space, namely:

1. Situation Analysis and Program-wide Synthesis
2. Integrated Systems Improvement
3. Scaling and Delivery of Integrated Innovation
4. Integrated Monitoring and Evaluation

The first research output covers the activities that are necessary to ensure that project activities are able to characterize and stratify target communities effectively so that promising interventions are identified and inappropriate interventions rejected. The second is delivered via a broad approach of participatory technology development and/or identification. This requires projects to allow for the identification of existing sound practices within communities that might be more widely propagated, the adaptation of these and other exogenous innovations, and the more effective combination of innovations from multiple sources.

The first two outputs will generate integrated technology combinations that are more effectively targeted on farmer's real development needs. The third output recognizes that, even where such technology combinations can be identified, the approaches used for scaling them out may not always be effective and seeks to redress this shortcoming. The fourth output relates to monitoring adoption, farmer preferences, and assessing economic and environmental impact of the project activities.



Africa RISING program countries.

Sustainable intensification of cereal-based farming systems in the Guinea-Sudano-Savanna Zone of West Africa

The Challenges

The Guinea-Sudano Savanna Zones of West Africa are dominated by small-scale, resource-poor farmers whose livelihoods depend on rain-fed crop, livestock, and crop–livestock farming systems. Main staple crops are cereals (maize, rice, sorghum, pearl millet), legumes (groundnut, cowpea, soybean, Bambara nut, pigeon pea), and vegetables (roselle, okra, pepper). The cereals are either grown in pure stands or intercropped/rotated with the legumes and a variety of vegetables.

Crops yields on farmers' fields are generally poor due to low and variable rainfall, drought, low and declining soil fertility, use of low yielding varieties, lack of quality seed of improved crop varieties and land preparation equipment, high cost of inputs, postharvest losses, labor constraints that lead to poor growing conditions (late sowing, sub-optimal plant populations, inadequate control of weeds, particularly *Striga*, pests and diseases), and low use of organic or mineral fertilizers.



Sow and piglets scavenging for food. Photo A. Larbi, Africa RISING, Ghana.

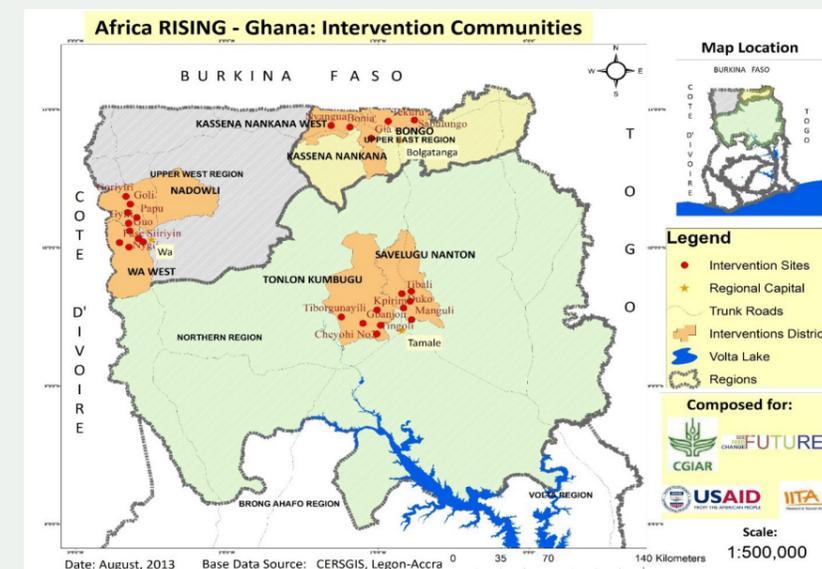
Cattle, sheep, goats, pigs, chicken, guinea fowl, turkeys, and ducks are reared for meat, milk, land preparation, transport, manure, and cash. The animals are mostly managed under extensive and semi-intensive systems with limited feed, shelter, health care, and breeding management. Productivity of the animals is low due to seasonal shortages in quality feed and watering points linked to degradation of the environment. Available commercial feeds are expensive and thus unaffordable for many farmers. Inappropriate husbandry (feeding, health care, housing, and breeding) practices result in high mortality rates. Farmers have limited access to veterinary services, and improved livestock breeds. In general, the crop and livestock enterprises are weakly integrated.

Diets of most rural poor farm-families are often dominated by the intake of basic staple foods (e.g., maize, rice, millet, and sorghum) which are usually deficient in micronutrients such as vitamin A, iron, and zinc needed to prevent malnutrition. The nutritional status of most farm households, especially pregnant women, breastfeeding mothers, and children below 24 months of age, is therefore poor, leading to chronic malnutrition linked to low income, unsuitable food processing and feeding practices, and iron deficiency. Nearly 25% of children in the intervention communities in Ghana are reported to be stunted, underweight, and anaemic.

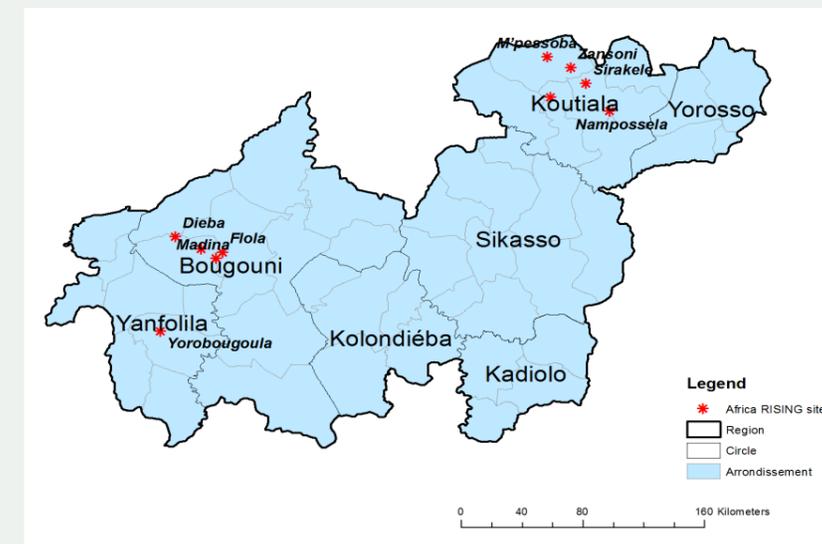
Farmers have limited access to input and output markets. Enabling institutions and policies are also lacking. Due to inadequacies of traditional promotional and scaling-up/out pathways, there is a large, unmet demand for information and technology, especially by women. This has led to low adoption of improved technologies and best practices by farmers to reduce food insecurity, poverty, and natural resource degradation.

Project countries

Africa RISING is being implemented in 25 intervention communities in the three northern regions of Ghana, and 10 villages in the Bougouni-Yanfolila and Koutiala districts of the Sikasso region in southern Mali to address the challenges of small-scale, crop–livestock systems outlined above. It is intended to result in spillover effects to other similar agro-ecological zones.



Africa RISING intervention communities in Ghana.



Africa RISING intervention villages in Mali.

Project interventions:

Participatory research and extension approaches including multi-stakeholder research-for-development platforms are used to identify constraints and plan appropriate interventions. Partners are trying out