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The U.S. Government's Global Hunger and Food Security Initiative

Africa RISING

USAID's Sustainable Intensification Program in Africa

Monitoring and Evaluation (M&E) Plan

IFPRI®

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Contents

List of Acronyms and Abbreviations

Abt	Abt Associates
ACDI-VOCA	Agricultural Cooperative Development International/Volunteers in Overseas Cooperative Assistance
ADVANCE	Agricultural Development and Value Chain Enhancement
AEZ	Agro Ecological Zone
AR	Africa RISING
ARD	Agricultural and Rural Development
ATA	Agricultural Transformation Agency (Ethiopia)
CGIAR	Consultative Group on International Agricultural Research, often abbreviated with CG
CRP	CGIAR Research Program
CSA	Central Statistical Agency (Ethiopia)
DALDO	District Agricultural and Livestock Development Officer
EPA	Extension Planning Area (Malawi)
ESA	East and Southern Africa
FO	Farmer Organization
FTF	Feed the Future
GAEZ	Global Agro Ecological Zone
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IFPRI	International Food Policy Research Institute
IITA	International Institute for Tropical Agriculture
ILRI	International Livestock Research Institute
IMET	Impact, Monitoring and Evaluation Team
M&E	Monitoring and Evaluation
MSU	Michigan State University
NAFAKA	Tanzania Staple Value Chain
NARS	National Agricultural Research System
NGO	Non-Governmental Organization
R4D	Research for Development
RISING	Research In Sustainable Intensification for Next Generation
SI	Agriculture Sustainable Intensification
SpatialDev	Spatial Development International
USAID	United States Agency for International Development
WA	West Africa

Africa RISING

Monitoring and Evaluation (M&E) Plan

1. Introduction

This document represents the initial Monitoring and Evaluation (M&E) Plan for Africa RISING (Africa Research in Sustainable Intensification for the Next Generation), a USAID-funded research for development (R4D) program (henceforth called the "program").[1] Because some detailed objectives and many operational activities of Africa RISING are still being finalized by a number of implementation teams, this initial M&E Plan is also subject to further revision and refinement. To properly complete the M&E plan further deliberation and consensus is required at the program level amongst USAID, the implementation partners, and the M&E team with regard to: the exact scope and nature of intended outcomes, the inherent development hypotheses or theory of change being assumed or tested, and the adoption of evaluation approaches that are at once credible, practical and affordable.

The M&E Plan describes: Africa RISING's M&E approach and strategy, the currently understood and agreed intended outcomes and measurable indicators for tracking progress toward and achievement of those outcomes, the M&E methods to be used, and the initial assignment of M&E responsibilities. Beyond the need to satisfying standard/conventional M&E requirement, this plan also describes activities designed under an expanded Africa RISING M&E scope. These activities include: (i) a structured stratification schema (by geography and household categories) and action research and control site selection process, (ii) a program-wide, spatially-enabled M&E data management and sharing platform open to program participants and stakeholders, and (iii) initial steps in embedding a farming-system modeling capacity into the program's M&E toolkit. The role of modeling is to better integrate and interpret monitoring data in ways that will enhance research design, evaluation and learning as well as, looking forward, research investment targeting and scaling of proven technologies and practices.

While they are highly complementary, monitoring and evaluation are separate both in their purpose and their implementation. Bearing this in mind, the current "M&E" plan does not describe a single combined activity, but describes each of them separately.

[1] It is important to distinguish between the overall Africa RISING program and the individual projects that it encompasses.

1.1. Roadmap of this document

The next section of this document contains a brief overview of the general goals and objectives of M&E (section 2), followed by an introduction to the specific commitments made, components agreed, and hallmark features of the Africa RISING M&E work stream (section 3). These sections provide the programmatic context for the various elements of the detailed M&E plan that follows. The next four sections detail: 4) the causal logic of Africa RISING, and a discussion of the uncertainties about the program; 5) the proposed Results Framework and results indicators that will be used to monitor progress and the output indicators proposed; and 6) how targets will be set against baseline data; 7) the plan for performance monitoring, including the overall strategy, responsibilities, data sources, and deliverables. The plan also describes the proposed M&E Alliance, an open-access M&E website, and an annual M&E technical meeting.

Following these sections there is a synthesis of identification and characterization of the research sites in the three mega-sites of AR (section 8). The final two sections specify the data planned for collection and tools for their organization and display (section 9); the modeling activities, including linkages between M&E and other data (section 10).

The final section of this Plan covers evaluation, both quantitative and qualitative approaches. The analytical approaches and tools detailed in this section include:

- Characterization and stratification of target farming systems;
- Action research site selection;
- Attribution assessment, potential comparison group(s), and impact assessment design;
- Power calculation for Tanzanian districts on yield increase (maize and rice);
- Outcome mapping.

2. M&E Goals and Objectives

Monitoring and evaluation of project activities are critical for several reasons. They support effective project management, provide the data for timely reporting to project funders, and help all stakeholders to learn about the project's successes and failures. A robust M&E system should provide learning on what did and what did not work that, in turn, should inform the design and implementation of new interventions, as well as catalyze adjustments to ongoing activities that might enhance efficiency and effectiveness.

2.1. Critical aid in effective management

Monitoring can be a critical aid in effective management when it provides project managers with timely information on the status of activities and the results they are achieving. This allows managers to assess the need for changes in strategy or implementation.

2.2. Reporting requirements

Auditing and monitoring staff require frequent reporting of progress and results (monitoring) from project implementers, in order to provide funders with the evidence they need to both justify the expenditures underway and to maintain a flow of resources. In this regard it is vital to have clarity and consensus on the scope and nature of the expected direct results and beneficiaries, as well as on associated indirect outcomes, be they positive or negative. For example, direct results might include increases in productivity, incomes or nutrition in target smallholder households, whereas increased demand on women's time or reduction in catchment water yields might be key indirect consequences that need increased monitoring and, possibly, ameliorative action. The selection and/or development of appropriate indicators, as well as the determination of their associated reporting needs (e.g., metrics, frequency, and disaggregation) need to account for all direct and indirect outcomes important to both clients and stakeholders.

The Africa RISING M&E strategy to best meet these needs is of relevance both to USAID and to implementation partners since the data required to satisfy donor needs are also of value to CGIAR and national research scientists and institutions as part of their own internal M&E needs. This plan, therefore, will strive to meet the legitimately distinct goals and priorities of both USAID and the CGIAR M&E systems.

2.3. Learning

Development projects provide great opportunities to learn what works and what does not. This can be done through rigorous independent impact assessment and/or through evaluation(s) carried out by project staff. Given that the impact of large and highly visible projects will be reported at high levels, USAID's evaluation policy specifies an independent (and rigorous) evaluation. However, USAID recognizes that much valuable learning can also be achieved through evaluations carried out by the project itself. Africa RISING is likely to collect or make use of large amounts of detailed information, which can support various types of evaluation, especially if the evaluation design is carefully considered at the outset of the project. The key questions that Africa RISING (both at a program and project levels) has set to answer will inform the design of the consequent evaluations, with the latter being probably among the most important challenges that the program faces.

3. M&E In the Context of Africa RISING

In this section we outline the key components and distinguishing features of the M&E strategy and approach in Africa Rising. Apart from the usual research outputs and impacts, the Africa RISING program has also set itself the goal of developing best practice approaches to the design and implementation of sustainable intensification investment programs. This ambition also

extends to the M&E workstream and a deliberate attempt has been made from the project outset to maintain and document a structured and systematic approach to all aspects of M&E including dimensions such as research site stratification and selection, a systematic, open access M&E data management platform, and novel analytical tools to complement traditional econometric evaluation approaches.

3.1. Africa RISING M&E Commitments and Components

As the M&E component of USAID's FTF sustainable intensification flagship investment in Africa, Africa RISING (AR), is committed to achieving a number of specific goals in terms of its deliverables and approach, as follows:

- **FTF Compliance:** AR M&E will conform to the overarching M&E standards, best practices, and core indicators established for the entire FTF initiative.[2] This includes compliance with guidelines and processes established for the FTF FEEDBACK evaluation initiative where relevant.[3]

- **Open-access platform:** The AR M&E activity will deliver and maintain an open-access, M&E data management and analysis platform to serve the needs of SI implementation partners and other stakeholders. Open data access is mandated by both US Government regulations and (likely from May 2013) by the CGIAR Consortium.

- **Monitoring & projection:** Beyond its formal monitoring obligations, the AR M&E activity will generate ex ante evaluations for a range of farming system and livelihood outcome indicators on an annual basis to provide enhanced research management and outcome mapping needs.

- **Multi-scale reporting:** To meet different stakeholders' needs, and to provide the capability to support multi-scale monitoring and evaluation, the AR M&E platform will be designed to report at several scales and levels of aggregation:

    - **SSA-wide:** cross-system reporting to serve the needs of SI-wide roll-up of indicators across the three investment geographies/system project- or mega-sites (Guinea Savannah, Ethiopian Highlands, East and Southern Africa)
    - **Site-wide report**: for each of the three project sites
    - **Country report:** Breakout of site-wide reports to serve the needs of national stakeholders (e.g., USAID country missions, national institutions)

[2] http://www.feedthefuture.gov/sites/default/files/resource/files/ftf_monitoringevalfaqs_feb2012.pdf
[3] For example, http://www.agrilinks.kdid.org/library/fy12-feed-future-monitoring-system-guidance-document

- **Custom/Sub-system reports:** Some reporting needs will need to be met by customized aggregation of sub-system indicators (e.g., to generate reports by CRP or by farming system).

- **Scaling up and out potential outcomes and impacts**: To inform planning and longer-term projections of potential innovation impact at scales beyond the actual action research sites, forward-looking analysis will explore the productivity and sustainability consequences of a range of adoption scenarios and geographic/system spillover pathways across broader landscapes and regions.

Africa RISING's M&E activities are coordinated by the HarvestChoice team at IFPRI. The HarvestChoice team has acquired work experience over the past four years in developing data and analysis systems to support investment decision targeted to enhancing agricultural productivity and increased value-chain participation by smallholder farmers in Sub-Saharan Africa. The team has expanded its spatial framework to encompass nationally representative household survey data, as well as biophysical, production, market, demographic and infrastructure data. These elements form the core of a consistent M&E platform that can be applied across sites, and that has sufficient spatial and system specificity to support spatially disaggregated examination of farming sub-systems, household types and key ecosystem services within each site. This core capacity will need to be increased in several ways to assimilate and integrate more granular project site-specific data from the field, and richer intervention-specific data from field- and experiment-based activities of AR implementation partners. This includes the need to conduct targeted surveys to collect supplementary information needed to support the agreed scope and scale of M&E activities and commitments.

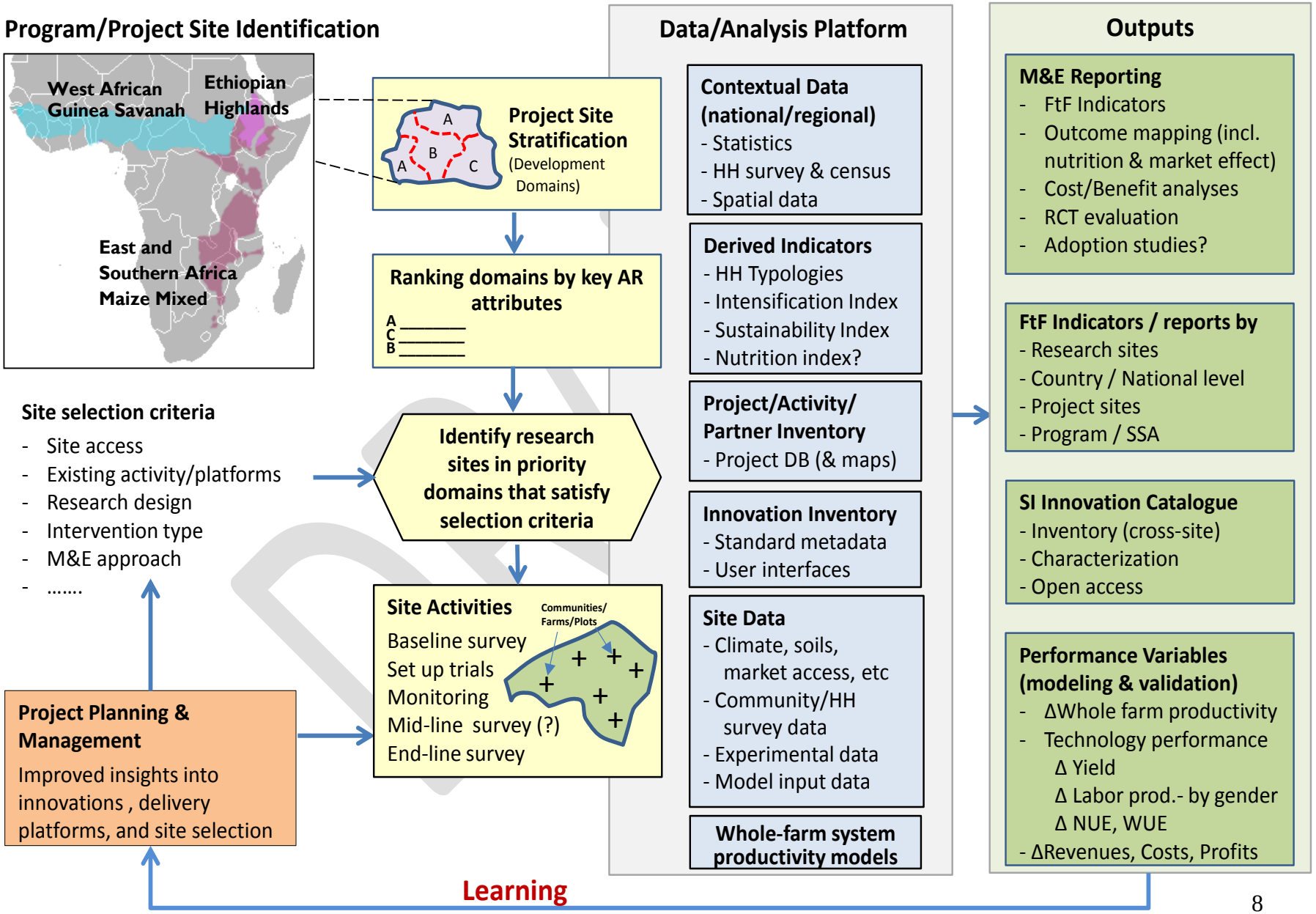
While the specific elements of the M&E system need review and acceptance from all implementation partners involved in AR (and to this end the annual M&E meeting described below is crucial), there are at least four data and analytical components of the M&E evaluation system (see section 11 for additional details):

1. **Delineation and characterization of target farming systems**: This activity relies on the fusion of regional, spatially-explicit data, agricultural production data, environmental data, and farm/household data for representative participating and non-participating households;
2. **Technology/intervention inventory**: An inventory of the individual and integrated farming system interventions/innovations (together with their distinctive characteristics) whose adoption and impacts need to be evaluated;
3. **Change estimation/projection models for selected indicators**: e.g., productivity change, land, labor (gender differentiated) and water use efficiency; and

4. **Attribution assessment**: In addition to the ability to measure and model change in indicators is the need (with additional information/assumptions) to assess the extent to which Africa RISING contributions contributed to those changes.

Initial M&E activities were aimed at seeking synergies with national and international partners in tapping available and reliable data sources. Subsequently, according to the quantity, quality and relevance of information available for each of the three mega-sites, targeted data collection will be required at the local level, through qualitative and quantitative *ad-hoc* surveys. These data will complement the suite of accessible HarvestChoice spatially-disaggregated indicators. The M&E main components, activities and outputs are schematically represented in Figure 1.

Figure 1: Africa Rising M&E Components, Activities, and Outputs



With respect to monitoring, IFPRI's HarvestChoice team is partnering with each lead CG center in observing and reporting FTF indicators and setting their targets for each of the three mega-sites. Annual M&E documents will include data integration and modeling using more comprehensive and local data sources, some of which will rely on data sharing protocols being established with other implementation partners. An inferential analysis based on the characteristics of each farming system/household typology will also be undertaken to target "homogeneous" groups of farmers for determining the likelihood of adoption of specific interventions.

3.2. Hallmarks of Africa RISING in Achieving Sustainable Intensification

As part of USAID's Feed the Future initiative to combat hunger and food insecurity, Africa RISING will implement research to support sustainable intensification (SI) of smallholder cereal-based farming systems (through, for example, crop diversification and rotation, improved management, and inclusion of high-value cash crop and livestock enterprises). The success of the program relies on different projects that offer pathways out of hunger and poverty through sustainable intensification. By design these interventions will not be entirely prescriptive, allowing individual research teams, working with smallholder households, to build on past experiences and to exercise creativity in developing workable solutions to farmers' problems.

Key features of Africa RISING include the following:

- The research conducted will be designed around a set of hypotheses that are carefully linked to outputs and associated developmental outcomes identified by Africa RISING.

- Its research activities will be problem-focused and driven by changes in market demand, evolving policy environments (e.g., food security and environmental mitigation) and changing social structures (resulting from migration/urbanization, etc.). It will also meet the needs of farmers. These activities will support the integration of SI-related innovations from a wide range of sources (past research, ongoing adaptive research and indigenous solutions) into the farming systems that are targeted.

- It is built on a set of guiding principles that will help to ensure that its research outputs are targeted effectively on development needs and are feasible for targeted farm households to implement. These principles include an appreciation of household diversity, differing and multiple objectives, complementarity of interventions/innovations and the dynamic nature of intensification at the household level.

- It is implemented at several levels with:

    - core research outputs that are likely to be common across Africa RISING;

- research activities that may or not be relevant to all of the research questions posed by the individual projects at project sites; and
- methods and tools that can be applied flexibly as dictated by these individual research activities and the context in which they are to be carried out.

- Scaling opportunities are foreseen in Africa RISING from the onset, through the development of investment plans with various development agencies and implementing partners, primarily USAID funded ones (such as NAFAKA, ADVANCE). Some of these opportunities are already emerging through initial discussions with other partners and donors.

Africa RISING's research approach was designed to be effective in addressing the continuum from problem identification and targeting through participatory technology evaluation and adaptation to scaling. It was designed with clear objectives and outputs that are built on testable and refutable hypotheses.

3.3. A mix of M&E approaches

The M&E activities of Africa RISING rely heavily on data collection and analysis, both for reporting and for management. Initially, baselines or situation analyses are being conducted (also as an M&E team contribution to Africa RISING's Research Output 1) in order to generate data for agroecological characterization, farming system analyses, household characterization by typologies, diagnosis of production system constraints and opportunities, generation of an innovation inventory, and for benchmarking innovation performance. Agroecological, demographic, land use and marketing system characteristics can be combined, for example, to generate "development domains" that stratify geographic areas having similar sets of development issues and that provide opportunities for different sets of interventions. Analysis of baseline household information on resource endowments (e.g., land, labor, livestock, and finance), livelihood strategies, production orientation and household aspirations will also be used to develop household typologies that simplify the diversity in farm households. Regional geographic stratification and household typologies can be used to better target interventions and help identify representative or otherwise appropriate action research and control sites.

Participatory approaches will be used to identify technology options and combinations that best suit specific farming systems and household categories, and those combinations will be tested and evaluated under on-farm and on-station conditions. Successful crop and livestock system technology combinations will be documented and promoted, and their subsequent adoption by different groups of farmers will be monitored. Recommendations for targeted scaling up of successful technology combinations will be made based on evaluative modeling.

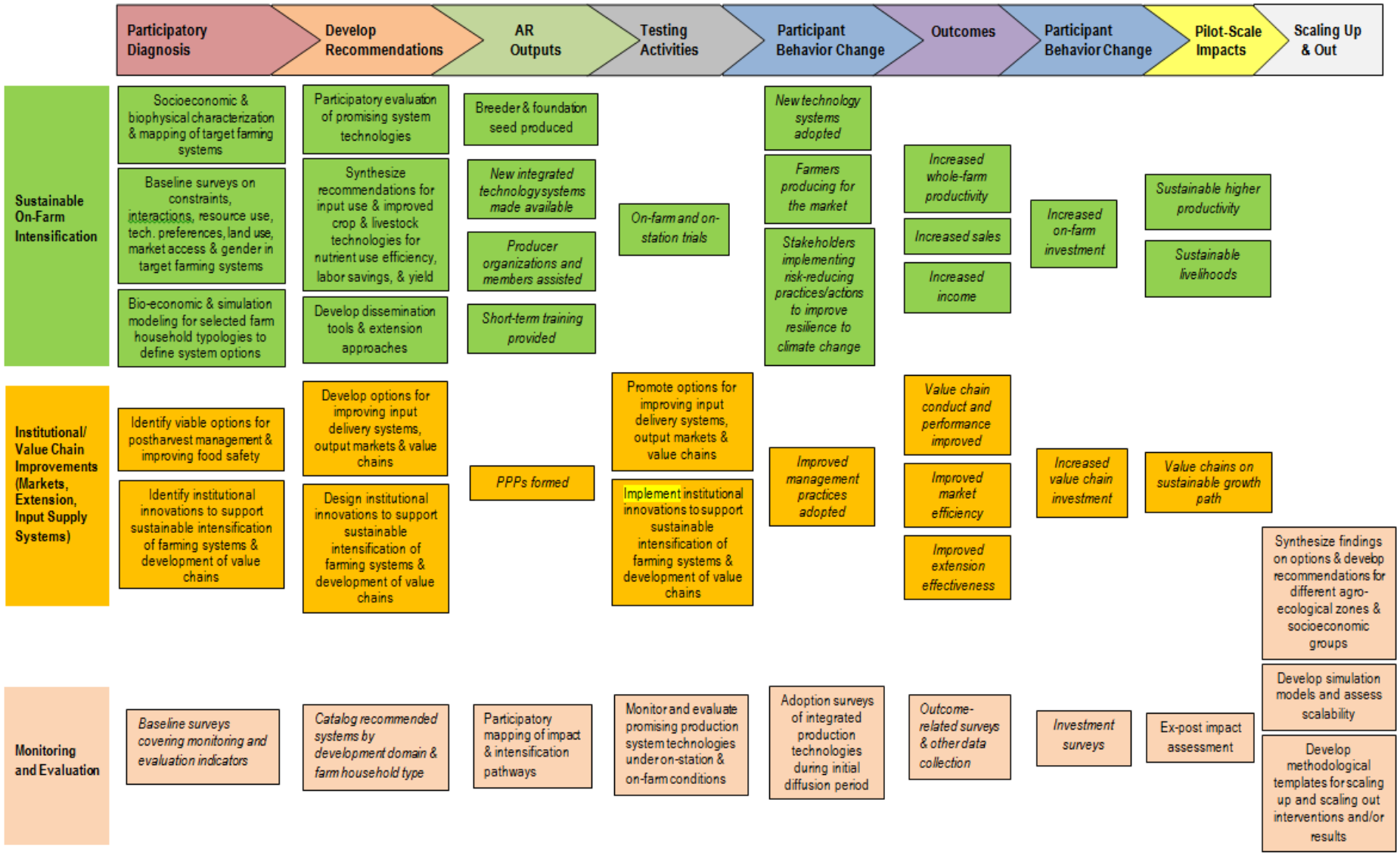
In order to predict the scalability of successful technologies, it is necessary to track adoption rates and to better understand the socio-ecological and cultural factors that condition such

adoption. This information, furthermore, increases our understanding of how agricultural productivity can be sustainably increased. It is anticipated that most of the data collected and analyzed on the effectiveness and adoption of interventions will help to fulfill both the reporting requirements and the learning objectives of the AR M&E component.

4. Development Hypotheses (Impact Pathways)

At the early stage of the program's definition and before its implementation, promoters of Africa RISING have been developed a conceptual framework on the development outcomes that they the program is likely to achieve and its associated possible channels. The impact pathway chart that has been developed in the course of finalizing Africa RISING's program document and drafting this M&E Plan is shown in Figure 2, referred to as the "development hypothesis graphic". It was an early attempt to capture the broad objectives, activities, expected results, and M&E activities of Africa RISING, and it relied partly on the concept note ideas, but also attempted to fill gaps. It was designed to stimulate discussion and arrive at a clearer picture of Africa RISING and how to go about its monitoring and evaluation. It tries to include and link the components of the overall FTF Results Framework to Africa RISING specific research activities and development pathways. Nevertheless, the extent of the impact of AR on development outcomes needs to be carefully evaluated, as the program's objectives, activities, and expected results continue to shape up. Indeed our articulation of the actual focal hypotheses and impact pathway segments of AR research will be refined as implementation successes and failures are documented, and segments of this overall schema will be omitted or expanded as necessary.

Figure 2: Africa RISING Impact Pathway



4.1. Program Uncertainties

Here we list several ambiguous or apparently unsettled areas with regard to the existence of a clear consensus on the specific scope or nature of outcomes, impacts or target populations that Africa RISING seeks to achieve or serve. For the most part these ambiguities are revealed explicitly or implicitly by review of the draft AR Research Plan or subsequent knowledge of the specific 2013 research plans of individual research teams.

Primary outcome?

The first research outcome of the draft research program document is stated as "Integrated innovations increase production and/or improve productivity in a sustainable manner for the most relevant farm typologies within the Africa RISING research sites".

This statement represents significant ambiguity about the main outcome of Africa RISING. Is it to increase agricultural *production* or to increase agricultural *productivity*? Strategies to achieve these different outcomes can be quite different, as would indicators to measure results and evaluation questions. A more precise definition of this outcome is needed both to properly finalize the Research Plan and, more specifically, to finalize a coherent M&E Plan. Such ambiguity or lack of clarity may also be addressed at project level by country-, region-, or system- specific implementation teams where relevant. In order to facilitate a more robust evaluation, each outcome to be developed at country, region or farming system level should refer to the main outcomes in the Africa RISING program document.

The nature of interaction between researchers and farmers?

AR implementation partners will most often be undertaking research on farmers' fields, with few interventions at a landscape/community level. At the time of preparing this plan, however, the specific research activities and the role of farmers in those activities are not well defined. For example, will Africa RISING conduct collaborative research, with farmers providing their land, labor and perhaps management? Or is it a set of farmer-chosen SI demonstrations carried out by researchers on farmers' fields? If the former, what would be meant by "adoption," which is often a key indicator of progress in agriculture? Is there a sequence in which collaboration comes first and then surrounding farmers would become adopters? Such questions are critical to understanding how best and most appropriately Africa RISING can design and track indicators and/or design and conduct evaluation. As specific research implementation teams are formed to develop activities to address location-specific constraints, the nature of the collaboration between researchers and farming communities will be better defined at the lower level instead of program level. Most concerns posed above are being addressed at project level as national partners are helping to identify action research sites with collaborative farming communities. Partnerships with local authorities (DALDOs), NARs, and ACDI-VOCA projects have ensured land

availability to set-up demonstration experiments in research sites. The M&E strategy will be tailored to location-specific research activities and partnerships once the teams have finalized their research plans.

Partnerships?

The fourth and last program objective on development of the draft program document aims "*To facilitate partner-led dissemination of integrated innovations for sustainable intensification beyond the Africa RISING action research sites*".

Partnering with another USAID-funded project would have particular implications for M&E in that all USAID projects are accountable and USAID does not want results to be double-counted. Partnering completely within the scope of Africa RISING would not present this issue. It also needs to be clear to what extent establishing partnerships of some sort is in itself an important objective of Africa RISING, or if this is seen simply as a means to achieving Africa RISING's technical objectives. Noteworthy is the progress made during the development of the research program document to address this aforementioned uncertainty identified in the initial stage of the AR program. Different AR project meetings and workshops conducted between September and October 2012 identified the imperative need for AR to partner with various research and development partners to maximize the project's expected impacts, taking advantage of the NARs local skills, knowledge and experience on the ground. The issue will be addressed in Research Output 1 of the program document, whereby specific activities will be undertaken to establish R4D platforms at the geographical administrative level 2 (districts in Ghana, *cercles* in Mali, *woredas* in Ethiopia, wards in Tanzania, and Extension Planning Areas -EPAs- in Malawi). These R4D platforms will involve various research and development partners, operating in specific components (e.g., value chain) within AR system interventions. Efforts that have been initiated to develop partnerships in AR include:

- The integration of NARs in the formulation of research implementation teams at the project level: key contacts of NARs in each mega-site were invited to attend the planning workshops held in AR action countries. Their contribution is considered an integral part of activity implementation by research teams.
- Alignment of Africa RISING and ACDI-VOCA projects: discussions amongst USAID program coordination team, USAID country missions, and the AR program coordination team led to the decision to co-locate Africa RISING research with on-going USAID-funded development work wherever possible. Besides offering the great opportunity to focus USAID efforts in implementation countries, strategic partnerships with ACDI-VOCA farmers (e.g., NAFAKA in Tanzania and ADVANCE in Northern Ghana) can increase the impact of Africa RISING in action sites; and
- Partnering with other donors: different donors, including private sector and international agencies, are being identified to partner within the scope of AR program.

Specific implications for M&E purposes from the aforementioned partnerships were raised in all project planning workshops. USAID will need to find the best option to carefully credit relevant partners, while the latter will ensure avoiding a double-counting of outputs under the different USAID-funded initiatives.

Market- and institution-related objectives and activities?

A significant portion of the development hypothesis graphic (orange-colored boxes of the conceptual framework of Africa RISING in Figure 2) is devoted to activities that would occur off-farm, namely activities related to markets and institutions. In the M&E meeting in Addis Ababa, September 5-7, 2012, there was considerable discussion of the possibility of Africa RISING's partnering with other USAID-funded projects that work in the areas of markets and institutions.

However, Africa RISING market- and institution-related activities seem to be contained only in pilot projects for scaling up proven technology systems. These pilot activities are probably seen as learning opportunities, not attempts to yield significant impact. The results of these activities will likely be fed into models that will predict the potential scope of impact of the technology improvements.

In the latest version of the AR program document it is stated that sustainable intensification can only be achieved when farmers are connected to profitable and efficient value chains. In order for AR to yield the desired impact through the development hypothesis, AR action research sites will be linked to target value chains through R4D platforms. AR will set up R4D platforms where these are absent and/or strengthen their functioning where appropriate. Activities of R4D platforms are explicitly described in the program document. One of the main activities consists in identifying priority value chains around which AR activities will be developed as well as essential partners along these chains. On this note, the impacts will be shared amongst key partners.

5. FTF Results Indicators and Results Framework

As a project funded by Feed the Future (FTF), Africa RISING must and will report regularly on its progress using FTF indicators. The FTF Indicator Handbook specifies these indicators in detail, including requirements for their disaggregation. Within the overall stratification structure adopted as part of Africa RISING's Research Strategy, however, additional levels of disaggregation of these indicators by development domain, farm household typology, etc. might be needed. Such additional disaggregation will help to provide the granularity of data required to achieve program and project level (e.g., West Africa, Ethiopia, East and Southern Africa) goals and accountability that go beyond the needs of high-level FTF reporting. The complexity of the program and the expected diversity in the three projects will also call for the development of a

number of "custom" indicators to provide a complete picture of outcomes and impacts and, hence, provide more complete progress reporting. These custom indicators will not be aggregated across FTF projects (and the FTF monitoring system does not record custom indicators in its central database), but they are needed to satisfy other internal USAID and CRP monitoring of Africa RISING's progress. Data on custom indicators will also provide critical information on, for example, the program's country-specific and mega-site intervention outcomes.

5.1. FTF Results Indicators

Appropriate results indicators can only be determined once the Africa RISING program document is finalized and project activities have been more precisely specified. In the meantime we present some core USAID indicators deemed to be essential and suggest a number of additional ones that Africa RISING should likely consider given the program's goals and development hypotheses (impact pathways).

USAID used an iterative process to develop a set of monitoring indicators and targets that were agreed upon. In order to meet USAID's internal requirements, an initial set of indicators was selected by USAID for Africa RISING "Quick Win" activities that were undertaken between April and September 2012. These initial indicators were revised and considered in the development of the set of indicators to be measured during the implementation of Africa RISING activities in the long-term phase of four years. Setting targets for these indicators necessitates the involvement of the partners who will implement the activities in the action sites. It requires that these partners propose realistic targets after the baseline values of these indicators are known. In cases where baseline values are zero, targets can be proposed once indicators are agreed upon. Given that the process for setting targets requires knowledge of specific objectives and interventions for each project and baseline data collection for some monitoring indicators as well as an agreement upon these targets, this plan is necessarily a "living document" that will be updated periodically. Concept notes for specific research activities that will be implemented in action sites during the time-span of the project are also available, and the periodic update of the plan will be largely driven by the actual research activities carried out by implementation teams.

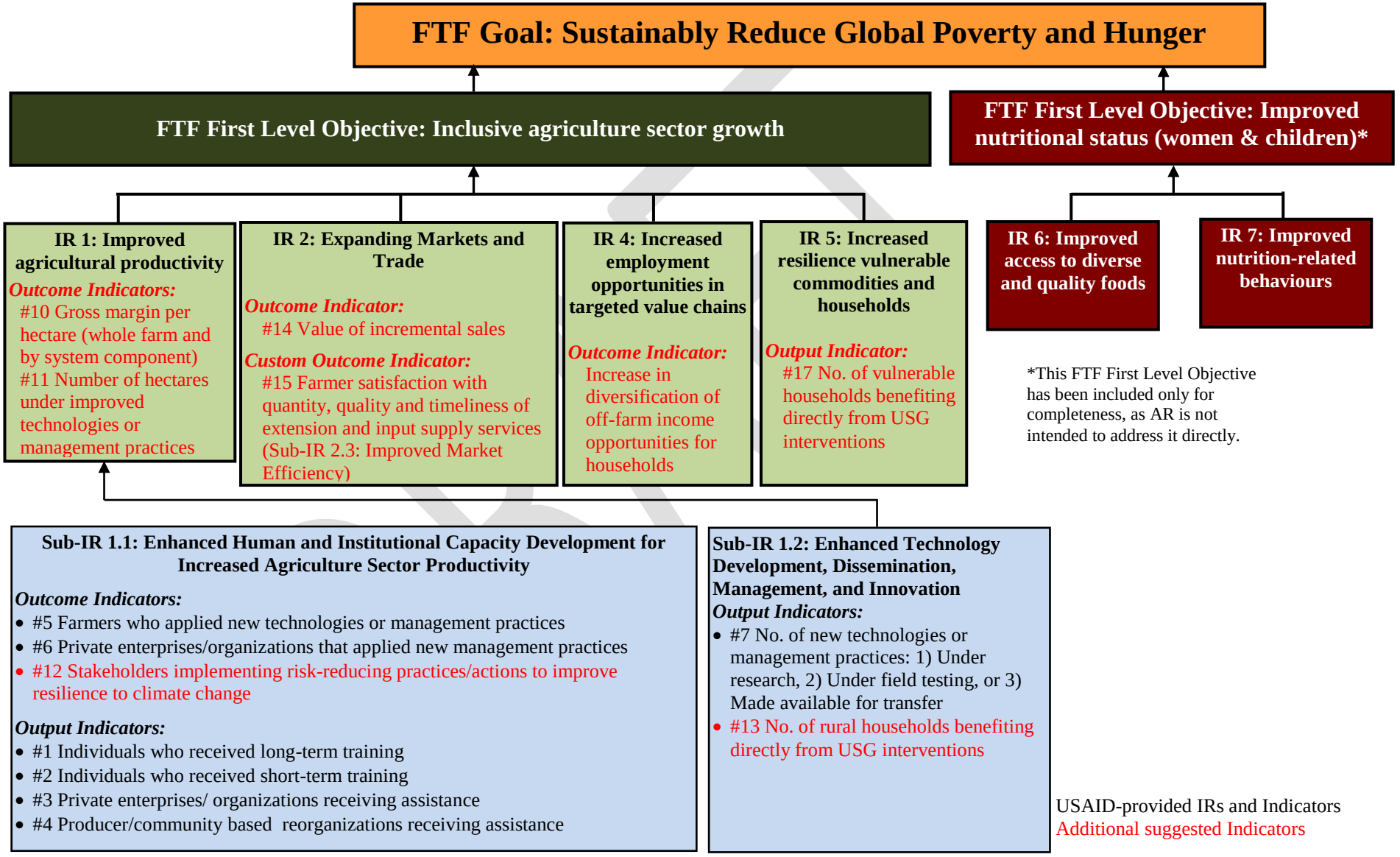
5.2. FTF Results Framework

The indicators can be organized into a standard USAID Results Framework (RF), showing the FTF Intermediate Results (IRs) and sub-Intermediate Results (sub-IRs) that these indicators track (Figure 3). The list of indicators (which the numbering in the figure refers to) is reported in Annex I and II. Annex III presents general indicators proposed by AR implementers during the M&E expert meeting, and the Ethiopian Highlands annual review and planning meeting. Some of these indicators will be monitored by the project's implementers depending on the type of

interventions carried out. Annex IV shows the format of the indicator reference sheet as required by USAID-FTF monitoring system.

Figure 4 provides the link between the overall FTF IRs and sub-IRs with the three Africa RISING Research Objectives (ROs) and their associated components, as reported in the project's research design document.

Figure 3: Proposed Africa RISING Results Framework and Indicators



Source: Volume 1 FTF M&E Guidance Series (ftf_volume1_monitoringevaloverview_feb2012[1].pdf)
Note: IR 3 (Increase investment in agriculture and nutrition-related activities) and IR 8 (Improved use of maternal and child health and nutrition services) have been omitted from the FTF original version.

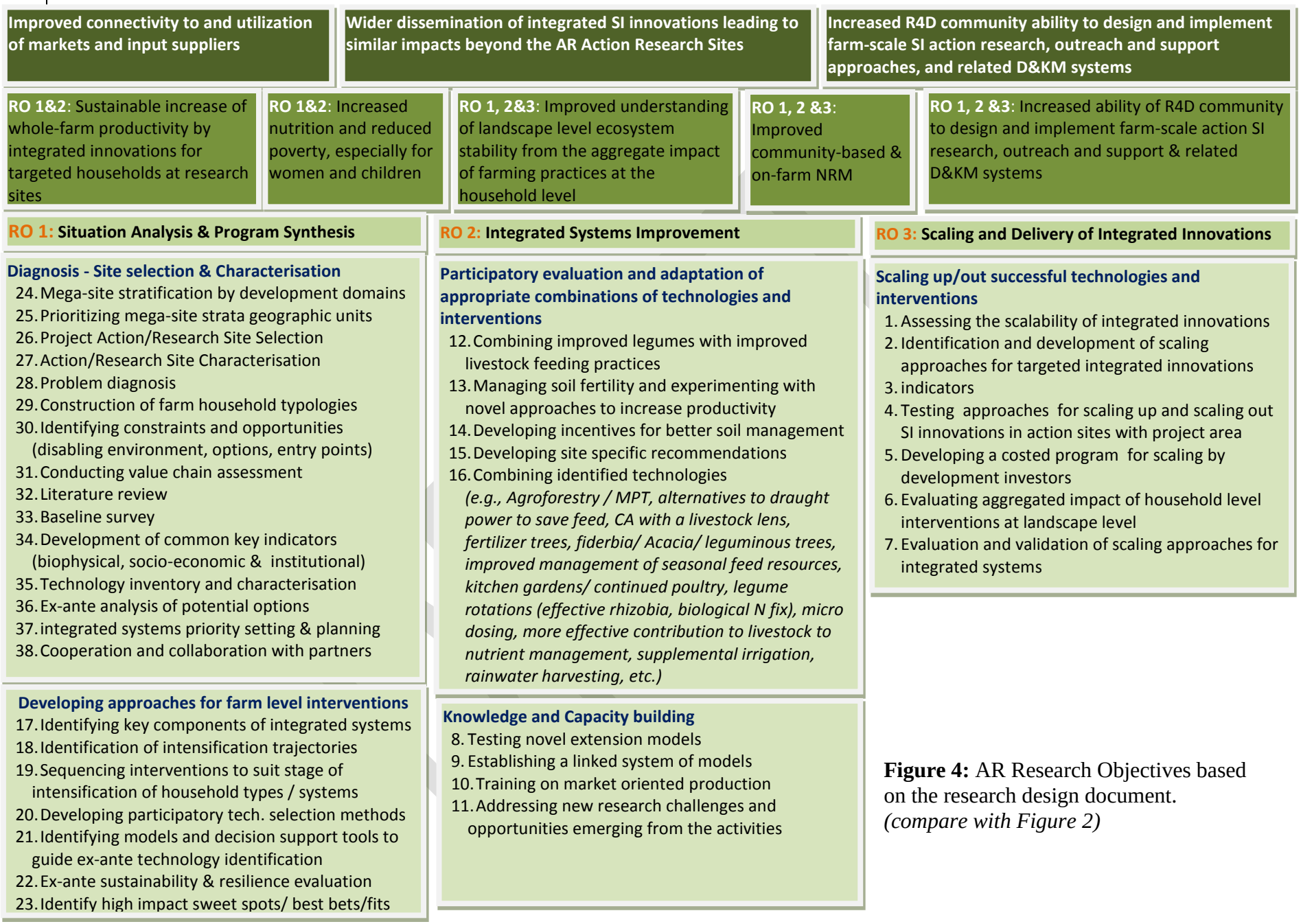


Figure 4: AR Research Objectives based on the research design document. *(compare with Figure 2)*

6. Baselines and Targets

6.1. Baselines for FTF indicators

One baseline values of indicators are known, implementation partners must propose realistic targets (although internal USAID reporting needs often lead to the setting of preliminary targets much earlier than appropriate baselines are known). In some cases baseline values are zero, so targets can be proposed once indicators are agreed upon. Because baseline data will need to be collected for some monitoring indicators and then targets proposed and agreed, this plan is necessarily a "living document" that will be updated periodically as USAID and implementation partners agree on the specific sets of innovations to be made available to farmers in specific sites.

Africa RISING will conduct a survey to jointly determine any non-zero baselines once all indicators are agreed and other initial survey needs are considered.

6.2. Targets for FTF indicators

By their nature some types of indicators do not require that a baseline be measured before setting the annual target, as the baseline is implicitly zero. For example, when a project conducts training, it is not relevant whether the persons trained had training by another project in the past, so the target number of individuals is set in the absence of any baseline information. Table 1 shows the targets proposed for FY 2012 and 2013, as set by the CG lead implementing centers in each mega-site.

For other indicators previous levels are quite relevant. For example if a farmer were already applying a method that a new project intends to disseminate, then the new project should not count that farmer towards its target. If a firm were already exporting a product, then a project to promote exports should not count the full level of exports of that firm towards its target, but rather only the difference between the current total and the baseline level.

The following are indicators for which the non-zero baseline would have to be determined before the target was set:

- #5 Number of farmers and others who have applied new technologies or management practices as a result of USG assistance

- #6 Number of private enterprises (for profit), producers organizations, water users associations, women's groups, trade and business associations, and community-based organizations (CBOs) that applied new technologies or management practices as a result of USG assistance

- #10 Gross margin per unit of land, kilogram, or animal of selected product

- #11 Number of hectares under improved technologies or management practices as a result of USG assistance
- #12 Number of stakeholders implementing risk-reducing practices/actions to improve resilience to climate change as a result of USG assistance
- #14 Value of incremental sales (collected at farm-level) attributed to FTF implementation
- #15 Farmer satisfaction with quantity, quality and timeliness of extension and input supply services
- #16 Value of new private sector investment in the agriculture sector or food chain leveraged by FTF implementation

Table 1: Feed the Future indicators targets by fiscal year 2012 and 2013 for AR mega-sites

#	Indicator*	Targets by Fiscal Year					
		West Africa Guinea Savannah		Ethiopian Highlands		East and Southern Africa	
		2012	*2013*	*2012*	*2013*	*2012*	*2013*
1	Number of individuals who have received USG supported long-term agricultural sector productivity or food security training	-	-	600	200	-	-
2	Number of individuals who have received USG supported short-term agricultural sector productivity or food security training	3,478	200	-	-	2,450	200
3	Number of food security private enterprises (for profit), etc. receiving USG assistance	37	10	2	10	2	10
4	Number of members of producer organizations and community based organizations receiving USG assistance	3,680	-	-	-	407	-
5	Number of farmers and others who have applied new technologies or management practices as a result of USG assistance	2,000	20	505	20	1,600	40
6	Number of private enterprises (for profit), producers organizations that applied new technologies or management practices as a result of USG assistance	410	5	2	5	0	5
7	Number of new technologies or management practices in one of the following phases of development in Phase: -I: under research as a result of USG assistance -II: under field testing as a result of USG assistance; and -III: made available for transfer as a result of USG assistance	48	30	12	30	3	30
9	Number of public-private partnerships formed as a result of FTF assistance	4				5	
11	Number of hectares under improved technologies or management practices as a result of USG assistance	50	100	50	100	100	200

*Indicator number is the same as in Annexes III and IV
- indicates non-available targets

7. Plan for Performance Monitoring

7.1. Reporting FTF indicator data, project management and strategic M&E needs

Project monitoring serves both day-to-day project management (by providing accurate and timely data on progress) and strategic M&E needs (by providing a comprehensive set of data that address all the project's expected results, thereby permitting occasional "portfolio reviews"). Africa RISING sees both these purposes as important, and it sees little tradeoff between them in implementing the monitoring program.

Data collection and basic analysis will be a regular feature of the monitoring program, to support management and regular reporting. Analysis for strategic purposes would be additional, but might be carried out by management staff, rather than regular M&E staff.

The frequency and the methods for data collection to feed the FTF indicators are summarized in Table 2.

7.2. Roles of "M&E" team vs. implementing partners in data collection and analysis

The function and roles of the M&E team were clearly defined at the M&E expert meeting in Addis. The participants in this meeting distinguished the roles of the M&E team from those of implementing partners. They, therefore, concluded that monitoring will by and large be the responsibility of the implementing partners (IITA and ILRI), and evaluation will be the responsibility of IFPRI. They particularly noted that evaluation cannot be carried out without full cooperation between implementing partners and evaluators.

Table 3 presents a synthesis from the input of three groups gathered at the M&E 2012 meeting in Addis, which unanimously converged on most issues. The main unknown highlighted by most participants relates to the role of IFPRI in the design and implementation of the M&E system. For simplicity and clarity, results from the discussion hereafter focus on IFPRI's responsibilities and roles. The responsibilities and roles of other Africa RISING stakeholders (the implementing centers: IITA/ILRI and their collaborators: CG sister centers, NARS, FOs, NGOs, private sector, etc.) are shown. For example, while IFPRI (and its technical collaborators SpatialDev, MSU, Abt, etc.) plays a pivotal role in the design, deployment and technical operation of the M&E system, thereafter it is typically the responsibility of mega-site implementers (IITA, ILRI, collaborating centers, NARS, FOs, NGOs, private sector, etc.) to feed the latter with monitoring indicators.

Table 2: Frequency and methods of data collection for the FTF indicators

#	Indicator	Frequency of data collection	method of data collection
1	Number of individuals who received USG supported long-term agricultural sector productivity	Continuous	Project records
2	Number of individuals who received USG supported short-term agricultural sector productivity	Continuous	Project records
3	Number of food security private enterprises (for profit) receiving USG assistance	Continuous	Project records
4	Number of members of producer organizations and community based organizations receiving USG assistance	Continuous	Project records
5	Number of farmers & others who applied new technologies or management practices as a result of USG assistance	Annual	Survey of farmers
6	Number of private enterprises (for profit) that applied new technologies or management practices as a result of USG assistance	Annual	Survey of organizations
7	Number of new technologies or management practices in one of the following phases of development in Phase: • I: under research as a result of USG assistance • II: under field testing as a result of USG assis. • III: made available for transfer as a result of…	Annual	Project records
9	Number of public-private partnerships formed as a result of FTF assistance	Annual	Project records
10	Gross margin per unit of land, kilogram, or animal of selected product	Per growing seasons	Survey of farmers
11	Number of hectares under improved technologies or management practices as a result of USG assistance	Per growing seasons	Survey of farmers
12	Number of stakeholders implementing risk-reducing practices/actions to improve resilience to climate change as a result of USG assistance	Per growing seasons	Survey of stakeholders
13	Number of rural households benefiting directly from USG interventions	Per growing seasons	Project records
14	Value of incremental sales (collected at farm-level) attributed to FTF implementation	Per growing seasons	Survey of farmers
15	Farmer satisfaction with quantity, quality and timeliness of extension and input supply services	Per growing seasons	Survey of farmers
16	Value of new private sector investment in the agriculture sector or food chain leveraged by FTF implementation	Per growing seasons	Survey of farmers and firms
17	Number of vulnerable households benefiting directly from USG interventions	Per growing seasons	Project records

Table 3: Roles and responsibilities of Africa RISING M&E activities

M&E focus	Monitoring	Evaluation
Who	IFPRI (& technical collaborators SpatialDev, MSU, Abt, etc.) backstops on ***output monitoring.*** Implementers (IITA, ILRI et al.) are responsible for properly feeding the M&E system with monitoring indicators	IFPRI (& technical collaborators SpatialDev, MSU, Abt, etc.) evaluates ***outcomes*** and is responsible for evaluation activities. Implementers (IITA, ILRI et al.) assist in the execution thereof.
Funding	IFPRI funds AND delegates to implementers with facilitation role (co-responsibility)	IFPRI funds AND executes (lead responsibility)
Functions	IFPRI (et al.): 1. Provides efficient technical mechanisms for collation, processing, quality check and serving (mapping) of outputs monitoring indicators 2. Provides a function of 'independent watchdog', verifying the indicator reporting by ground research teams 3. Provides a generic set of standardized indicators and indicator collection procedures and tools at various granularity levels (from mega-site to country to district to cluster to village levels) 4. Provides backstopping on research sampling design, data flows and standardization of methods through active participation in mega-site research planning workshops 5. Provides data sharing policy, protocols, platforms, and methods for data aggregation, biophysical and technology performance data	IFPRI (et al.): 1. Is responsible for the design and execution of baseline, mid-term and end-line surveys, including engagement of national statistical offices to help with survey design and administration 2. Is responsible for ensuring interactive learning takes place within and across mega-site teams through regular reporting to the latter 3. Is responsible for organizing modeling and GIS work towards scalability of Africa RISING successful interventions
M&E human resources	IFPRI: - Hires three M&E officers: o to be embedded in each of mega-site research teams o tasked with facilitation of output indicator data collection, transfer and serving back to research teams for accelerated learning and efficiency o tasked with end-to-end organization of baseline, mid-term and end-line surveys, data o etc. (see TORs provided by IFPRI)	

7.3. The AFRICA Rising M&E Alliance

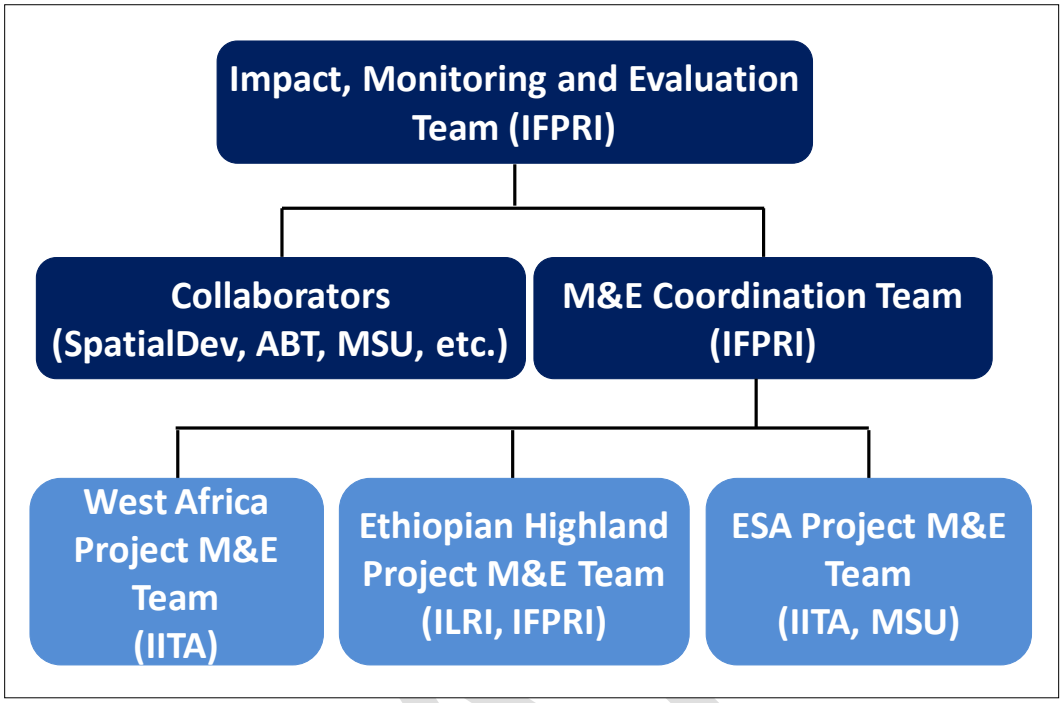
The stakeholders of the Africa RISING program identified specific roles and responsibilities in program management and coordination. The Impact, Monitoring and Evaluation Team (IMET) coordinates all the AR activities on monitoring and evaluating the agricultural research across the three mega-sites, including dissemination of results. The structure of the IMET is presented in Figure 4 below. It has two basic, field levels: three regional M&E sub-systems working together to feed into the overall M&E system coordinated by IFPRI. The M&E coordination team is an integrated component of the IMET, led by IFPRI. As an integrated component of the

IMET, the M&E team plays a pivotal role in the design, deployment, and technical operation of the overall M&E system. The M&E team:

- guides and provides internal review of the M&E work plans and deliverables;
- assumes the responsibility for the development of a comprehensive framework for tracking outcomes and impacts of the research for development activities across the three projects;
- identifies and tracks indicators (including custom indicators where necessary) in accordance with the FTF program and the AR program framework. Tracking of these indicators will facilitate comparative analysis of trends in performance both across countries (within projects) and across projects (at the program level). At the same time, data on custom indicators will provide critical information on specific country and mega-site parameters;
- ensures the development of effective platforms for data collection, analysis, and timely and required performance reporting to donors; and
- conducts modeling to support scaling up, scaling out and projections of output, outcomes and impact indicators of viable SI interventions.

IFPRI recognizes the demanding nature of credible and objective impact of the complex interventions of AR program, and the required analytical rigor for assessing the project activities, outputs, outcomes and impacts across the three mega-sites. IFPRI will nominate an M&E coordinator whose role is to ensure that implementation would be realized according to the M&E overall strategy. This includes that the M&E requirements described are developed, adhered to, implemented, and observed in a timely fashion. The M&E coordinator is also responsible for making sure that there are sufficient personnel with the right levels of resources and other support needed to implement with good quality the M&E strategy. IFPRI will recruit M&E officers for each of the three projects, and they will be embedded in the research teams. The M&E officers will seek synergies and partnerships with all implementers to engage with relevant stakeholders in the technical and operational design and implementation of M&E activities. At the project level, each M&E officer will also rely on strategic partnerships and alliances to support data collection and the analytical work. The M&E officers will report directly to the M&E coordinator in IFPRI. To the extent possible, IFPRI will interact with reputable M&E experts in the AR implementation centers (IITA, ILRI and sister CG centers), USAID/Washington, USAID missions, and other partners in mega-sites to deliver on this result. The analysis of impact evaluation will focus primarily on delineating and, where possible, quantifying the impacts of agricultural research and dissemination approaches. IFPRI is working in partnership with key technical collaborators that include Abt Associates, Spatial Development International, and Michigan State University to deliver on key indicators, site selection, as well as an open data tool.

Figure 4: Structure of the IMET



7.4. Split of resources between Monitoring and Evaluation

The split of Africa RISING resources between monitoring and evaluation depends on the final level of evaluation proposed. These efforts should be complementary, in that monitoring data should help to tell the story that evaluation needs to tell, and in some cases, monitoring data might be collected through surveys that are primarily conducted for evaluation.

7.5. Annual M&E Technical Meeting

Among the various pillars of the IFPRI M&E strategy, the annual M&E technical meeting is critical in setting up objectives and scope, reviewing methods and results, and distilling recommendations for the project management entities. The M&E strategy needs to be explicitly aligned and consistent with research activities, and the annual meeting guarantees that the strategy is also relevant for the entire AR program, adequately addressing M&E questions and needs.

The first M&E meeting, organized by IFPRI at the ILRI-Addis Ababa campus from 5 to 7 September 2012, gathered representatives from the three AR mega-sites to discuss the M&E principles of the program. It aimed at bringing together participants from all areas of the program to collectively discuss and agree on the main components of the M&E framework that would encompass both the day-to-day monitoring issues and the broader and longer-term evaluation questions that Africa RISING needs to answer. The participants shared progress on the overall

research framework (which guides the research approach for the entire program) and on research activities in the three mega-sites.

The annual M&E meeting is a good opportunity to keep AR stakeholders informed about IFPRI's plans for general M&E activities, as well as specific actions and products helpful for the program as a whole (e.g., data management platforms, tools). Most importantly, the meeting helps to track and assess the relevance of important issues, such as the key evaluation questions that AR should focus on and try to answer, the approaches and methods that would help answer these evaluation questions, the roles and responsibilities of each CG center in M&E activities of the program, and the inclusion of the global Feed the Future indicators in the Africa RISING monitoring system.

In the M&E system design, a number of challenges should be addressed, specifically on:

- Combining the different ideas and priorities of the IFPRI team (in charge of global M&E and data collection) and the regional/national implementation teams (in charge of project implementation and indicator reporting), when the former needs consistent data collection and rigorous evaluation design, and the latter need practical and relevant M&E activities that support the research fieldwork;

- Balancing monitoring (keeping track of project efficiency) and evaluation (ensuring effectiveness of the project and leading from research outputs to outcomes) across the three mega sites, which may have different priorities;

- Dealing with USAID and development partner preferences (e.g., for specific sites to carry out the work) as opposed to scientists' needs (e.g., for sites that satisfy all the criteria for evaluation design);

- Reconciling the different M&E needs and consequent approaches across the three mega-sites, given the complexity of the AR program and the diversity of its activities, inputs, outputs, outcomes, and impacts. The complexity makes it challenging to link research outputs and outcomes, and applying a fully developed M&E system for R4D across all projects.

- Facing the M&E budget constraints as it is expensive to establish baseline measures (for example farmer/household surveys); the diverse types of research that will be conducted will necessitate different performance metrics; and data requirements are complex and diverse. Moreover, M&E will partly compete with the actual research for a share of limited time and financial resources.

- Assessing the trade-off between a rigorous randomization across action research sites and development partners' preferences for direct site selection due to existing partnerships and ongoing activities, with the latter option yielding future, perhaps intractable complexities in estimating impact.

- Choosing among different evaluation designs, some of them involving RCTs (Randomized Controlled Trials) on the "treatment" (where Africa RISING is already working or plans to work) and the "control" sites (similar sites taken as valid counterfactual to assess the relative impact of Africa RISING)

In the first year of AR, the issues above could raise some sequencing concerns due to the selection of sites before the set-up of specific research activities. In this respect, the annual regional planning and review meetings can help solve some of the problems through intensive dialogue between evaluation experts and CG representatives with high local in-depth knowledge of the agricultural landscape in each mega-site.

The annual workshop helps prioritize evaluation questions towards improved impact assessment and stronger ongoing monitoring. The following are the evaluation questions AR selected during the 2012 annual M&E meeting.

1. Are Africa RISING's approaches replicable/scalable?
2. Did Africa RISING increase agricultural productivity?
3. Did Africa RISING make a contribution at the goal/highest objective level?
4. What is the variation in impacts across different domains, geographies, household types, & gender?
5. Did farmers adopt the new Africa RISING technology(ies)?
6. What are the tradeoffs among different impacts?
7. Are the improvements made by Africa RISING sustainable?
8. Did Africa RISING demonstrate implementation methods that other projects can use?

All relevant materials of the 2012 M&E annual meeting are available at:

http://africa-rising.wikispaces.com/moneval_experts_2012

8. Identification and Stratification of AR Project and Action Research Sites

Neither the development hypotheses nor the results framework suggest where AR research will be conducted, other than indirectly by specifying the type of beneficiaries targeted – poor cereal-based smallholder families. To properly attain the benefits of the AR program therefore it is necessary to delineate the geographical areas within which there are large numbers of potential beneficiaries as well as significant opportunities for the welfare of those beneficiaries to be enhanced through SI interventions that AR implementation partners (CG centers, NGOs, local institutions) can help deliver.

There are several steps in the geographical targeting process, assisted by the M&E team. The first step involved identification of the three sub-regional geographies that satisfied the criteria of high levels of poverty, high concentration of cereal-based farming systems, and low levels of productivity: the West African Guinea Savannah, the Ethiopian Highlands, and the maize- and rice-based systems of East and Southern Africa. The second step involved delineating geographical strata (or domains) within those larger areas, where each stratum was hypothesized to represent relatively uniform farming system, SI intervention, and impact pathway conditions or opportunities. The third step involved characterizing each of the strata in terms of the number of potential beneficiaries and other farming system, infrastructure, environmental and welfare-related variables that would help prioritize individual strata from an AR perspective (presuming that it might not be practical or feasible to conduct research in all strata). The final step, described as part of the evaluation approach in section 11.1.2, involved random selection of action research and control locations within priority domains.

The geographic targeting and prioritization process is summarized in Figure 5 and described in the following sub-sections.[4]

Within the AR program, this systematic process of geographical targeting and selection of research action sites has been identified as a significant research contribution (RO1). Since its outset, the Africa RISING program, has purposely adopted a highly-structured approach to geographic targeting and the selection of action research sites. The stepwise process described was initiated by IFPRI's HarvestChoice team with the USAID program design team (resulting in the selection of the three regional target geographies for the program), and has continued in the program implementation phase. This structured approach will greatly facilitate the extrapolation of findings from action research sites, and hence the spillover of knowledge and technologies, across the entire West Africa Guinea-savannah zone, the Ethiopian Highlands, and the maize-based systems of East and Southern Africa. Each research location has an associated set of information on its biophysical, farming, market and socio-economic factors that can be interpreted in a broader regional context

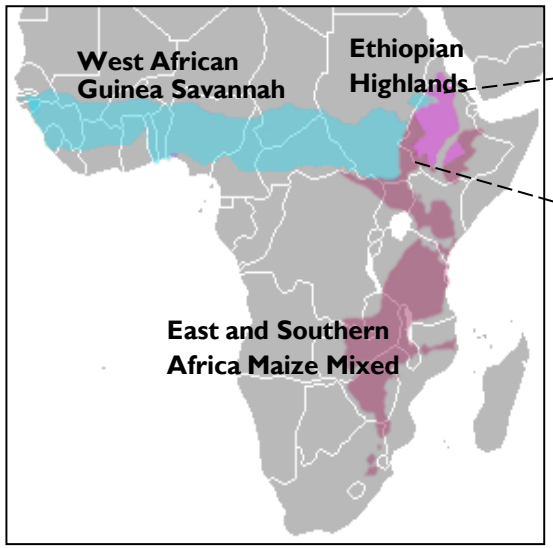
[4] See the accompanying report *Africa RISING Geographical Targeting and Site Selection*, Legg *et al*., forthcoming.

Figure 5: Geographical Targeting and prioritization process in site selection

Goal: To delineate, stratify and prioritize geographic areas within which (a) the greatest human and environmental benefits might be achieved through the adoption of SI innovations, and (b) the choice of appropriate SI innovations and the nature of their impacts would be relatively uniform.

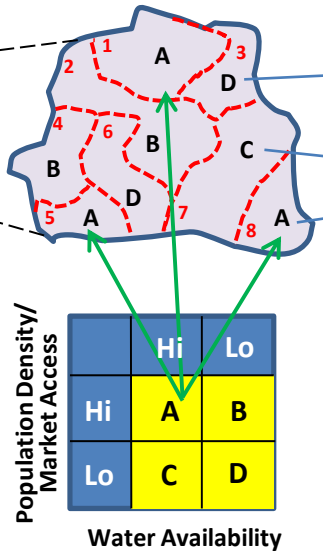
Step 1: Prioritize regional farming systems in terms of the total number of rural poor and the potential for SI to improve productivity and diversify farm enterprises

Results: 3 priority regional farming systems (AR project domains) that contain the largest concentration of poor households dependent upon low productivity, cereal-based farming systems



Step 2: Stratify regional farming systems, delineating homogeneous geographical sub-units across which the most appropriate SI interventions and intensification trajectories will most likely differ significantly

Results: Stratification of admin units within each regional farming system by, for example, water availability and pop. density/ market access conditions, yielding 4 "development domain" classes found in 8 geographical areas



Step 3: Characterize and prioritize stratified spatial domains in terms of factors signaling greatest potential for SI interventions and greatest scale of potential benefits to FtF target beneficiaries.

Results: I. Characterization of each geographic area delineated in Step 2, and II. Ranking each strata in terms of overall scoring across key variables.

I. Characterization of each geographic unit

	Area #	Strata	# Poor	Poverty %	Rural Pop	Maize Area	#Cattle	etc
	1	A	23,000	32	50000	104	98	
	2	B	105,000	44	165000	225	47	
	3	D	4,500	26	6600	234	230	
	4	B	64,400	31	125000	6570	150	
	5	A	32,780	55	47000	140	2300	
	6	D	46,000	23	80000	2367	140	
	7	C	63,200	15	300000	824	2540	
**	8	A	118,000	33	220000	563	270	

II. Overall ranking of strata in terms of potential for FtT impact (ranking method not shown)

	Rank	Strata	# Poor	Poverty %	Rural Pop	Maize Area	#Cattle	etc
*	1	A	173,780	42	317,000	3,546	2,668	
	2	C	46,000	20	80,000	2,367	140	
	3	B	37,280	38	53,600	1,112	2,530	
	4	D	50,500	50	86,600	2,601	370	

* Highest ranking overall strata. Research sites only located in this strata if funds limited, ** Highest ranking area in highest strata. Research site in this area if funds sufficient for one area (Hypothesis is that area 8==5==1, all A's are equivalent). Within strata research sites should best be selected randomly.

Different proxies for potential and actual intensification have been used to identify potential areas for the program intensification in the three regions. The stratification of project sites was based initially on the following variables:

- farming system
- rainfall
- elevation (proxy for temperature)
- population density
- access to markets.

In some areas, attributes on slopes and information on the distribution of cultivated land were used to fine-tune the analysis. Preliminary analyses produced maps and other data that assisted in the selection of target districts and eventually also project sites.

8.1. Guinea Savannah zone of West Africa

The same stratification approach was applied to identify the Guinea savannah zone in southern Mali and northern Ghana. Two *cercles* (Koutiala and Bougouni) were identified to cover the sorghum- and millet-based systems in southern Mali. Likewise, three regions were identified to cover maize-based and rice-vegetables-based systems in northern Ghana. The Northern region, Upper East and Upper West regions were selected to address production constraints in rice and maize-legume production systems in northern Ghana. Northern regions of Ghana are characterized by small land holdings and low-input, low-output farming systems, which adversely impact food security. This negative impact results in a seasonal cycle of food insecurity of three to seven months for cereals (i.e., maize, millet and sorghum) and four to seven months months of legumes (i.e., groundnuts, cowpeas, and soybeans) in these regions. These crops in the savannahs are often produced in a continuous monoculture in which soil natural resources are steadily depleted and yields per unit area are falling to very low levels. The poverty profile of Ghana also depicts the three northern regions as the most poverty- and hunger-stricken spots in Ghana. Gender inequalities are also apparent in these regions, where women have limited access to resources and capacity to generate income.

The Ghana research team held a stakeholders' workshop in March 2012 to develop its research work plan. Participants identified 20 communities per region, totaling 60 communities, in which to implement research activities. A suggestion was made to revise the selection approach and to reduce the number of communities. A systematic approach following the stratification by Chris Legg should be used to select action research sites in Ghana. Five to nine districts could be selected per district to capture the homogeneity in these administrative units with diverse cropping systems.

As indicated above, the project will focus on the Sikasso region of southern Mali. This region is ecologically similar to northern Ghana but stretches northwards into drier zones, where maize cultivation is associated with high economic risks. Sorghum is traditionally the lead cereal and staple crop. Both maize and pearl millet are widely cultivated to exploit specific ecological

niches and market opportunities. It was suggested to add another district in order to accommodate the diversity found in site stratification. About 20 communities are being targeting in Mali but this number might be too small to represent the diversity of the communities in the selected areas.

8.2. Ethiopian Highlands

The integrated research will focus on the wheat-growing area in the Ethiopian Highlands. Proxies for potential intensification used to identify project sites in Ethiopia included:

- Ethiopian Agro Ecological Zone (AEZ), based on rainfall and altitude
- "three Ethiopias" (productive, hungry, and pastoralist)
- agricultural potential zones
- Global Agro Ecological Zone (GAEZ), based on suitability
- IFPRI-HarvestChoice crop modeling results
- market access.

These proxies were complemented with actual intensification ones on:

- actual yields
- inputs (from Central Statistical Agency -CSA- data)
- livestock and human population densities.

These analyses resulted in identification of the wheat-growing area and in setting the initial threshold to 25% of this area. This area exhibits large variation in existing levels of intensification, cereal-legume rotation and other crop combinations, as well as in crop-livestock-tree integration. Furthermore, factors driving intensification, such as agricultural potential, access to available technologies, demand for livestock products, demand for livestock feed, and integration with markets, vary within the area.

Four potential regions were identified during the M&E and annual review and planning meetings held in Addis in September 2012. Such identification was guided by the stratification work done by Chris Legg and experience gained from the quick wins projects. Implementing research teams proposed to select one *woreda* per region as follows:

- Tigray: Endamehoni in Southern Tigray
- Oromia: Sinana Dinsho in Bale
- SNNPR: Limu in Hadiya
- Amhara[5] region.

[5] Noteworthy is the existence of an important wheat-growing area in Amhara region that did not meet the initial 25% criterion. The extension of the research area to Ahmara requires the relaxation of the threshold but with the emphasis to work on wheat-based systems in Ahmara region.

A number of *kebeles* were selected in each of selected *woredas*. They represent contrasting levels of intensification to enable the characterization of different trajectories and identification of technology combinations that lead to sustainable development pathways. Research teams led by CG centers (ILRI, ICARDA, ICRAF, CIP, and CIMMYT) were formed around five research components to select sites in collaboration with national partners. Each team nominated one representative to visit sites by the first week of November. Site selection in Ethiopia is currently facilitated by Dr. Leonard Oruko from IFPRI/Agricultural Transformation Agency (ATA).

8.3. East and Southern Africa

In East and Southern Africa Africa RISING focuses on maize-based systems in Tanzania, Malawi, and easterrn Zambia.

Feed the Future in Tanzania is focusing on reducing poverty and improving nutrition through key investments to improve the availability of and access to staple food by enhancing the competiveness of smallholder farmers. These investments are being geographically focused in areas with high agricultural potential bordering chronically food-insecure districts. These areas are found in the Dodoma, Manyara, and Morogoro regions. The first two are the geographic focus for the maize-livestock-based systems, whereas the last is the focus for the rice-vegetable-based systems. These areas are located in the Southern Agriculture Growth Corridor of Tanzania. One district was selected in each region based on stratification of the project area. Proxies for intensification potential used for the stratification included rainfall, elevation, slopes, cropped areas, livestock density, market access, population density, and predicted reduction in growing season by 2050. The districts selected are:

- Kongwa in Dodoma region
- Babati and Kiteto in Manyara region
- Kilombero in Morogoro region.

The final selection of these districts was made by research implementation teams based on on-going USAID/Tanzania-funded projects on maize and rice value chains in Kongwa, Kiteto, and Kilombero districts. These projects are implemented by NAFAKA in each of these districts. The partnership of different USAID-funded projects in these districts will help address emerging research needs of the development work. Furthermore, Kiteto and Kongwa districts supply Kibaigwa, the international maize market located in Kongwa district. An additional district with high potential for maize, legume, livestock, and agroforestry integration was selected by the research implementation team to cover the diversity in agro-climate, maize-based systems, human population and livestock densities, and market access in Manyara region. Babati district was selected in the sub-humid area based on existing projects such as SIMLESA and past experience on legume studies done by ICRISAT in the district.

A recent analysis undertaken by IFPRI and IITA following a field visit proposed action and counterfactual sites in Babati, Kongwa, and Kiteto districts. The stratification was refined using criteria on elevation and rainfall. Five ecozones were identified and classified as follows:

- Very low elevation – very low rainfall,
- Low elevation – low rainfall,
- Medium elevation – medium rainfall,
- Medium elevation - high rainfall, and
- High elevation – high rainfall.

Wards were selected in each ecozone based on cropping system and population density. Villages in selected wards were visited and action sites, chosen randomly. Potential counterfactual sites were selected randomly in wards adjacent to and with similar characteristics to action sites.

In Malawi, sites where Michigan State University (MSU) has carried out long-term projects have been selected for the research activities. These include Ntcheu and Dedza districts. Two Extension Planning Areas (EPAs) are targeted in each of the two districts, and the research team has further selected two sections in each EPA: one where to draw four action villages; and the second to draw four counterfactual villages. This brings the total number of intervention villages to 16, with an equal number of villages used as controls.

Four research teams were formed around the different countries, different systems within the country and different agro-ecological zones within the systems to finalize site selection for the implementation of research activities, planned to begin in November-December 2012.

9. Data Management and Access Tools

A significant commitment being made by the AR M&E activity is to deliver, maintain (and enhance where appropriate) an open-access data management platform. The platform will serve four key purposes:

- Provide implementation partners with a secure, web-based data storage and documentation repository that over time constitutes a major AR knowledge pool supporting further discovery, integration and analysis;
- Provide a set of indicator capture, validation, integration, and automated reporting procedures for generating periodic monitoring reports on indicators agreed with AR partners (USAID, CGIAR CRPs and Centers, and other national and transnational partners)[6];
- Provide a live repository for non-indicator variables that are used to provide baselines, context and input variables to systems modeling efforts and evaluation studies linked to farming system, post-harvest, and market related interventions; and
- Serve as a one-stop, structured and queryable inventory of AR project and partner organizations, activities, and outputs catalogued in a consistent manner across the entire AR portfolio, enabling investment and institutional data to be linked to a range of technical data assets.

The platform will include both tabular (e.g., plot, household and community) as well as spatial data and will support management of indicators and other variables as time series (in regular or irregular time series formats).

The AR M&E data and knowledge management platform is developed by design to leverage data assets and tools developed and maintained by project partners (e.g., HarvestChoice's 300+ SSA data layers, ReSAKSS 300+-project database, the Gates Foundation Project Mapping Tool, the CAADP-CGIAR Alignment and Mapping Tool, as well as project databases of the World Bank, the African Development Bank and – still under development by the Consortium – the CGIAR).

9.1. M&E Open-Access Web-Site

An activity deserving attention in the M&E system is data collection. Conducting standardized farm/household surveys can provide essential data for characterizing the agricultural research process. At the same time, survey data can serve as baselines for monitoring research performance at the farm/household level. Baseline, mid-line and end-line surveys on identified indicators (both the common set of standards and – where necessary – custom indicators) are imperative for assessing monitoring progress during the different project cycles. In the project countries, there has been an explosion of baseline farm/household surveys, many of which are not effectively used; most only meet the needs of specific projects. Building strategic

[6] Wherever possible AR data will be gathered dynamically from partner-curated data holdings accessed through metadata query and harvesting tools and APIs. Data coding/metadata standards will be adopted/developed and supported by the M&E D&KM support team over the life of the AR initiative.

partnerships and alliances with multiple stakeholders would be an important step toward tapping into existing data, thus containing the cost of M&E in Africa RISING. In countries where baseline surveys exist and are available, the M&E team in collaboration with the implementers will conduct a gap analysis to identify the need for complementary baseline surveys. The team will then develop effective data structures and systems to cover all the identified indicators. These data structures and systems must be validated by the implementers at the project level before their use for data collection.

The M&E team will also provide data sharing policies, protocols and vehicles for aggregate biophysical and technology performance data. The team will develop an open-access web-site for storing and managing project data. The team will maintain a transparent data analysis platform to serve the needs of SI stakeholders. Different access rights will be given to different users. The open-access web-site will be a platform of knowledge sharing systems for sustainable intensification innovations in Sub-Saharan Africa. Information on promising technologies will be shared with a large network of stakeholders.

9.2. Project Mapping Tool

The Project Mapping Tool (PMT) is a web-based mapping application intended to visualize where development work is taking place, and intersect it with a wide suite of biophysical and socio-economic spatial layers. The features of this web application allow users to browse, map, add, edit and share projects without the need for geographic information systems expertise.

The PMT is ultimately intended to help users improve project strategies and partnerships for greater impact in their work. Its features and functions have been designed to provide the following benefits:

- *Inform strategic and project management decisions.* The PMT can help inform decisions by allowing users to take geographic information into account, whether it is the location of markets, related projects and partners, travel time, annual precipitation or maize crop yields.

- *Communicate projects to key stakeholders.* A primary benefit to users of the PMT is to see the spatial layout of their projects relative to context. Users have the ability to add their projects to the PMT database and then visualize those projects in a variety of ways.

- *Understand how programmatic efforts relate to other projects as well as to useful agricultural information.* Users have the ability to browse and map other projects alone and alongside their own projects. This functionality provides the framework for multiple organizations to share vital strategic information in a coordinated fashion.

The PMT is designed to be flexible and expandable, allowing users to develop unique ways of applying the tool to their work.

The PMT enables users to find projects, make maps with those projects and enter new project data. Each of these primary features is described in greater detail in corresponding sections of the User Guide.

- *Explore Projects.* Users have the ability to browse and filter projects both in a tabular project list and spatially on a map.
    - *Filter by:* Keyword, Favorites, Project Title, Country, Organization, Approach and Action Type
    - *Sort by:* Project Title, Action Count, Approach, Organization, Favorites
    - *Group by:* Project Title, Country
    - *Navigate by:* Pan, Zoom, Location Finder

- *Add and Edit Projects.* Users play a key role in the addition and maintenance of projects in the PMT database.
    - *Project Details:* Describe the purpose of the project, its budget and schedule information.
    - *Contacts:* Enter contacts and project partners.
    - *Action Details:* Describe the actions and activities that comprise the project.
    - *Action Locations:* Map where the project actions and activities are occurring.

- *Create and Save Maps.* Users have the ability to create and save custom maps using their choice of projects and contextual overlays.
    - *Visibility:* Control the projects and actions that appear on the map.
    - *Reference Layers:* Add reference layers and turn them on and off.
    - *Other Project Datasets:* Get external layers and draw them on the map.

- *Share Maps.* Once saved, users can share their maps with others via permalink.

9.2.1. Data

The PMT contains two primary data types: project data and contextual reference data. These two types of data can be used together to create informative, interactive maps. A third type, external data, is suitable for advanced uses where existing data sources from outside the PMT database can be "mashed up" onto a map.

9.2.2. Project Data

Behind the PMT is a database that stores detailed project information. This project information describes what activities are taking place and where. The PMT database contains information about the PMT user's projects, other projects and external layers, so connections can be made on the ground.

Key Concept: Action
In PMT, projects are comprised of actions. While the Project is described by basic and largely unchanging attributes, actions are described in greater detail in the dimensions of location and time. Put another way, Project details are those that were most likely provided as part of a grant application. Actions are aspects of a project that may have been described when the project was conceived but should represent the work in its current state after final implementation plans and adjustments made in response to ongoing challenges and opportunities.

Project Data is made up of specific projects, their actions and the locations where these actions occur. Each project has basic attributes like name, description, grant amount, and duration.

Within each project are actions, each representing a programmatic activity of the given project. Each action has basic attributes similar to those of the project but specific to the action. What actions have, and projects do not, are on-the-ground field locations.

Locations illustrate where the actions are taking place and may represent a variety of things, ranging from training locations to chilling plants to development sites. Locations are represented as points or areas (polygons). These are drawn by the user, uploaded in batches (points only) or taken from the PMT database of known places and administrative district boundaries. Contact and partner information are also stored as part of the project data.

9.2.3. Reference Data

The PMT contains reference data to help users put project data into context. Contextual reference data consist of reference data from international institutions involved in global development (CGIAR, FAO). The content spans a wide variety of topics, including demographics, crop suitability and market characteristics, mostly drawn from HarvestChoice. These layers are provided with descriptive metadata so that users can understand how to use the data appropriately. Additional layers and categories of data are planned based on availability and user feedback. Specific requests for reference data can be made either through the feedback tool or by a support request to the IFPRI-HarvestChoice team.

9.3. Technology/Intervention Inventory

As part of Africa RISING project implementation, a need arises to document FTF projects carried out in each of the three mega-sites, including documenting the recently completed so-called “quick-wins” projects. To facilitate this task, a structured form was submitted for completion to CG partners and stakeholders who attended a meeting in February 2012 in Dar es Salaam. The participants documented the projects in each of the mega-sites, and these data were subsequently compiled to produce a FTF-Project technology and intervention inventory. On the

other hand, the quick win projects inventory was compiled from the proposals submitted by different stakeholders and available from the AR wiki site (http://africa-rising.wikispaces.com).

The project and quick-win inventories are contained in separate spreadsheets where projects have been categorized across the three mega-sites. The FTF project inventory was subdivided into five categories, which include: i) Crops; ii) Livestock; iii) Systems; iv) Natural Resource Management; v) Market and Value Chain and others.

The project inventory contains several attributes aimed at providing clarity to each of the projects documented. These include project/initiative name, lead agency, funding agency, thematic focus, location, methods and objectives, information on the research/development area, and URL/contact for more information. The quick win inventory features include project site, country, project location, objectives, lead institution, partners, projects time line, and the number of farmers targeted.

The project inventory includes 170 projects, of which 22 are in the Ethiopian Highlands, 13 in Guinea-Savannah of West Africa, and 135 in East and Southern Africa. The quick win project inventory has also been compiled across the three mega-sites.

Table 5 below summarizes the projects documented in the FTF projects inventory.

Table 5: Number of FTF Projects documented per component, by mega-site

Mega-site	Livestock	Crops	Systems	NRM	Market	Others	Total
West Africa (Guinea-Savannah zone)	1	4	2	3	0	3	13
Ethiopian Highlands	0	2	3	2	12	3	22
East and Southern Africa	15	56	32	8	1	23	135
Total							170

Each of the projects in the FTF project inventory and the quick-win list has been geo-located based on the specific project location.

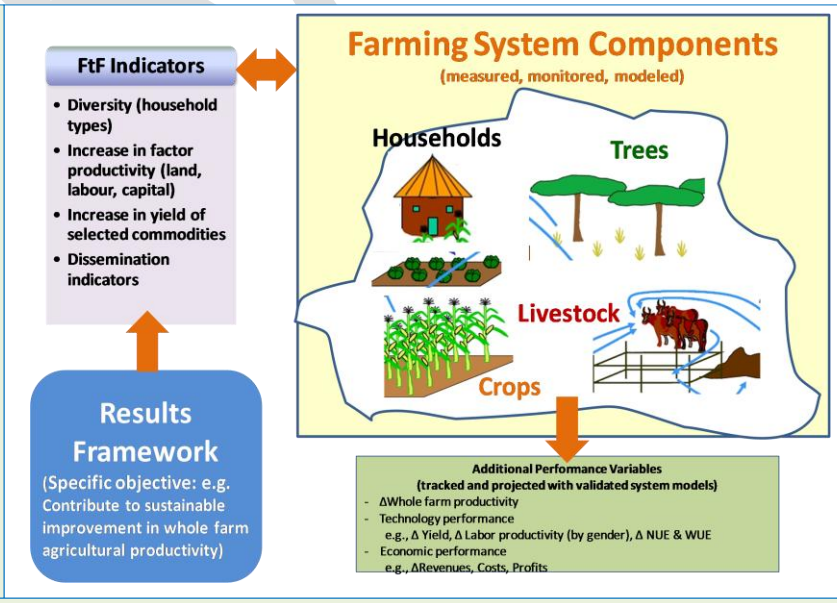
10. Modeling Activities, Including Linkage of M&E and Other Data

The Africa RISING M&E system will incorporate combinations of approaches that are by no means mutually exclusive: rapid appraisal and participatory methods, integrated system approach, impact evaluation, and cost-benefit and cost effectiveness analysis, amongst others. As indicated in the overall research program, modeling is core to the M&E activities. Modeling can be considered as an aid to M&E and learning. Simulation models have proved to be useful in capturing the interactions between climatic conditions, soil types and nutrient dynamics in cereal-based farming systems in Africa. Modeling approaches can be used to assess the contribution of agricultural research to overall output growth at the whole farm/household level and to ecosystem stability at the landscape/community level. Combined with relevant participatory approaches, modeling approaches can be used to assess the adoption/dissemination of specific interventions by targeted communities in research sites and beyond these sites. M&E methods include econometric models that rigorously link R&D and/or R4D to productivity growth and other project outcomes. Econometric models can also be used to simulate various R&D spending strategies. The models also include computable equilibrium models that capture multiplier effects and broader economic linkages (for example, among labor markets). These more systemic approaches can also provide an evaluation framework for agricultural innovation systems.

Key activities that will be undertaken are presented in Table 6. The diagram schematizes key modeling elements, which will be identified from the M&E system. It comprises:

Table 6: relationship between results framework, indicators, and farming systems

- the results framework (or simplified logframe), providing the basis for identifying questions and indicators;
- the indicators for monitoring the project impacts;
- farming system components for measuring, monitoring the performance metrics; and



- additional performance variables that will be tracked and projected with validated system models.

Given the complexity of the AR program and the expected diversity of its projects, each M&E officer is expected to develop a results framework for each of these projects. These frameworks will be harmonized to form the overall M&E results framework. Indicators of achievement of these projects will be identified from the results frameworks. Associated milestones and targets to each result will be identified. Likewise, these indicators will be integrated with the standard FTF indicators in the overall program result framework. The process of indicator integration will ensure that each project objective and its associated indicators are aligned to the program performance monitoring framework. The actual tracking and reporting against activity milestones and output indicators will be embedded in the implementation process, so as to allow implementers to timely and effectively monitor the indicators.

The present M&E plan defines each indicator, the method of data collection and analysis, and its reporting frequency. In addition, the M&E team will develop a comprehensive performance monitoring plan with protocols for data collection, analysis, and reporting. Following these protocols, data and information on each performance indicator and activity milestones will be collected, analyzed and reported by the project implementation team in collaboration with the project M&E officer. The officer will compile the data and information at the mega-site level, synthesize and prepare the performance report and forward to the program M&E coordinator.

Farming system analysis

In the context of Sub-Saharan African agriculture, smallholder farming systems are complex, with various crops and livestock, off-farm income sources and different agro-climatic conditions. The complexity leads to a wide range of competing farming objectives that necessitate some trade-offs when farmers make decisions on allocating their resources and on implementing agricultural technologies. Technological interventions to address the problem of poor productivity of smallholder agricultural systems must be designed to target these socially diverse and spatially heterogeneous farms and farming systems. This is precisely what AR tries to address, and the M&E system helps in identifying success and failures of those interventions, especially at the farmer level.

Formulation of household typologies

Farming systems studies will be undertaken to improve the understanding of the complexity of smallholder farms by identifying the main drivers of household diversity. The drivers will be used to construct farm household typologies. The methodology of the typology formulation is articulated using the first step of the DEED approach by Tittonell (2007). This approach helps to define representative prototypes of fields, cropping sequences, farms or localities that capture key management, socio-economic, and agro-ecological aspects of systems under study. Their heterogeneity and diversity at different scales will be categorized, relying on solid understanding

of key drivers of such variability and using methodologies that allow comparisons across systems. A combined data driven and expert-knowledge method will be used to categorize households into functional farm types. In order to allow comparison and harmonization across sites (within a project), the typologies will be developed based on simple criteria that include land size, livestock ownership, hiring labor, hiring out labor, production strategies and orientation. Household typologies will be developed to suit the purpose of each project in the mega-site. Participatory approaches will be used to identify farmers' needs to ensure that targeted technologies and/or combinations address opportunities and constraints in local farming systems. This combination of methods allows one to facilitate the targeting of promising interventions to different farming systems.

Approaches for providing guidelines and targeting through ex ante analysis at farm level

As indicated in the program document, the farm household is the intervention unit of the Africa RISING program. The choice of the farm household scale helps focus research activities on understanding household needs and incentives to supportive effective evaluation, adoption and adaptation of the most relevant interventions. The complexity of the farming systems necessitates that these interventions are identified and insights are provided on better targeting into local farming systems. Farming system modeling has become an accessible tool for developing intervention strategies targeted at smallholder farms.

Farm-scale analytical tools that can adequately model the dynamics and key interactions of a real farm will be used to analyze and address the complexity as well as to simulate the productivity of highly-constrained smallholder farming systems. Two bio-economic simulation models are proposed in an integrating platform for assessing changes in system productivity at farm-scale across the three projects. Findings will be used to make projections of indicators and outcome and impact indicators at scale, building on the monitoring data to be collected. Two candidate approaches are: NUANCES (Nutrient Use in Animal and Cropping Systems: Efficiencies and Scales; Giller et al., 2006) and APSFarm (Agricultural Production System: whole farm business simulator; de Voil *et al.*, 2009). These approaches will be used to:

- Analyze and address the complexity;
- Model key dynamics and interactions; and
- Simulate the productivity of highly-constrained farming systems.

The NUANCES framework

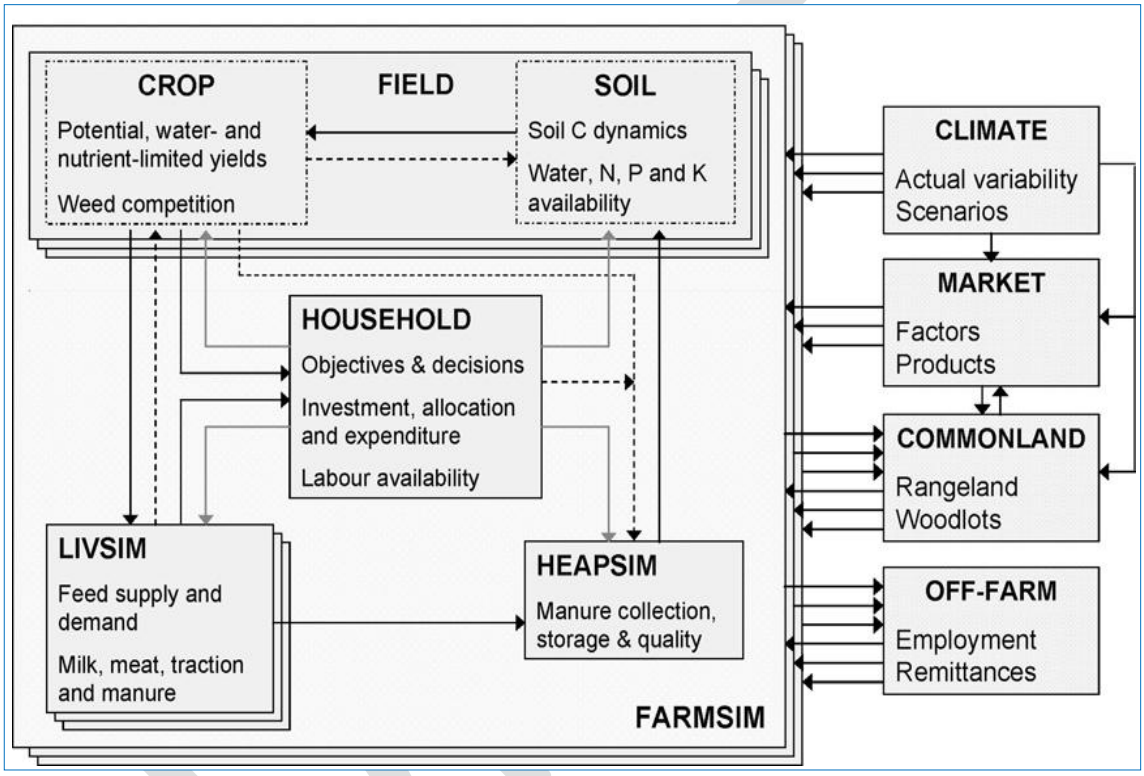
NUANCES integrates functional modules that simulate each component of a farming system:

- FIELD: Soil-Crop system: Field-scale resource Interactions, use Efficiencies and Long-term soil fertility Development;
- Livestock (LIVSIM: Livestock SIMulator);

- Manure handling and storage (HEAPSIM: HEAP SIMulator); and
- Labor availability (LABOURSIM).

The NUANCES framework will be applied to explore nutrient management strategies across soil gradients and to simulate livestock production and manure handling in identified farming systems. Specific applications may include:

- ❖ Soil carbon and crop yield and crop response to nutrients (NPK) in maize-based systems;
- ❖ Milk production and feed need; and
- ❖ Crop residue management in mixed crop-livestock systems.



The APSFARM framework

APSFarm is an extended configuration of the APSIM (Agricultural Production Systems SIMulator). APSFarm is a dynamic modeling framework that can be used to analyze whole farm management. It integrates multiple biophysical modules, operating at different scales (management unit, farm, and sub-catchment). The capacity of APSFarm to capture the interactions between climatic conditions, soil types, and nutrient dynamics as well as to simulate the two-way transition between flooded and non-flooded soil conditions in cereal-based systems will be explored. The framework will be used to assess the performance of intercropped cereal-legume systems and of pastures. Cereals include maize, sorghum, rice, and millet, whereas

leguminous crops include common beans, cowpeas, groundnuts, pigeon peas, and soybeans. Potential cropping systems for the application of APSFarm can include:

- ❖ maize, pigeon peas, and soybeans monocultures;
- ❖ maize-legume (cowpea) intercropping;
- ❖ macuna-maize rotation;
- ❖ sole maize in crop-livestock systems;
- ❖ cowpea, pigeon pea, groundnut and sorghum rotation.

The treatments can include crop response to nutrient management, water availability, planting densities, etc.

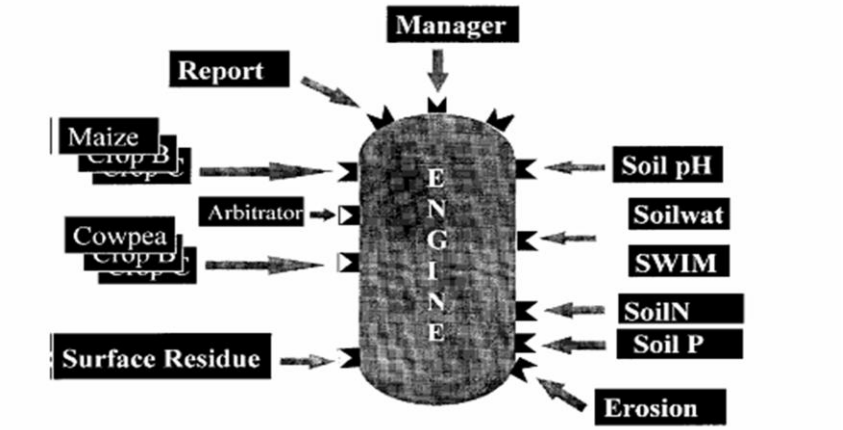


Fig. 1. Diagrammatic representation of the APSIM simulation framework with individual crop and soil modules, module interfaces and the simulation engine.

Biophysical processes: C, N&P dynamics in soils, soil water balance, crop growth, etc.
Crops: cereals (maize, sorghum, millet, wheat, rice), legumes; and pasture

Econometric, market, and welfare models will be used in complement to the biophysical and bio-economic ones to monitor project outcomes. Trade-off analysis will also be done to estimate costs and benefits of the interventions.

Complementary use of NUANCES and APSFARM

APSIM provides a flexible modeling environment to configure a set of modules from a collection of crops, soil and management options, as well as environments (humid, sub-humid, semi-arid, and irrigated) and landscape positions (lower lowlands, upper lowlands, and uplands) to suit tropical cropping systems in sub-Saharan Africa;
Enhanced to simulate soil C and N dynamics through cycles of aerobic and anaerobic soil conditions;

- FARMSIM model has the capability to simulate the response of crop growth to K, which is not available in APSIM.
- The NUANCES framework provides a potential platform to unravel the complexity that characterizes smallholder farming systems in Africa;
- APSIM can be used to derive coefficients to parameterize the FARMSIM model.

11. Evaluation

To formulate a plan for evaluation, it is necessary first to select which questions the evaluation is set to answer. At the Addis meeting (September 5-7, 2012), participants gathered in groups and proposed the eight main questions that Africa RISING needs to take into account for an appropriate evaluation, shown in Table 7:

After a final decision is taken on evaluation questions, a number of other steps need to be completed. Methods (quantitative, qualitative, or a mix) should be proposed for answering each question, and the implications of applying those methods in actual project contexts need to be carefully considered by implementing partners and evaluation designers together. To support this process, IFPRI estimated the cost of an evaluation in these contexts, and provide a rough notion of how many evaluations can be afforded with the available resources.

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Furthermore, the Africa Rising Research Document sets out several key assumptions and research hypotheses that likely need additional clarification and validation by the research teams in order to become fully embedded into the overall evaluation approach, noting that testing each of these hypotheses in robust ways across different strata and typologies will be extremely complex and costly given the nature of the demand-driven and participatory way in which AR research has been described. These hypotheses are:

Adoption hypothesis: Adoption rates for any innovation (combinations of technologies and management practices and knowledge) are enhanced by targeting on the demand from and capacities of potential adopters.

Integration hypothesis: Innovations with components that mutually reinforce whole-farm performance/productivity produce greater and more sustained benefits than the joint adoption of equally effective single purpose technologies and practices.

Trade-off hypothesis: Effective targeting of innovations also reduces the negative impacts of trade-offs between farm productivity and environmental sustainability and helps to identify potential "win-win" options for SI

.

Innovation sequencing and sustainable intensification pathways hypothesis: The adoption of innovations that lead to SI is affected by the sequence in which the component technologies, practices and knowledge are integrated and applied.

Scalability hypothesis: A research approach based on targeting and evaluating SI-related innovations, in context, increases the relevance of findings from action research sites and enhances their scalability to similar strata elsewhere (i.e., to similar development domains and households typologies in other locations).

Table 7: Evaluation questions

1. Did Africa RISING Make a Contribution at the Goal/Highest Objective Level?
✓ Did technologies or combinations of technologies have a positive impact on people's lives, income, nutrition, livelihoods?
✓ Did Africa RISING provide pathways out of poverty and/or malnutrition through agricultural SI? Which pathways did Africa RISING provide?
✓ What is the contribution of SI to poverty alleviation, food security, nutrition, (livelihoods), NRM?
✓ Did Africa RISING make a contribution in the context of multiple projects in the same geographic area?
2. Did Africa RISING increase agricultural productivity?
✓ Did Africa RISING increase whole-farm productivity? (labor, women's labor, vs. single-crop productivity)
✓ Did Africa RISING show how to best make use of available technologies?
✓ Did Africa RISING interventions complement each other? (individual technologies vs. packages, synergies)
3. Are Africa RISING's approaches replicable/scalable?
✓ How scalable are the results of Africa RISING?
✓ How big are the scalable impacts of Africa RISING?
✓ What are the most successful elements of Africa RISING that should be scaled up/out?
✓ Are the benefits of Africa RISING greater than the cost?
4. Did farmers adopt the new Africa RISING technology(s)?
✓ Have Africa RISING technologies been taken up beyond the trial farmers?
✓ Did Africa RISING learn why some farmers adopt and others do not?
5. What are the tradeoffs among different impacts?
6. What is the variation in impacts across different domains, geographies, household types, & gender?
✓ Which types of farmers did Africa RISING help? Are they the targeted ones?
7. Are the improvements made by Africa RISING sustainable?
✓ Has water and/or soil quality been maintained?
8. Did Africa RISING demonstrate implementation methods that other projects can use?
✓ Which processes/institutions were most helpful/useful in achieving improved outcomes? (Participatory vs. top-down)
✓ How do we determine best-bet agricultural options for specific farmer types?
✓ Did Africa RISING show how to use existing innovation platforms to scale out research efforts
✓ Did Africa RISING improve the efficiency of partnerships?
✓ Are multiple stakeholder partnerships effective?
✓ What is the optimal sequence of interventions?
✓ What is the optimal sequence of interventions?

11.1. Analytical Approaches and Tools

11.1.1. Characterization and stratification of target farming systems

The M&E team has undertaken the stratification of each of the project sites in terms of key agricultural development conditioning factors, e.g., classifying Ethiopian *woredas* or Tanzanian wards according to their dominant agricultural potential and market access conditions. These strata, according to AR research hypotheses, are considered to be representative of significantly different development conditions, potential intervention options, and likely levels of adoption and impact.

Stratification at the community/village level: The biophysical and socio-economic stratification parameters used in early site selection of AR (the so-called "quick-wins" project locations) were population density, rainfall, elevation, slope, and market access. However, selection of quick-wins was mostly driven by previous partnerships, political reasons, and the necessity of having rapid and readily measureable impacts. IFPRI's role was to provide the characterization and stratification at the village level.

Prioritization of strata: Through the characterization at the village level (based on cropland area, number of poor, maize area, cattle population, etc.), it is possible to highlight which specific domains (or even individual domain polygons) may be higher priority for sampling (locating research sites) based on their higher relative importance in terms of aggregate benefits/beneficiaries compared to other polygons (e.g., other *woredas* in Ethiopia or wards in Tanzania) from the same strata. Limited resources might necessitate targeting interventions and evaluation only to the high priority strata (higher in terms of potential beneficial impacts on target beneficiaries). This needs to be constantly assessed by the M&E system.

11.1.2. Action research site selection

In line with AR research hypotheses, similar types of interventions will be targeted to specific strata, and action research sites at the community/village level can be selected within each stratum according to a set of M&E principles (to be agreed), including:

1. Randomized selection of action research sites by strata: This could, with the proper evaluation design, provide statistically robust estimates of the potential impacts of some of the higher-profile AR intervention options
2. Purposive selection of action research sites by strata: This could be based on more practical criteria of selection but runs the significant risk of not providing statistically robust estimates of impact
3. Purposive initially, but with new control/intervention sites randomized over time: This strategy has advantages in terms of practical implementation, being also a compromise between pure randomization and purposive selection.

Given the advanced status of site selection in Ethiopia and Ghana, what IFPRI suggested in Tanzania was to follow step 1 as the best route for selecting new sites. The most promising - potentially high-value– AR interventions would take place in such sites. Option 3 was deemed to be a second-best option (if 1 were not feasible). IFPRI's task and responsibility should be to provide the stratification and validate it with local experts. In addition, lists of communities/villages for each of the representative wards visited for each stratum will form the sample frame for evaluation design. Directly selecting action research sites (option 2) would be the least favored option, as it would yield future, perhaps intractable complexities in assessing impacts.

IFPRI will suggest the sampling strategy and the exact site/village locations. This strategy could allow the evaluators to gain some control over the intervention locations, which will be chosen based on the stratification agreed upon with AR implementers.

Following are the steps IFPRI followed for site selection in Tanzania, although a similar method was used in all mega-sites with different variable ranges.

1) The regions defined in the original "mega-site" proposal were stratified at the ward level using all the commonly-accepted attributes. Wards rather than districts were used in Tanzania, since the ward in this area is only slightly smaller than the districts in Ghana, data were available at the ward level, and some districts, notably Babati and others in the Rift area, are extremely heterogeneous internally. Cluster analysis of wards resulted in a series of groups covering the multi-dimensional spectrum of variance in the region. Ideally, districts would then have been selected to cover as much as possible of this variance. In practice, Kongwa and Kiteto districts were forced on IFPRI by USAID, given the need for AR to operate in the same areas as the NAFAKA project (also USAID-funded). Babati was selected as the district covering most of the variance not seen in Kongwa and Kiteto.

2) Within the three selected districts, wards were re-classified to reflect just the variance in those districts. Wards in Kiteto and Kongwa had to be selected to cover NAFAKA sites, but in Babati the remaining variance was found in a number of wards, which were selected as targets.

3) Each target ward was visited. Field visits were extremely important to verify, firstly, whether the wards were internally fairly homogeneous, and secondly whether all the villages in each target ward were broadly similar in farming system, access and other characteristics.

4) From villages within homogeneous target wards that showed broadly similar characteristics, one village was selected at random as the action site. Randomization was based on the initial letter of the village name, with the lowest in the alphabet being selected.

5) The control villages were chosen within the control wards showing characteristics action villages as much as possible identical to the target wards. Moreover, the control village must be physically or in some other way isolated from the action villages. In Kongwa and Kiteto, which are internally more homogeneous, the two factors might be compatible, but in Babati, with incredible variations in topography, climate and access, this proved to be a very difficult task, so it was decided to randomly select sites from the adjacent districts of Mbulu and Hanang. It was not always possible to move further than an adjacent ward without entering significantly different zones in terms of access, climate, population density etc. In a few cases where wards were locally unique and lateral transitions very rapid, control villages had to be selected within the same ward as the action sites. The precise selection of control villages was left to the M&E team.

Contrary to the quick-wins site selection, the longer-term selection should take evaluation needs into account. In stratifying the sites based on biophysical and socio-economic characteristics (population density, rainfall, elevation, slope, market access, as well as poverty, education level, agricultural intensification gradient), the PMT (discussed in chapter 9) could be a very useful and powerful tool. Also, planning meetings scheduled in each mega-site were key to assessing whether randomization is a feasible option.

IFPRI's proposal was to have AR's CG implementers choose from a limited set of sites (randomly selected among the stratified sites) for the new project locations, without any need of abruptly ending the research activities in the existing quick-win sites. This seemed a reasonable compromise between practical and theoretical/evaluation design considerations. The randomization IFPRI proposes would be limited to the new project sites at the village level, to preserve the effectiveness of the projects already started and to minimize the cost of evaluation, given the budget constraint and the number of sites/projects foreseen. Local knowledge should inform the selection of villages, both treated and controls, as this is key to selecting a wide pool of treated and control villages with matched characteristics from which to randomize.

AR partnerships, although helpful from a program effectiveness point of view, weaken IFPRI's leverage to have control over projects, especially on their impact evaluation. This poses an additional challenge for evaluation design, perhaps being less of an issue for monitoring, due to the eventual contamination effect the project sites have been already exposed to prior to AR implementation. Contamination can be a positive effect in itself (depending on how it occurs), but in most cases it prevents a rigorous impact evaluation, possibly undermining the objective of

the whole program. Also, the impact of the intervention should be measured in the absence of partnerships if one would like to conclude something credible and convincing for the scale-up and -out, as partnerships are not guaranteed elsewhere in the country nor in the USAID zone of influence in general.

Nevertheless, one of the options suggested for the impact evaluation of AR is precisely looking at its spillover to neighboring villages, which is indeed an intended consequence of AR implementation, the scaling up of the technology package through a diffusion mechanism. In this case, the spillover to as many villages as possible would increase the degrees of freedom of the analysis and the likelihood of detecting a minimum effect size. Careful consideration should be given to site selection and their characteristics, as they can be driving the final results of the evaluation.

Therefore, IFPRI's role is to provide relevant information on the characteristics of the sites where AR should be working. Within those sites, since IFPRI is also charged with the evaluation, it is strongly advisable to have some control over the sample of AR beneficiaries and non-beneficiaries.

AR is a Research for Development project, with the explicit objective of "providing pathways out of hunger and poverty", as it is clearly stated in its objective. To correctly assess its current and future impact upon scale-up, the aspect of a rigorous impact evaluation cannot be overemphasized. The attribution assessment would aim to capture the life-changing effects of AR on the peasant farmers, on their nutrition and livelihood. It is of paramount importance that AR carries out a quantitatively convincing and rigorous evaluation, as this could be an ingredient of its success and endurance, especially if other FTF programs will be able to show conclusive evidence.

Site selection is a critical step for Africa RISING that is at the nexus of implementation and evaluation. In addition there is time pressure to make these selections in the three mega-sites because of the impending onset of the planting season, and of the need to field research activities according to the timeline of the program set for 2013.

In general implementing partners need to select sites according to a set of parameters that relate to the feasibility and suitability for research, whereas evaluation designers would in addition like the sites selected in accordance with an evaluation design that permits a requisite level of rigor. The latter sometimes means applying randomization in the selection of sites. Applying the two sets of criteria does not necessarily result (in the first round) in a set of sites acceptable to both implementers and evaluators. This reinforces the importance of planning in advance and allowing time to arrive at an evaluation design and concomitant site selection that is acceptable all around.

11.1.3. Attribution assessment, comparison group(s), and impact evaluation design

The objective of an attribution assessment (impact evaluation) is to assign an observed impact to the program intervention. The identification of the counterfactual is the organizing principle of an impact evaluation; that is, it tells us what would have happened to the beneficiaries if they had not received the intervention. The counterfactual is identified by selecting a control group. A group of control farmers should be chosen from non-beneficiaries of AR to be representative of the group of AR beneficiaries with one key difference: the control farmers did not receive any intervention. If the two groups are dissimilar in other dimensions, the outcomes of non-beneficiaries may differ systematically from what the outcomes of participants would have been without AR, producing selection bias in the estimated impacts. This bias may derive from differences in observable characteristics between beneficiaries and non-beneficiaries (e.g., location, demographic composition, access to infrastructure, wealth, etc.) or unobservable characteristics (e.g., natural ability, willingness to work, etc.). Some observable and unobservable characteristics do not vary with time (such as natural ability) while others may vary (such as skills). Furthermore, the existence of unobservables correlated with both the outcome of interest and AR intervention can result in additional bias (i.e., omitted variables).

The most direct way of ensuring a comparable control group of farmers is via an experimental design (Randomized Control Trial, RCT), in which farmers are randomly allocated between control and treatment groups. This guarantees that the fact that those farmers are AR beneficiaries is uncorrelated with other (observable and unobservable) variables, and as a result the potential outcomes will be statistically independent of whether a farmer is an AR beneficiary. On average the groups will be identical, except for the fact that one of them was affected by AR interventions.

Under these conditions, the average treatment effect (ATE) of the AR program can be identified simply as the mean difference in outcomes between the two groups. In addition to the ATE, perhaps the most commonly reported statistic is the average treatment effect on the treated (ATT), which measures the average impact of the program on beneficiary farmers.

In a non-experimental setting, such as the one AR is experiencing, ATE and ATT usually differ and, in addition, using the mean outcome of non-beneficiary farmers runs the risk of comparing different farmers' groups if factors that determine the participation decision also influence the outcome variable of interest (i.e., if there is selection bias). In other words, the validity of experimental estimators relies on the assumption that the control group farmers are not affected by AR.

Non-experimental design methods are often used when a randomized experiment is not possible, or when the experimental design fails to achieve observable balance among groups, due to

chance or when for example the number of units of randomization is relatively small.
In non-experimental studies it is necessary to make some identifying assumptions to solve the selection problem. The same is true when differences between treatment and control groups at baseline emerge despite randomization. More systematic differences at baseline between treatment and control groups require econometric techniques to create a better counterfactual by taking account of pre-existing significant differences in key variables.

Table 8 below presents the methodologies that the IFPRI M&E team is planning to employ, in the household level analysis of the AR program. We begin with difference-in-difference (DD) estimators, which can be employed using data from an experimental design (RCT), and then we move on to techniques that help us deal with weakened experimental designs or non-experimental settings: propensity score matching methods (PSM) and regression discontinuity design (RDD).

Table 8: Impact evaluation methods

Method	*Pros*	*Cons*	*Likely to be used*
Outcome Mapping	Easy to implement and interpret. Forces articulation of impact pathways	Primarily qualitative. Subjective assessment approach	Yes
DD (*difference in difference*)/RCTs	Provide quantitative evidence	Not as rigorous if RCTs are not carried out	Yes
PSM/IPW (*propensity score matching methods*)	Provide quantitative evidence, although second-best option	Not as rigorous if RCTs are not carried out	Yes
RDD (*regression discontinuity design*)	Provide rigorous evidence	Big sample needed, sharp cut-off based on continuous eligibility criterion (which AR is currently not supporting)	No

11.1.4. Power calculations for Tanzanian districts on yield increase (maize and rice)

There are various features that should be taken into consideration in designing the sample. These include the need for rigor as it affects sample size and cost. In order to make the power calculations that result in sample size, other important factors like effect size must also be specified. This is likely to require implementers to advice on what size of effect seems feasible to achieve. To support this process, Table 9, 10, and 11 provide an initial estimate of the cost of an evaluation in the three action districts of Tanzania under different assumptions.

The cost of a rigorous evaluation depends on many parameters, namely the projected change in the variable of interest, the sample design (simple random sample, clustered sample, stratified sample), and the local estimated cost per household for survey implementation (transport, field staff, data-entry operators, supervision, training, material, equipment), which was estimated based on previous survey experience.

Assuming 90% confidence level and 0.5 correlation between baseline and follow-up measurements, survey cost can range from $210,000 to $1.22 million for an evaluation in Babati over two survey rounds for three groups of farm households (those in AR action sites only; those in AR action plus partners sites; those in control sites). This cost can also vary according to the desired confidence level (the lower the level, the smaller the sample size needed), and the correlation between successive measurements (the higher the correlation, the smaller the sample needed).

Table 9: Power calculation and estimated costs for maize-based system in Babati district (assumption: maize yield increase)

Baseline values: average maize yield: 2270 kg/ha, std. dev.: 1351.23

Follow-up scenarios	Power	P	Sample required (N)	Cost per household/survey ($)	**Total cost baseline and follow-up ($000) x 3 household groups**
10% yield increase -2497 kg/ha-	90%		607	80	**291**
				120	**437**
				160	**583**
10% yield increase -2497 kg/ha-	80%		438	80	**210**
				120	**315**
				160	**420**
10% yield increase -2497 kg/ha- (with 10 hh/cluster)	80%	0.1	833	80	**400**
				120	**600**
				160	**800**
10% yield increase -2497 kg/ha- (with 10 hh/cluster)	80%	0.05	636	80	**305**
				120	**458**
				160	**611**
10% yield increase -2497 kg/ha- (with 20 hh/cluster)	80%	0.1	1271	80	**610**
				120	**915**
				160	**1,220**
10% yield increase -2497 kg/ha- (with 20 hh/cluster)	80%	0.05	855	80	**410**
				120	**616**
				160	**821**

Besides the factors mentioned above, one of the key hypotheses lies on the value of the projected percentage increase (for simplicity set at 10% in the estimates shown): the lower the change, the higher the sample required. For practical reasons, though, it is advisable to plan and design the

survey to be able to capture statistically significant variation of relatively small percentage changes, to avoid the risk of the sample being too small to rigorously detect a variation if a lower-than-expected change occurred.

Summing up, the rational sequence to conduct a rigorous evaluation involves AR stakeholders' addressing the following issues, which are crucial for an appropriate evaluation design.

- What questions would we like AR to answer?
- Which outcome indicator(s) will AR choose to look at?
- What R4D lessons can we learn from jumpstart projects? What would you carry over to longer-term AR activities?
- What are the specific research activities foreseen in each mega-site?
- Do research activities differ across locations within a mega-site?
- Is targeting being conducted to specific farmers?
- How many beneficiaries will AR target in each mega-site?
- In how many villages/locations will AR research projects be active?
- In how many of them will AR be partnering with other initiatives/institutions?
- Do we have access to a comprehensive and updated sampling frame of our population of interest?

Table 10: Power calculation and estimated costs for maize-based syste Kiteto and Kongwa districts (assumption: maize yield increase)

Baseline values: average maize yield: 1028 kg/ha, std. dev.: 676.79

Follow-up scenarios	Power	ρ	Sample required (N)	Cost per household/survey ($)	**Total cost baseline and follow-up ($000) x 3 household groups**
10% yield increase -1131 kg/ha-	90%		738	80	**354**
				120	**531**
				160	**708**
10% yield increase -1131 kg/ha-	80%		533	80	**256**
				120	**384**
				160	**512**
10% yield increase -1131 kg/ha- (with 10 hh/cluster)	80%	0.1	1013	80	**486**
				120	**729**
				160	**972**
10% yield increase -1131 kg/ha- (with 10 hh/cluster)	80%	0.05	773	80	**371**
				120	**557**
				160	**742**
10% yield increase -1131 kg/ha- (with 20 hh/cluster)	80%	0.1	1546	80	**742**
				120	**1,113**
				160	**1,484**
10% yield increase -1131 kg/ha- (with 20 hh/cluster)	80%	0.05	1040	80	**499**
				120	**749**
				160	**998**

Only upon addressing all these issues can IFPRI propose a careful evaluation that encompasses these elements and dimensions:

- Randomization
- Ethics for control
- Sample design
- Survey strategy (on baseline, mid-point, and follow-up)
- Feasibility
- Econometric method/statistical techniques
- Statistical power for causal impact
- Total estimated cost

Table 11: Power calculation and estimated costs for rice- and vegetables-based system in Kilombero district: (assumption: rice yield increase)

Baseline values: rice average yield: 1952 kg/ha, std. dev.: 1020

Follow-up scenarios	Power	P	Sample required (N)	Cost per household/survey ($)	**Total cost baseline and follow-up ($000) x 3 household groups**
10% yield increase -2147 kg/ha-	90%		469	80	**225**
				120	**338**
				160	**450**
10% yield increase -2147 kg/ha-	80%		339	80	**163**
				120	**244**
				160	**325**
10% yield increase -2147 kg/ha- (with 10 hh/cluster)	80%	0.1	645	80	**310**
				120	**464**
				160	**619**
10% yield increase -2147 kg/ha- (with 10 hh/cluster)	80%	0.05	492	80	**236**
				120	**354**
				160	**472**
10% yield increase -2147 kg/ha- (with 20 hh/cluster)	80%	0.1	984	80	**472**
				120	**708**
				160	**945**
10% yield increase -2147 kg/ha- (with 20 hh/cluster)	80%	0.05	662	80	**318**
				120	**477**
				160	**636**

A proposal put forward in the review and planning meetings was to consider following a similar evaluation design used in the Sub-Saharan Africa Challenge Program, by matching villages in pairs (using the four criteria for stratification) and then randomizing action and control villages

within each pair. This approach is schematically represented in Figure 6, and it can be summarized as follows:[7]

1. Stratify the wards by high (H)/low (L) agricultural potential (agp) and market access (ma);
2. Select, for each of the 4 strata, four wards assigned to interventions and four wards used as controls;
3. Carry out village listing operations, and characterize them as "clean" (having received no agriculture intervention in the last five years) or "conventional ARD" (having received conventional agriculture research and rural development intervention in the last five years);
4. In the treated AR wards, randomly select five clean villages and ten households in each of them;
5. In the control wards, randomly select five clean villages and five conventional ARD villages, and then ten households in each of them.

Within each stratum the village selection would yield five clean villages and 50 households in each of the four AR wards and four control wards (4x50x4x2=1600 households). In addition, five conventional ARD with 50 households in each control ward will be sampled (4x50x4=800), but they will be not paired up with five conventional ARD villages in the AR wards. The total sample will be 2,400 households.

It is to note that this design would allow the impact evaluation of AR versus no intervention, but not the evaluation of AR versus conventional ARD interventions. In order to measure the impact of AR versus conventional ARD interventions, an extra five villages in each stratum needs to be sampled in all AR wards, for an additional 800 (4x50x4) households.

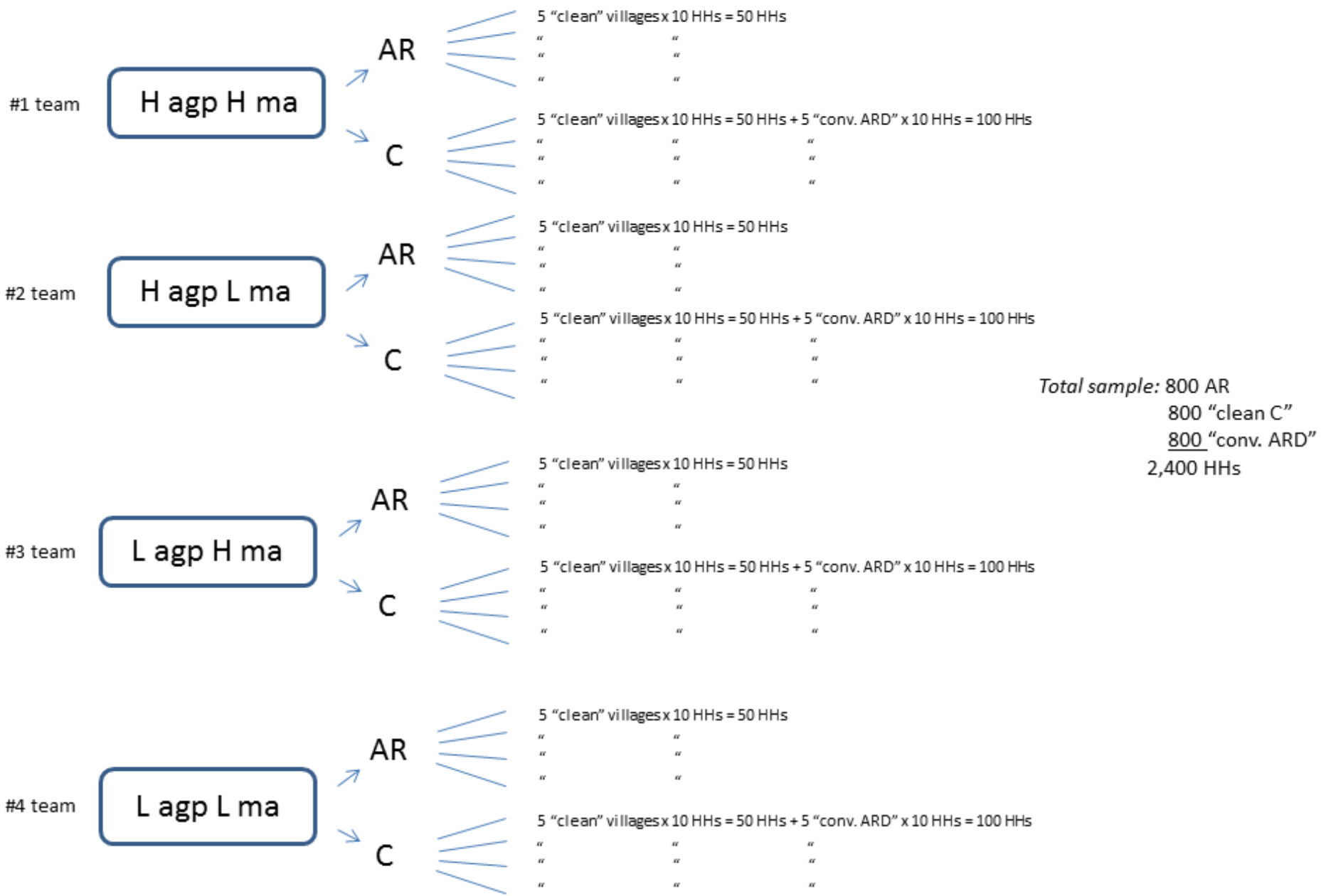
Stratification and pairing up villages would certainly improve the randomization, although this is a second-best option, compared to the preferred alternative of randomly choosing the sites among the group of treated and control villages after stratification.

There are other severe issues in applying the Sub-Saharan Africa Challenge Program design to AR. First and foremost, the scale of which AR operates is not likely to allow the program to target and reach the number of villages and households required to detect a minimum effect size. Setting up a relatively complex evaluation design with a substantial risk of failure may undermine the credibility of the whole program.

[7] The description draws heavily on de Janvry A. and Sadoulet E. (2010), CGIAR Sub-Saharan Africa Challenge Program –Evaluating the IAR4D approach using a randomized control trial methodology", *Independent Science and Partnership Council of the CGIAR*, University of California at Berkeley.

Second, only in some selected district and wards the M&E has leverage to select villages and farm households. This would bring about the exercise to depart from the ideal randomization conditions on which it is grounded, with AR and ARD villages differing systematically. Also, whether the village will receive or not AR intervention could be strongly correlated with important village characteristics, as whether it has received or not ARD projects in the past could also.

Figure 6: Evaluation design structure of Sub-Saharan Africa Challenge Program



Third, if AR interventions will reach only a relatively small set of villages, as in the case of on-station demonstration plots, how can these results be extrapolated? The issues of external validity and scalability hypotheses in AR are the funding pillars of the whole program.

If the preferred alternative of stratified RCTs is deemed risky, a second option is the use of a diffusion model for comparison intervention and control farmers. This option lies on selecting farm households from randomly selected villages. There are no explicit and predetermined treatment and control farmers. Instead, a measure of "proximity" is computed which captures a household's interaction with the program. This might include membership, access to services and physical proximity to institutions that are supported by the program. When the data are analyzed, the variable of interest will be the estimate on how far the "proximity" to the program affects the key outcomes. The advantage of this approach is that it allows explicit measurement of diffusion effects. Indeed, control group contamination provides a good proxy of project spillover and diffusion. The main problem with the approach is that results can be difficult to interpret as they are complex than the common difference-in-difference estimator calculated over control and treatment farmers.[8]

A slight variation of the option above would entail the inclusion in the intervention of as many farmers from villages in the proximity of the on-station demonstration plot as possible, although the selection of villages would not be random, but explicit randomization would occur between intervention and control villages, unlike in the previous alternative. This would bring about the desired advantage of increasing the degrees of freedom of the evaluation, as neighboring villages (and the selected random households within those) will be part of the treatment sample, overcoming the risky design and task of pairing up villages.

The third evaluation option discussed among the experts in the evaluation design team is to evaluate an additional intervention on top of the AR project in some areas, partnering with local institutions in designing and implementing the new measure. The sample design could be similar to what it is shown in Figure 6, and the sample size would be unchanged. The main drawback of this option is that it is not designed to evaluate AR, and it would bring additional coordination challenges in the implementation.

Regardless of the evaluation design chosen, it is advisable to conduct baseline surveys, at least in the action sites. Those surveys would be also helpful for conducting situation analysis and monitoring indicators in all cases where the implementing agencies would deem it necessary. However, whether that is possible will depend on the timing requirements of monitoring versus evaluation and other analyses. A final decision on the evaluation design would largely depend on the research proposals that will be submitted by the implementing partners in each mega-site.

[8] This approach has been used by ACDI-VOCA in Ethiopia, see Watkins B. (2011), Discussion of Sampling Method, Kimetrica Limited, Addis Ababa.

11.1.5. Outcome mapping

Outcome mapping has been suggested as a specific method that could be employed by Africa RISING. According to a recent manual[9] on outcome mapping:

Outcome mapping focuses on one specific type of result: outcomes as behavioral change. Outcomes are defined as changes in the behavior, relationships, activities, or actions of the people, groups, and organizations with whom a program works directly. These outcomes can be logically linked to a program's activities, although they are not necessarily directly caused by them. These changes are aimed at contributing to specific aspects of human and ecological well-being by providing partners with new tools, techniques, and resources to contribute to the development process. Boundary partners are those individuals, groups, and organizations with whom the program interacts directly and with whom the program anticipates opportunities for influence. Most activities will involve multiple outcomes because they have multiple boundary partners. By using Outcome Mapping, a program is not claiming the achievement of development impacts; rather, the focus is on its contributions to outcomes. These outcomes, in turn, enhance the possibility of development impacts - but the relationship is not necessarily a direct one of cause and effect. Ultimately, all organizations engaged in international development want their work to contribute to long-term development impacts. However, this is rarely accomplished by the work of a single actor (especially an external donor agency). The complexity of the development process makes it extremely difficult to assess impact (especially for an external donor agency seeking attribution). Furthermore, focusing assessment on long-term development impacts does not necessarily provide the kind of information and feedback that programs require to improve their performance. For these reasons, Outcome Mapping focuses on outcomes instead of impact, while recognizing the importance of impact as the ultimate goal toward which programs work.

From this description it is clear that outcome mapping might be useful to Africa RISING, but it would not substitute for rigorous quantitative evaluation.

[9] Earl, Sarah, Fred Carden, and Terry Smutylo. 2001. Outcome Mapping: Building Learning and Reflection into Development Programs, *International Development Research Centre*, Ottawa.

Annexes

Annex I: FTF Indicators Originally Designated for Africa Rising by USAID

Annex II: Additional FTF (and One Custom) Indicators Proposed for discussion by IFPRI

Annex II: General indicators for Africa RISING proposed by implementers

Annex IV: Indicator Reference Sheets

Annex I

FTF Indicators Originally Designated for Africa Rising by USAID*

FTF Indicators by IR/Sub-IR		Indicator
IR 1: Improved Agricultural Productivity		
Sub-IR 1.1: Enhanced Human and Institutional Capacity Development for Increased Sustainable Agriculture Sector Productivity		
#1	Number of individuals who have received USG supported long-term agricultural sector productivity or food security training	Output
#2	Number of individuals who have received USG supported short-term agricultural sector productivity or food security training	Output
#3	Number of food security private enterprises (for profit), producers organizations, water users associations, women's groups, trade and business associations, and community-based organizations (CBOs) receiving USG assistance	Output
#4	Number of members of producer organizations and community based organizations receiving USG assistance	Output
#5	Number of farmers and others who have applied new technologies or management practices as a result of USG assistance	Outcome
#6	Number of private enterprises (for profit), producers organizations, water users associations, women's groups, trade and business associations, and community-based organizations (CBOs) that applied new technologies or management practices as a result of USG assistance	Outcome
	Sub-IR 1.2: Enhanced Technology Development, Dissemination, Management, and Innovation	
#7	Number of new technologies or management practices in one of the following phases of development in Phase: I: under research as a result of USG assistance II: under field testing as a result of USG assistance III: made available for transfer as a result of USG assistance	Output
	Sub-IR 1.3: Improved Agriculture Policy Environment	
#8	Numbers of Policies/Regulations/Administrative Procedures in each of the following stages of development as a result of USG assistance in each case: Stage 1: Analyzed Stage 2: Drafted and presented for public/stakeholder consultation Stage 3: Presented for legislation/decree Stage 4: Passed/approved Stage 5: Passed for which implementation has begun	Stages 1&2: Output Stages 3,4, & 5: Outcome
	IR 3: Increased Investments in Agriculture and Nutrition-Related Activities	
#9	Number of public-private partnerships formed as a result of FTF assistance	Output

*****During the Quick-Win phase.

Annex II

Additional FTF (and One Custom) Indicators Proposed for discussion by IFPRI

#	Indicator	IR/Sub-IR	Output/Outcome Indicator
10	Gross margin per unit of land, kilogram, or animal of selected product	IR 1	Outcome
11	Number of hectares under improved technologies or management practices as a result of USG assistance	IR 1	Outcome
12	Number of stakeholders implementing risk-reducing practices/actions to improve resilience to climate change as a result of USG assistance	Sub-IR 1.1	Outcome
13	Number of rural households benefiting directly from USG interventions	Sub-IR 1.2	Output
14	Value of incremental sales (collected at farm-level) attributed to FTF implementation	IR 2 (Expanding Markets and Trade)	Outcome
15	Farmer satisfaction with quantity, quality and timeliness of extension and input supply services	Custom (Sub-IR 2.3: Improved Market Efficiency)	Outcome
16	Value of new private sector investment in the agriculture sector or food chain leveraged by FTF implementation	IR 3	Outcome
17	Number of vulnerable households benefiting directly from USG interventions	IR 5 (Increased Resilience of Vulnerable Communities & Households)	Output

Annex III

General indicators for Africa RISING proposed by implementers

System component	Indicator
Crop	Increase productivity (land, labor, water, soil fertility management, biomass) Increase diversification (intercropping, rotation per cropping seasons, multipurpose crops)
Livestock	Increase in feed (biomass and forage) Increase in milk and meat production Increase in household income
Agroforestry	Increase in tree cover Increase in species diversity (wood and non-wood products
Soil	Increase in soil fertility (through BNF, targeted input use) Improved NUE
Water	Improved WUE
Household income	Increase in on-farm income (through high value enterprises such as livestock, cash crops, legumes, vegetable, tree products, bee-keeping)
Food security	Increase in household food requirement (months of yearly food security) Increase in food self-sufficiency Decrease in reliance on food aid
Nutrition	Increase in calories, protein, vitamins and micro-nutrients Improved diet
Gender	Increase in equity Increase in women participation in decision-making and benefiting
Institutions	Increase in engagement in local institutions Increase in strength/linkages between local, regional, and national institutions Improved value chains performance Improved market efficiency Improved private sector integration
Capacity building and/or strengthening	Improved knowledge of farmers and extension agents, development agents Improved extension efficiency
NRM	Agro-biodiversity, water quality and quantity Increased contribution to natural capital and flow of environmental services Landscape rehabilitation and conservation (soil erosion) Improved ecosystem service stocks and flows and community resources (e.g., grazing lands, wood lots, soil and water conservation activities, and pest management strategies) Improved and equitable management of community-based resources Improved ecosystem service flows between landscape and farm scales.

Source: M&E expert meeting, and Ethiopian highlands annual review and planning meeting, ILRI, Addis Ababa, Ethiopia, September 2012.

Annex IV

Indicator reference sheets

For standard FTF indicators, see reference sheets in the FTF indicator handbook. Any custom indicators could use a version of the standard USAID format, shown following with some typical entries.

<table>
<tr><td colspan="2">SPS LOCATION: N/A
INITIATIVE AFFILIATION: FTF – Sub-IR 2.3: Improved Market Efficiency</td></tr>
<tr><td colspan="2">INDICATOR TITLE: Farmer satisfaction with quantity, quality and timeliness of extension and input supply services</td></tr>
<tr><td colspan="2">DEFINITION:</td></tr>
<tr><td colspan="2">RATIONALE:</td></tr>
<tr><td>UNIT:</td><td>DISAGGREGATE BY:
Sex (male, female)</td></tr>
<tr><td>TYPE:
Outcome</td><td>DIRECTION OF CHANGE:
Higher is better</td></tr>
<tr><td colspan="2">DATA SOURCE:</td></tr>
<tr><td colspan="2">MEASUREMENT NOTES:

➢ LEVEL of COLLECTION: Project-level
➢ WHO COLLECTS DATA FOR THIS INDICATOR: Implementing partners
➢ HOW SHOULD IT BE COLLECTED:
➢ FREQUENCY of COLLECTION: Collected per growing seasons; reported annually</td></tr>
</table>