



Report of the internally-commissioned external review of the Africa RISING project in East and Southern Africa

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The Africa Research in Sustainable Intensification for the Next Generation (Africa RISING) program comprises three research-for-development projects supported by the United States Agency for International Development as part of the U.S. government's Feed the Future initiative.

Through action research and development partnerships, Africa RISING will create opportunities for smallholder farm households to move out of hunger and poverty through sustainably intensified farming systems that improve food, nutrition, and income security, particularly for women and children, and conserve or enhance the natural resource base.

The three projects are led by the International Institute of Tropical Agriculture (in West Africa and East and Southern Africa) and the International Livestock Research Institute (in the Ethiopian Highlands). The International Food Policy Research Institute leads an associated project on monitoring, evaluation and impact assessment.



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Cover photo: a compilation of photos taken during the review

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Review team

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Acknowledgements: We would like to acknowledge the support, openness and enthusiasm of Africa RISING management, staff and partners including farmers during the review process, not only in answering our many questions but also identifying the challenges with which they have been faced and suggestions on a way forward. Many of these have been incorporated into our review.

Acronyms

ADD	Agriculture Development Division, Malawi
AEZ	Agro Ecological Zone
AEDO	Agricultural Extension and Development Officer. Malawi
Africa RISING	Africa Research in Sustainable Intensification for the Next Generation
ARI-Hombolo	Agricultural Research Institute, Hombolo, Tanzania
ARI-Naliendele	Agricultural Research Institute, Naliendele, Tanzania
AVRDC	The World Vegetable Centre
CA	Conservation Agriculture
CADECOM	Catholic Development Committee
CIAT	International Centre for Tropical Agriculture
CIMMYT	International Maize and Wheat Improvement Centre
COSTECH	Council for Science and Technology, Tanzania
CG or CGIAR	Consultative Group on International Agricultural Research
CRP	Challenge Research Program
DAES	Department of Agricultural Extension Services, Malawi
DAECC	District Agricultural Extension Coordinating Committee, Malawi
D&N	Dedza and Ncheu Districts, Malawi
DADO	District Agriculture Development officer, Malawi
DAICO	District Agriculture, Irrigation and Cooperative Offices, Tanzania
DALDO	District Agriculture and Livestock Development Offices, Malawi
DARD	Department of Research and Development, Tanzania
DARS	Department of Agricultural Research Services, Malawi
EPA	Extension Planning Area
ESA	East and Southern Africa
ETG	Export Trading Group, Tanzania
Farm Africa	A UK based NGO
FUM	Farmers Union, Malawi
GAP	Good Agricultural Practice
HI	Heifer International
HQ	Headquarters
ICRAF	International Centre for Agroforestry Research
ICRISAT	International Crops Research Institute for the Semi-arid Tropics
IFPRI	International Food Policy Research Institute
iAGRI	Innovative Agricultural Research Initiative
IITA	International Institute of Tropical Agriculture
ILRI	International Livestock Research Institute
IP	Innovation Platform
INADES	INADES-Formation Tanzania
INVC	Integrating Nutrition in Value Chains, Malawi
IRA	Institute of Resources Assessment, University of Dar es Salaam, Tanzania
ISWC	Integrated soil and water conservation
ISFM	Integrated soil fertility management
K&K	Kongwa and Kiteto Districts, Tanzania
LF	Lead Farmer

LUANAR	Lilongwe University of Agriculture and Natural Resources, Malawi
M&E	Monitoring and Evaluation
MAFCO	Ministry of Agriculture, Food Security and Cooperatives, Tanzania
MSU	Michigan State University, USA
MU	Malmo University, Sweden
NARS	National Agricultural Research System
NARES	National Agricultural Research and Extension Systems
NASFAM	National Smallholder Farmers Association of Malawi
NAFAKA	Tanzania Staples Value Chain Activity, Tanzania
NGO	Non-governmental organisation
NM-AIST	Nelson Mandela African Institute of Science and Technology, Tanzania
NRM	Natural Resource Management
PCT	Program Coordination Team
PMMT	Project Mapping and Monitoring Tool
QDS	Quality Declared Seed
R4D	Research for Development
R&D	Research and Development
SAG	Science Advisory Council
SFHC	Soils, Food and Healthy Communities, Malawi
SI	Sustainable Intensification
SIMLESA	Sustainable Intensification of Maize-Legume Systems for Southern Africa
SIMLEZA	Sustainable Intensification of Maize-Legume Systems for Eastern Province, Zambia
SUA	Sokoine University of Agriculture, Tanzania
TALIRI	Tanzania Livestock Research Institute
TARI	Tanzania Agricultural Research Institute
TUBORESHE CHAKULA	Improved Food Processing for Nutrition and Value Addition, Tanzania
UDOM	University of Dodoma, Tanzania
USAID	The United States Agency for International Development
VBA	Village Based Advisor
WA	West Africa
WP / WT	Work Package / Work Theme
WU	Wageningen University, The Netherlands
ZIELU	Zonal Information and Extension Liaison Unit, MAFCO, Tanzania

Summary

The review: This review has assessed Africa RISING East and Southern Africa's work to date evaluating progress towards the expected outputs and outcomes and made recommendations to meet the challenges being faced. The review process included literature review, discussions with partners and visits to a number of villages where Africa RISING is working for discussions with farmers, technicians and others involved in the research activities. Field visits included 13 days in Tanzania and eight days in Malawi. During the review discussions were held with Africa RISING partners and a number of villages were visited covering each agro-ecological zone (AEZ) in which Africa RISING is working.

We would like to acknowledge the support, enthusiasm and openness of Africa RISING staff and partners and implementation staff in the review process. Many of their own ideas on the way forward are incorporated in this report.

Africa RISING ESA achievements include the establishment of a wide range of partnerships, increasing stakeholder collaboration, addressing priority bio-physical constraints concerning genetic improvements, cereal and legumes crops, vegetables, soil fertility and other natural resource management practices, livestock fodder production, poultry, post-harvest and nutrition, as well initiatives linking Africa RISING ESA with bilateral USAID-funded development activities.

In all districts, variations of a "Mother-Baby-Granddaughter/spillover" approach are being successfully used providing opportunity not only for participatory research, but importantly for demonstration and training thereby linking R & D activities through recently established R4D platforms. This is encouraging further farmer testing, demonstration and adaptation through farmer-to-farmer extension. Links between Africa RISING ESA with USAID bilateral projects will be invaluable for widening scaling approaches and providing opportunity for learning.

Implementation strategy: Three year's work have almost been completed, with one cropping season in the remaining 18 months. In the first year USAID requested tangible results and IITA implemented "jump start" projects including community, value chain and stakeholder analyses, seed production, technology identification before target areas had been identified. Africa RISING's subsequent Program design reflects four outputs aimed at achieving a common outcome of "providing pathways out of hunger and poverty through SI farming systems" contributing to impact of "increased adoption by smallholder farmers of productivity increasing SI innovations". Africa RISING ESA subsequently developed its own project framework that contributes to Program outputs.

Research Framework: It is recognised that process-led projects such as Africa RISING, do not lend themselves easily to planning or review. Although the newly developed Africa RISING ESA logical framework (logframe) has provided a basis for this review, greater clarity is needed on how Work Packages and Themes contribute to Program outputs, outcomes and impact.

Recommendation. The ESA logframe should be updated with clearer definition between outputs and activities using time bound targets that reflect both quality and quantity with a "theory (or hypothesis) of change" used to inform activities and assumptions. In particular, gender sensitive measurable indicators, baselines and targets need identifying, confirming or revising, given the experiences of the last three seasons. This will help in improved planning, implementation, monitoring and learning for the final stages of the project, as well as providing vision for the future and building blocks for a second phase.

Research outputs. There are four interrelated Program outputs which have formed the basis of the review. Within this, ESA has identified eight project outputs organised initially as work packages and more recently combined to form a number of interrelated themes and clusters, each area being configured slightly differently reflecting differing institutional approaches.

Output 1: Situation Analysis and Program-wide Synthesis

This output is expected to provide baseline data and socio-economic “support” to other outputs, including participatory assessment of SI technologies through cost-benefit and gender analyses as well as ensuring R4D platforms are actively involved in helping to decide research priorities and facilitate scaling processes.

Challenges: Some of the activities under this output remain to be fully addressed. These include: i) a comprehensive inventory of potential technologies with associated cost-benefit and gender analysis, ii) characterisation of farmers being only recently completed and consequently not yet being used, iii) R4D platforms being at early stages of development with links from district to community/village levels platforms requiring to be strengthened. These need to be seen as more than a dissemination approach, but also actively involved in identifying challenges, research opportunities and seeking solutions.

Value chain analysis has generally not been carried out and commodity-based IPs derived from R4D platforms addressing input-output value chain challenges and possible interventions are lacking. In the absence of a value chain approach, research priorities have been identified mainly for bio-physical production and post-harvest constraints.

Recommendations

Socio-economic support

- i) Cost-benefit analysis of SI innovations should be established, or where initiated, continued as routine procedures to be undertaken both before and after farmer testing using research protocols as a guide. Analysis should take into account the use of draft animals, labour availability and use, especially that of women and children.
- ii) Initiate a participatory budgeting (gross-margin or partial budget) approach with women and men farmer groups to establish viability and acceptability of alternative technologies, systems and enterprises. This will complement the use of other participatory approaches.
- iii) Ensure gender and youth issues around technologies are addressed during participatory evaluation occasions.

R4D and Innovation Platforms

- iv) Platform purposes, functions and plans need to be further clarified and agreed by participants through ongoing facilitation during establishment and early operation. Platforms should build on existing structures for stakeholder participation as in Malawi, where agricultural committees are established at various levels, from district to village, using stakeholder panels. In Tanzania, the best entry point at village level would be the agricultural, environmental and welfare committees operational in each village. Links between District (strategic) and community/village (operational) levels need to be strengthened.
- v) Some important stakeholders including the private sector (agro-dealers, processors) and NGOs operating at project sites appear not to be members of the R4D/IPs at district or village levels. A stakeholder analysis should be carried out or revisited to identify/confirm all important actors are sensitized / motivated to be active members of the IPs. Actors along the major commodity value chains should be identified through value chain analysis and brought on board as active members of the IPs.
- vi) R4D/IP agendas should follow a learning cycle step-wise process in line with the season (engagement, planning, implementation, learning and review) with each cycle leading into and building on the next.
- vii) Where national platforms already exist, such as a “Grain Legumes Platform” in Malawi, and a National Mycotoxin stakeholder platform in Tanzania, ESA’s participation will help to strengthen

the platform without incurring additional cost and ensuring sustainability. It also provides opportunity to ensure constraints that Africa RISING cannot or is not addressing are prioritised by other stakeholders.

For a new phase

viii) Carry out / revisit value chain analyses of major commodities in line with R4D IP priorities to identify challenges, opportunities and interventions. These analyses should act as catalysts for the establishment of commodity-based IPs either as sub-groups of the R4D platforms or stand-alone IPs.

Output 2: Integrated Systems Improvement

This output comprises the main thrust of the research with a number of interrelated Work Packages (WPs) in the 2012-2013 and 2013-2014 workplans. The WPs addressed project priorities including crops, livestock, natural resource management, food storage and mycotoxin management, nutrition and food processing and R4D platform development. In the 2014-2016 work plan, the priorities were rationalized into Work Themes (WTs). Although the configuration varies between countries and districts, the WPs and WTs have been grouped together for this review.

In all sites farmer groups have been established by researchers with Lead Farmers (LFs) providing land, the groups providing the labour and researchers the inputs and design protocols for Mother Trials (MTs). These are a focus for learning through training, field days and exchange visits. Baby trial farmers are often farmer group members provided with seed and encouraged to test varieties and management options. Variations on this approach were noted. In some cases labour for MTs is hired, in others members of farmer groups provide labour in exchange for knowledge and seed. Babati has added a voucher lottery system to provide seed to other farmers allowing randomization into different typologies, rather than directly to group members. This will support network analysis of adopters.

Cereal-legume-vegetable cropping systems

WP/WTs have addressed: genetic intensification including MLN disease control, testing / demonstrating new varieties of cereals and legumes, inter and double cropping of legumes, alternative fertiliser and manure management combinations, and the use of aflasafe in maize for aflatoxin control.

Challenges. These include: the need to ensure timely planting through avoiding delays as work themes and funding arrangements are agreed and inputs ordered; NRM practices have not always been implemented in sites of genetic intensification or crop variety trials, resulting in serious soil erosion; the need for compensation for farmers when research fails; lack of cost-benefit and gender analysis of trial protocols and results; inadequate collaboration between some Africa RISING ESA work themes and with other R&D projects operating in the same areas. Farmers' concerns are often about scaling notably seed, fertiliser and pesticide availability and affordability and about marketing as yields increase. Many farmers use recycled seed or grain purchased at markets. Lack of seed is often being compounded by a lack of interest by seed companies in producing legume and OPV varieties, these being seen as unprofitable. Non-availability of inoculants for soya beans also remains a challenge.

The use of aflasafe for aflatoxin control and resistant varieties for MLN disease control are progressing well, but both will need a second phase before technologies or varieties can be considered for approved.

Recommendations

- i) Resolve contracting-funding arrangements so that all trials are planted timeously and best-bet NRM practices are routinely used in crop variety trials.
- ii) Encourage closer integration of between Africa RISING ESA research activities and those of other projects working in the same areas.
- iii) Develop stepwise SI recommendations where feasible based on low, medium and high input productivity options that reflect farmer typologies and are based on ex-ante and ex-post cost-benefit and gender analysis.

For a new Phase

- iv) Expand vegetable systems to K&K and Malawi using schools as sites for trials and demonstrations.
- v) Investigate the use of low lying wetlands (dambos in Malawi) and potential areas for irrigation for dry season high value crop production including vegetable and seed production.
- vi) Consider potential for high value crops already being grown including potatoes in Babati, sunflowers in K&K, cotton in D&N. Although these may not be high priority for USAID, they form an integral part of the cropping system offering potential for SI and livelihood improvements.
- vii) Link with seed regulatory authorities and inspectors to support QDS community-based seed production.
- viii) Encourage private sector input suppliers such as Minjingu fertiliser factory, agro-dealers and other development partners to establish demos close to points of sale and in villages neighbouring research hubs.
- ix) Undertake studies of intra-household gender relations and their implications on nutrition and technology development.

Livestock and livestock-cropping systems.

WPs/WTs have addressed improving feed supplies through testing alternative grass, legume and tree fodder species for cows and goats, establishing seed/plant nurseries, improving indigenous poultry and integrating poultry with use of vegetable waste. Little work has been done on either intensification of goat or milk production based on year round feeding packages or addressing other constraints.

Challenges. These include some varieties of grass, legume and tree fodder appearing unsuitable for the targeted AEZ, the introduction of a Napier stunt disease in nurseries, destruction of introduced fodder species in some areas due to free grazing of cropping areas in the dry season, inadequate manure/compost/urine to meet the quantities being applied in trials, lack of year round feeding packages and feed budgeting, poor housing and issues of chopper and hay bailer availability for fodder cutting and conservation.

With regards to poultry production, research is still at an early stage, although high mortality rates of young chicks in K&K is indicative of the need to improve housing and management of young birds while cost benefit analyses are necessary to determine cost effective feeding packages for indigenous chicken production.

Recommendations

- i) Ensure planting material introduced for testing is suitable for the AEZ and is free of disease.
- ii) Take steps to accelerate planting material and fodder species availability through community-based seed/nursery production.

- iii) Ensure integration with other SI farming system components, especially in Malawi
- iv) For poultry continue developing cost effective feeding packages including vegetable residues.

For a new phase

- v) Undertake livestock value chain analysis especially for dairy and goat production to identify opportunities for interventions that are considered by and prioritised by R4D platforms.
- vi) Develop livestock feeding packages through feeding trials to increase milk, meat and manure production working with existing dairy and goat groups and at the same time increasing manure and urine use on high value products, probably vegetables.
- vii) Address livestock health problems, improving livestock housing and management practices.

Natural resource management systems

WPs/WTs have addressed SWC & ISFM, landscape environmental research, nutrient use and run-off trials testing alternative crop establishment and management practices (flat, tied ridges, rip), fanya juu and agro-forestry practices for fodder and windbreaks.

Challenges. These include the long term nature of the environmental work being undertaken in Babati, serious land degradation in K&K, mechanisation/labour requirements for tied-ridge making, conflicts between crop farmers and pastoralists, free grazing of crop residues during dry months damaging grasses and trees planted along contours, fanya juu and in wind breaks. Many of the technologies being developed tend to be location specific requiring encouragement and training for on-going farmer experimentation. Serious land degradation poses a serious threat to the SI technologies being developed especially in K&K.

Recommendations

- i) Although long-term landscape NRM research is required, there is a need for interim outputs within the present phase of the project. This could include providing guidelines on best practices for distances between contour bunds, dimensions of fanya juu, tree and grass species and their management requirements.
- ii) Establish demonstration and training sites for different rainwater harvesting techniques in research hubs and proactively include women and youths in the training.

For a new Phase

- iii) Advocate and build consensus and support through R4D platforms for resolving challenges of degradation of forest and grazing areas, and free grazing of arable areas during the dry season. This requires the production of a position/advocacy paper(s) setting out the causes of degradation, the consequences of inaction and options for redressing the situation. The paper should be targeted at R4D District and community level platforms, with a view to involving regional and national decision and policy makers in supporting village and District action plans.

Post-harvest storage, value addition and mycotoxins

This WT addresses testing alternative bags for grain storage, grain drying and mechanised maize shelling

Research is showing the value of grain drying and success of triple bags in reducing aflatoxin spread and other pest damage, as well as labour saving in mechanised maize shelling. As with other technologies cost-benefit and gender analysis is required. Challenges include how to scale-up with issues to be addressed including: bag availability and affordability; warehouse management, machinery ownership options being funding for purchase, support for maintenance and repair and importantly how to involve the private sector.

Recommendations

- i) Commission/revisit a study on the maize value chain identifying challenges and opportunities for interventions by stakeholders that address the scaling up of triple bags, storage and mechanization with particular attention being given to ex-ante models of grain sheller ownership, credit needs and profitability, partial budget cost-benefit analysis of triple bags, warehouse and business management.
- ii) Present studies to R4D platforms for identification of private partners who can address the opportunities identified.
- iii) Ensure gender analyses to determine the implications of intra household gender considerations with regards to labour and suitability and access to equipment, ownership, credit and seed for women.

Food processing and nutrition

Ways forward related to the challenges include the need to establish baselines for monitoring and assessing change under different circumstances. This could include a joint research program across Tanzania and Malawi focusing on children under two year's old, pregnant women and different household categories. This will require close links between AVRDC, IITA, SUA and LUANAR in association with NAFKA, Tuboreshe Chakula (before closure) and INVC.

Recommendations

New Phase

- i) Link with international research institutions covering maternal and child health with production and nutrition linkages. Draw up detailed plans, including sampling/ research designs and establish links with relevant national health and nutrition Programs to ensure scaled outcomes.
- ii) AVRDC, IITA, SUA and LUANAR should prepare a nutrition research program cutting across Tanzania and Malawi focused on children <24 months and pregnant women in different household categories

Output 3: Scaling and Delivery of Integrated Innovation

This addresses challenges of wider adoption of innovations and initiation of programs by the development community

The WTs associated with this output address institutional cooperation and co-learning and scaling within the intervention sites with demonstrations, training, field days, media communication and workshops as part of the implementation strategy with the R4D platforms have an important role to play building on Output 1 activities. Links with USAID-funded NAFKA and INVC projects have an important role to play.

Challenges: These include the need to recognise and build on existing and new farmer groups and networks, both formal and informal. It requires social, economic and gender analysis of best bet technologies that include low, medium and higher input technology options targeted at different farmer typologies.

Recommendations

- i) Undertake "Networking Mapping" of babies/granddaughters/spillovers/voucher farmers to establish who is using which technologies, why and how these are being modified by different gender-based typologies of farmers. This has been initiated in Malawi and requires to be undertaken at other sites.

- ii) Communication, being the most basic requirement for the success of R4D platform is required to help partners acquire the skills to interact in platforms and undertake technical activities. Facilitation will be required.
- iii) Involve experienced local language speakers in facilitation of R4D platforms, encouraging development partners to be an integral part of the platforms. They could be local facilitators.
- iv) Ensure strong linkages between community/village and District levels IPs.
- v) Ensure USAID-Tanzania and USAID-Malawi and their bilateral projects, NAFKA in Tanzania and INVC in Malawi, continue to be informed about Africa RISING activities through representation on R4D platforms.
- vi) Document and share with development partners mature technologies together with their cost-benefit, gender and targeting analysis and conditions under which they can go to scale.

Output 4: Monitoring and evaluation

Although IFPRI is responsible for this Output, primarily to measure impact and support evaluation, Africa RISING ESA needs to undertake monitoring activities to ensure that learning is taking place.

Recommendations

- i) Ensure Africa RISING ESA establishes its own M&E and Learning Unit for continuous participatory M&E of its activities. This requires consideration by all partners, including WUR and IFPRI.
- ii) Ensure data, including socially and gender qualitative and quantitative disaggregated data on household participants, is collected that allows participatory cost-benefit and gender analysis of the trials.
- iii) Undertake studies on: how technology is incorporated into existing household livelihoods; comparative case studies of household food allocations; household labour allocations including the use of hired labour following the uptake of SI systems.
- iv) Monitor and learn from scaling approaches of development partners, specifically bilateral USAID-supported partners, NAFKA in Tanzania and INVC in Malawi.

Data collection and use

PMMT: Despite training being provided and increasing use of the data storage/retrieval system, some scientists report being unaware of how it operates. This requires reminders of storage protocols together with refresher capacity building, especially where staff changes have occurred. Consideration also needs to be given to how CG data, NARS and University generated data can be incorporated (or not) into Africa RISING's data base, especially when research undertaken within Africa RISING forms part of a wider research Program as with crop breeding.

Recommendations

- i) Encourage appropriate use of PMMT by scientists, through refresher training and addressing concerns of access for publications.
- ii) Follow up on data sharing between different institutions and incorporating data from different sources including NARS and Universities into the PMMT.

Communication and knowledge management: Much of the communication strategy to date has been targeted at higher level stakeholders including USAID and research partners rather than project participants on the ground. At the same time HQs of some NARS indicate that they have limited information on the project.

Recommendation:

- i) Target, develop and distribute communication material to national stakeholders, R4D platform partners (district, village, men, women and youth), farmers and beneficiaries of nutrition

programs. Particularly important will be feedback on research results and gender-based best practice guidelines in a form easily understood by farmers and non-literate individuals. These should aim at strengthening links to reinforce the Program, deliver project outputs and outcomes as well as documenting success stories.

- ii) Consider in-country learning events for national stakeholders.

Partnerships

An impressive number of partnerships have been established and are being consolidated. These include CG centers, National Research and Extension Institutions, Universities, NGOs, CBOs, farmer organisations and farmers as well as USAID-funded development projects. Most are working effectively and contributing to Africa RISING outputs. However absence of a base-line institutional analysis at both district and community level has meant that important partners may have been missed and consequently past experiences not used. This includes the NGOs Farm Africa in Babati, INADES in K & K, and linkages with other research projects in Malawi. At the same time partnerships with the private sector have been limited. Clearly the R4D platforms are integral to the establishment of sustainable partnerships, requiring support and facilitation.

Recommendations

- i) Agree a clear vision of Africa RISING research and scaling pathways through R4D platforms that begin with farmers and other partners in both the design and roll out of the research agenda, as well as promotion and dissemination of research outputs.
- ii) Encourage development partners, both NGO and private sector, to establish demonstration plots in accordance with researcher designed protocols for baby trials in communities adjoining Africa RISING target communities as with NAFACA in Tanzania.
- iii) Ensure two-way feedback of research results to and from R4D platforms and farmers to establish priorities for the remainder of this phase of the project as well as priorities for the future.

Management

Achievements include the establishment of a project steering committee for approving research activities; a recently appointed “Science Advisory Group” at program level to advise a “Program Coordination Team” comprised of the three implementing institutions IITA, ILRI and IFPRI, and USAID, who coordinate topics across the three regions; contractual arrangements between partners are in place and reporting systems have been established. It will be important that each committee/group/team plays their role and over-bureaucratization is avoided.

The Africa RISING team has recently been strengthened by the recent recruitment for both WA and ESA of an agricultural economist based in Ghana, communication specialist based in Nigeria and gender specialist based in Tanzania. Their roles are important in delivering the review recommendations, but additional in-country support is likely to be required in building a “community of practice” for socio-economic input.

Other challenges identified included delays in finalising inter-institutional agreements, lack of information and coordination amongst some WTs.

Recommendations

- i) Address the institutional arrangements related to mode of operations, fund transfers and reporting schedules by ensuring an accountable, responsive funding and reporting system that maximises timeliness in line with seasonal requirements, especially when pre-financing by NARS is not possible.
- ii) Ensure that absence of in-country CG partners does not result in clumsy sub-contracts. Where national institutions have limited capacity greater use of local regional consultants should be considered. At the same time budgets need to be closely matched with expected work.
- iii) Encourage more integrated activities ensuring team work is committed to Africa RISING outcomes and holds team members mutually accountable, through regular meetings and seminars to share the expertise allowing lessons to be shared with other R&D partners.
- iv) Ensure CG centres work closely with NARS scientists. This goes beyond joint planning and implementation, graduate training, and short-term courses but should include improved communication, mentoring and encouraging joint ownership of research results. Where NARS have limited capacity use of local regional consultants is justified.
- v) Improve links / encourage two-way communication with NARS HQs (DARS, MoAFS in Malawi, and DARD, MAFCO in Tanzania).

Availability of human resources

It is recognised that capacity limits are present at all levels, some of which are being addressed, while others will require priorities to be established. All work themes involve a number of scientists, sometimes with limited time allocated to Africa RISING. Long distances between workstations and research sites, especially K&K, exacerbated by inadequate transport are costly in terms of researcher time for both CG and national partners.

Recommendations

- i) Minimise the number of short-term/ part time senior researchers through hiring sufficient senior technical staff, with a full time coordinator at each project site.

Contribution to the Humidtropics and Dryland CRPs

The review team recognises that IITA is required to map Africa RISING ESA and WA onto the Humidtropics CRP and ICRISAT is required to obtain approval for Africa RISING research activities from management of Dryland Systems and Water, Land and Ecosystem CRPs. Equally, Africa RISING research has a contribution to make to both Humidtropics and Dryland Systems CRPs, as well as the USAID "Feed the Future" Program.

Recommendation

- i) The team is of the view that the future of Africa RISING lies in maintaining linkages with Humidtropics and Dryland CRPs, but should retain its separate identity.

Research development for a next phase

The review team recognises that a number of the recommendations made for existing or new activities are unlikely to be implemented before 2016, especially as new problems and opportunities emerge from ongoing work. It will be essential that the review recommendations are prioritised by the R4D platforms in line with farmer requests with work that can be concluded in the next 18 months given priority. This means that recommendations for completely new work are best addressed in a next phase. Key activities for this will be:

- Participatory monitoring with a strong gender component, technology use, developing and implementing a plan for learning and clearer targeting.
- Strengthening work on crop-livestock integration.
- Addressing year-round livestock feed, health and management issues.
- Addressing wetland use and irrigation potential for high value crops including community-based seed production.

Introduction

As part of its “Feed the Future” initiative, the United States Agency for International Development (USAID) is supporting an innovative multi-stakeholder agricultural research program, “Africa Research in Sustainable Intensification for the Next Generation” (Africa RISING). The Program’s main objective is to identify and validate scalable options for the sustainable intensification of key African cereal-based farming systems to increase food production and improve the livelihoods of smallholder farmers and at the same time conserve or improve the natural resource base.

Africa RISING is a 5-year research program launched in 2011 as three regional projects, bringing together a wide range of research and development partners from the CGIAR and national agricultural research and extension systems, farmers, NGOs, input and output dealers and policymakers to develop technology options and management practices to better integrate crops (cereals, legumes and vegetables), livestock and grasses, trees and shrubs in mixed-farming systems with the aim of improving farm productivity, nutrition and incomes of small-farm families without degrading the environment.

Africa RISING’s purpose is to provide pathways out of hunger and poverty for smallholder families, particularly for women and children, through sustainably intensified and diversified farming systems that sufficiently improve food, nutrition, and income security and conserve or enhance the environment. It also aims to develop innovations that effectively link farmers to input suppliers and output markets. The three projects are located in: the Guinea and Sudan Savanna Zones of West Africa, led by IITA, the Ethiopian highlands, led by ILRI and sub-humid and semi-arid area of East and Southern Africa, led by IITA. The program has been organised around three research outputs namely:

Situation Analysis and Program-wide Synthesis, which includes activities necessary to ensure that technological interventions address farmer identified constraints and opportunities, and to develop a program-wide synthesis related to the lessons learnt across the three projects. This includes activities to ensure that project is able to characterize and stratify target communities effectively so that promising interventions are identified and inappropriate interventions rejected. This will also allow for the identification of existing sound practices within communities that might be more widely propagated, the adaptation of these and other, exogenous innovations, and the more effective combination of innovations from multiple sources.

Integrated Systems Improvement, which is being delivered through participatory research to increase productivity, incomes, and natural resource management of farming systems. The first two outputs are expected to generate integrated technology combinations targeted at opportunities that meet farmer’s development needs and interests. In ESA Africa RISING focuses on cereal-legume-vegetable-livestock production systems.

Scaling and Delivery of Integrated Innovation, which comprises the development of approaches for scaling-up systems innovations to similar development domains. This third output recognizes that, even where technology combinations can be identified, the approaches used for scaling them out may not always be effective and seeks to redress this shortcoming. A fourth output, considered the responsibility of IFPRI, relates to assessing the economic and environmental impact of the project activities across the three Program projects.

Review purpose and process

Review purpose

The purpose of this review, where field activities are in the third full season are still ongoing, has been to focus on assessing the conformity of the implemented work with the Program research framework, evaluating how the project is fostering learning by stakeholders, including farmers, set against the achievements of the expected outputs and outcomes. The review has identified challenges, the implications for the research program of the management structure at project and program level, the contributions of existing partnerships for implementation of activities, and assessed the availability of human resources for project implementation.

The review team has also considered the extent to which learning experiences from past programs in the intervention areas are being considered. Current identification of data gaps and issues of data handling and sharing among partners have also been part of the review. Since IFPRI has prime responsibility for M&E, the contributions of these activities to the project's research agenda have also been considered. The specific terms of reference for the review are shown in Annex 1.

The review has been based largely on the 2014-16 work plan, which built on activities undertaken during 2013-14 and 2012-13, addressing evaluation questions provided in the TOR. The results are intended to allow Africa RISING management and its partners make necessary adjustments before entering the final year 2015-16 and for looking forwards to a possible second phase.

Review process

The review process included a review of literature and telephone/skype discussions with key stakeholders not met during the Review Team's 3-week visit in ESA. The visit included 13 days in Tanzania and eight days in Malawi, at the end of which a briefing was provided to Africa RISING scientists and management. The review process included:

- *Document Reviews:* This included project documents held at the coordination office and material assembled by partners since the start of the project, also available on the PMMT. These included work plans and themes, reports, baseline data, research protocols and data analysis documents.
- *Key Informant Interviews:* These included researchers of Africa RISING in ESA, Africa RISING management and governance staff (some members of the Steering Committee and PCT members), the IITA director for East Africa, IITA country representative for Malawi, USAID missions in Tanzania and Malawi.
- *Stakeholder analysis:* This was used to determine the effectiveness of partnerships and institutional collaborations forged between IITA and its partners.
- *Visits:* to project sites in Tanzania and Malawi, where discussions were held with Africa RISING partners and research trials were visited in a number of villages in each District where the project is working.
- *Discussions:* with District Councils members, Villages Executives and farmer groups at the project sites visited.

The review Program and the people interviewed are shown in Annex 2 and Annex 3. Challenges experienced during the review included the lack of an initial proposal and logframe from the outset and the need to draw together a coherent analysis of three contrasting programs in terms of their history, the players involved and program roll-out, together with a tight itinerary.

Project design and implementation strategy

Project design

Africa RISING activities in ESA were initiated in 2012 and are planned to last until September 2016. Three year's work have almost been completed with one season 2015-16 remaining. Although the project commenced with no implementation plan and no identified research sites, the program is now based on four research and development-oriented objectives, these being:

- *Identification and evaluation of demand-driven options for sustainable intensification*, that contribute to rural poverty alleviation, improved nutrition and equity and ecosystem stability
- *Evaluation, documentation and experience sharing* with approaches for delivering and integrating innovation for sustainable intensification in a way that will promote uptake beyond the Africa RISING action research sites
- *Creation of opportunities for smallholder farm households* within Africa RISING action research sites to move out of poverty and improve their nutritional status – especially of young children and mothers – while maintaining or improving ecosystem stability.
- *Facilitation of partner-led dissemination of integrated innovations* for sustainable intensification beyond the Africa RISING action research sites.

Initially Africa RISING-ESA had been regarded as independent from the other two Africa RISING projects in Ethiopia and West Africa. However, shortly after initiation USAID requested the three projects to operate as a single Program using a similar research approach, learning from each other and delivering similar outputs and outcomes. These feed into USAID's "Feed the Future" and its goal of "sustainably reducing global poverty and hunger through improved agriculture sector growth and improved nutritional status particularly of women and children"

During 2012, IITA commissioned 10 "jump starts" projects to generate information that would inform the design process for use in a longer-term project. These included: value chain analyses (IITA); improved post harvest technologies in Tanzania (CIMMYT); "evergreen-agriculture" for maize-based and pastoral systems (ICRAF); identifying efficient seed systems (CIAT and CIMMYT); multiplication of breeders and basic seed for maize and legumes (ICRISAT, CIMMYT and CIAT); quantifying mycotoxin problems in Tanzania (IITA); a catalogue of tested soil and water management options in Tanzania and Malawi (CIAT / TSBF); capacity building in rice weeds management seed production (Africa Rice); use of conservation agriculture in maize-based farming systems in Malawi (CIMMYT and TLC); and enhancing vegetable production in rice-based production systems in Tanzania (AVRDC).

During implementation of the "jump starts", Africa RISING staff of the three regional projects developed the Program framework as a guide for the three regional projects. At the same time partnerships were developed with outputs from some of the jump starts leading to field activities in 2012-13. Stakeholder consultations and workplan development meetings resulted in a workplan centred on five outcomes: i) Improved crop-livestock production; ii) Improved nutrient recycling; iii) improved water management; iv) Improved nutrition of women and children and; v) improved partnerships and capacity building. A research implementation plan (IITA et al, 2012) for the three Africa RISING projects identified approaches and included five key principles:

- The research will be designed to test a set of hypotheses linked to outputs and developmental outcomes.
- Research activities will be problem-focused and driven by changes in market demand, evolving policy environments and meeting the needs of farmers.

- A set of guiding principles to ensure that research outputs are targeted on development needs and are feasible for target farm households to implement.
- Core research outputs should be common across the program; using methods and tools that can be applied flexibly.
- Scaling-up will be embedded in the Program at a pilot level and beyond, through the development of investment plans with development agencies.

Output 1 (situation analysis and synthesis) include: community mobilisation, establishment of research-for-development (R4D) platforms, characterisation of Africa RISING sites, compilation of an inventory of innovations and identification of entry pathways for different household typologies.

Output 2 (Integrated systems improvement) include a number of work packages during 2012-13 and 2013-14, these being merged into a number of interrelated work themes for the remaining two seasons 2014-15 and 2015-16 (

Table 1). Since these have been configured differently for each site they have been grouped by systems component for this review (Table 2).

Output 3 (Scaling and delivery) activities include delivery, lesson learning, networking and coordination, and capacity building of scientists for data management and analysis.

Two project documents have provided a framework on which this review is based. The first (IITA, 2014) provides a detailed project log-frame (Annex 4) defining the purpose with nine outputs, each with related activities in line with the three Program outputs. The second (IITA, 2015) provides an overview of project development and management bringing together earlier thinking and providing an “ESA theory of change”. Although outputs are clearly defined, there remains a need to revise the indicators and develop time, quality and quantity targets for each output using baselines from completed surveys as well as implementing an accompanying gender analysis to identify gender indicators.

Challenges: The lack of a project proposal at the inception of the project caused and still causes some difficulties. Each project site, Babati, K&K, D&N, each with its own management uses a slightly different logical framework based, as expected, on differing technology development stages and institutional approaches, but making review complex. In addition there is some confusion about how the three ESA sites and the Africa RISING ESA project interrelate. As a consequence a lack of clarity on how intended outputs contribute to a common purpose is still apparent among some partners.

Way forward: In light of the experience gained to date, the logframe requires updating using measurable and gender sensitive indicators and targets guided by a “theory (or hypothesis) of change” The K&K Logframe can be used as an example in this regard. The updating will help in both prioritising activities for the remainder of this project phase and confirming ideas for the future.

Table 1: System components, jump starts projects, work packages and themes by area, 2011-2016

System	Components	Jump starts	Babati			K&K			D&N		
		2011-12	201 2- 13	201 3- 14	201 4- 16	201 2- 13	201 3- 14	201 4- 16	201 2- 13	201 3- 14	201 4- 16
Crops	Situation analysis Trade-off analysis					WP 6			WP 1 WP 2		
	Genetic intensification	Seed systems				WP 1		WT 1			WT 1
	Soil fertility	Breeders and basic seed	WP 1	WP 1	WT 1	WP 2	WP 1	WT 2			WT 1
	Agronomy		WP 2		WT 1			WT 2	WP 3	WP 1	WT 1
	Phosphorus application		WP 4								
	Integration of beans									WP 2	WT 1
	MLN			WP 2	WT 5			WT 1			
	Field control of aflatoxins				WT 4						
	Vegetables	Vegetables in rice systems		WP 6	WT 3						
Rice	Rice weeds management										
Livestock	Fodder, Dairy and goats		WP 3	WP 3	WT 2	WP 5			WP 3	WP 3	WT 2
	Indigenous chickens			WP 8	WT 2	WP 5	WP 3				
NRM	Water & nutrient flows	S&WM options		WP 7	WT 1	WP 3	WP 2	WT 2			
		Conservation agriculture Evergreen-agriculture									
Post-harvest	Mycotoxins	Quantifying mycotoxins	WP 5	WP 4	WT 4			WT 3			
	Nutrition	Improved post harvest technologies	WP 6	WP 5	WT 4	WP 4	WP 4		WP 3	WP 4	WT 3
Scaling & Cross cutting	R4Ds	Partnership building Value chain analyses		WP 9	WT 6		WP 5&6	WT 4	WP 4	WP 5	WT 4

Table 2: Output 2, systems components by project site

System components ¹	Tanzania, Babati District	Tanzania, Kongwa and Kiteto Districts ²	Malawi, Dedza and Ncheu Districts ²
Crops and crop management	<ul style="list-style-type: none"> - crop management efficiency (varieties and practices for utilisation of local nutrient sources) - management of MLN disease - aflatoxin and fumonism control using aflasafe - integration of vegetables into maize-based systems 	<ul style="list-style-type: none"> - packages for genetic intensification (legumes, cereals with emphasis on QPM), - integrated crop, soil health and livestock packages for ecological competitiveness as shown under NRM 	<ul style="list-style-type: none"> - integrated maize-legume production systems, - <i>best-bet options in maize-legume systems</i>
NRM and	<ul style="list-style-type: none"> - fodder and watershed/landscape management 	<ul style="list-style-type: none"> - Integrated soil fertility management, soil and water conservation including fanya juu, shelterbelts and in-situ water harvesting) 	<ul style="list-style-type: none"> - Fodder establishment - livestock-intensification for goat and dairy production
Livestock	<ul style="list-style-type: none"> - integrated management of poultry into the farming system - Development of feed resources 	<ul style="list-style-type: none"> - Indigenous poultry - Development of feed resources 	
Post harvest	<ul style="list-style-type: none"> - food storage, value addition and mycotoxin management 	<ul style="list-style-type: none"> - aflatoxin mitigation to improve food and nutrition security and market competitiveness 	<ul style="list-style-type: none"> - nutrition status improvement, diversification and food processing,
Innovation systems	<ul style="list-style-type: none"> - institutional cooperation and co-learning, through R4D platforms. 	<ul style="list-style-type: none"> - socio-economic intensification through IPs. 	<ul style="list-style-type: none"> - R4D platforms for dissemination, impact and networking.

¹Socio-economic and gender analysis cutting across all sites was intended to be undertaken within Output 1.

²In Babati NRM and development of feed resources are closely linked, while in K&K NRM is an integral part of crop management practices and in Malawi NRM cuts across crops and livestock

Implementation strategy

Africa RISING ESA's implementation strategy planned for participatory identification of research activities to address challenges and opportunities through development-orientated R4D platforms involving partners from public, NGO and private sectors as well as community based organizations. The approach was intended to facilitate community engagement, joint planning, joint experimentation and evaluation, ensuring buy-in and ownership by partners, using appropriate participatory communication tools. These approaches were designed to ensure sustainability and effective scaling-up involving local stakeholders.

Presently Africa RISING ESA operates in 11 villages across three Districts in Tanzania (Babati, Kongwa and Kiteto) and 25 intervention villages in two Districts in Malawi (Dedza and Ncheu) (Table 3). These cover sub-humid and semi-arid AEZs at low, medium and high altitudes with varying annual rainfall and distribution. IITA manages the Babati site, ICRISAT the K&K site and MSU the D&N site in Malawi.

TABLE 3: LOCATION OF AFRICA RISING RESEARCH SITES, DISTRICTS, VILLAGES AND AEZ

Country, Region or District	District	Village	AEZ
Tanzania, Regions		11 villages	Sub-humid highlands
Manyara	Babati	Long ¹ , Sabilo, Seloto ¹ , Hallu, Matufa, Shaurimoyo	1200-2200 masl 750-1200 mm annual rainfall
Manyara	Kiteto	Njoro ¹	Semi-arid lowlands
Dodoma	Kongwa	Chitego, Moleti, Mlali ¹ , Laikala	500-750 mm annual rainfall
Malawi, Districts	Extension Planning Areas & Sections	26 villages	High, medium and lowlands
Dedza	Golomoti ¹ & Linthipe ¹ Golomoti Centre & Mposa	Kalumo, Msamala, Pitala, Wilson Chibwana, Mbidzi, Mkuwazi, Ng'anjo, Phwere	500-1500 masl 700-1200 mm annual rainfall
Ntcheu	Kandeu & Nsipe ¹ Kampanje & Mpamadzi	Kasese, Zoyoyama, Kampanje Center, Kanjusi, Kazputa, Darika, Gonde, Koneba, Sereman, Mitchi Amosi, Champiti, Gwauya, Hiwa, Malaswa, Nzililongwe	

¹EPAs and villages visited during the review

On-farm research activities comprise a "mother-baby-spill over" or "mother-daughter-granddaughter" approach managed by researchers, researchers and farmers, and farmers only. These compare intensified practices with farmers' practices and demonstrate new technologies and combinations of technologies through farmers' field days, farmers' field schools and exchange visits. They are also used to train farmers, extension and research assistants. In many villages trials have been clustered providing "Technology-Hubs" linking research and development activities. This

encourages further demonstration and farmer testing and adaptation in spill-overs through a farmer-to-farmer extension process. Links with USAID mission-funded projects are proving to be ideal for these purposes.

Strengthening human capacity at all levels from farmers and their associations' officers, development workers, field and laboratory technicians, scientists and policy makers forms an important component of the project. Academic training at MSc and PhD level focuses on research to address important knowledge gaps, and to develop 'second generation' technologies that may be suited specifically to particular recommendation domains and/or farmer typologies. Gender awareness and gender equity, youth and under-privileged groups within society are intended to be considered in all project activities. Barriers to participation of women are also intended to be reduced by offering interventions that lie within their interests with women groups being supported to enhance the potential of their collective action in their commercialisation of small-scale agriculture.

The scale of implementation varies from plot to farm scale and from household to community level with results and outputs designed to be extrapolated to larger scales and recommendation domains for other areas and countries with similar agro-ecology and socio-economic environments using modelling, Geographical Information Systems (GIS) and Remote Sensing techniques.

Challenges:

- In some sites research trials are scattered providing less opportunity for farmer learning, compared to where they are concentrated and in close proximity.
- Although R4D platforms have been being established, their intended role is only now becoming apparent. Consequently research activities were supply-led in the early stages but as farmers have become involved often on District R4D/IPs they have become increasingly demand driven.
- Gender awareness, gender equity, youth and under-privileged groups have generally not yet been considered in most existing activities with other suitable development initiatives not being identified.

Way forward:

- Implementation strategy should continue to encourage, where feasible, expansion of technology hubs, linked to both babies and demonstrations established by development partners (not only USAID) in neighbouring communities to provide wider learning opportunity. This will promote further scaling out, as envisaged, through encouraging farmers to learn from each other.
- The process of R4D platform involvement at village and district level requires to be strengthened so that they can play their intended roles.
- Greater attention needs to be given to gender, youth and the needs of under-privileged groups.
- Each site should ensure their activities are linked to those of the RD4 platforms creating greater ownership in annual learning cycles (engagement, joint planning, implementation, learning and review), each feeding into the next. This requires clear guidelines and membership of R4D platforms with appropriate facilitation by a platform development partner, where capacity permits.
- Close linkages should be established between village/community and district level IPs.

Progress towards outputs and realistic 2016 achievements

This section's is based on Africa RISING's expected Program Research Outputs and Outcomes as determined by ESA's Africa RISING Project Outputs and their associated Work Packages and Themes. Progress, challenges and ways forward have been identified for each broad Theme addressing what can be realistically achieved by 2016. It is noted that 2015-16 is the last season of the current Phase of Africa RISING with some outputs only being feasibly delivered post 2016.

Program output 1: situation analysis and program wide synthesis

This Program Output addresses challenges of community mobilization, establishment of R4D platforms, identification of potential innovations and entry pathways for different household typologies.

Africa RISING ESA identified four project Outputs to deliver Program Output 1, which includes socio-economic and gender support across all Program outputs.

ESA Outputs	Main Activities	Deliverables
1. Intervention sites identified at an appropriate level, and characterized.	<ul style="list-style-type: none"> - Site selection - Survey to identify development domains - Surveys to identify biophysical constraints 	<ul style="list-style-type: none"> - 11 action villages identified in Tanzania, and 4 Extension Planning Areas in Malawi - Agricultural Land use potential identified by project implementing institutions - IFPRI base-line survey
2. Farm households characterized and typologies in intervention sites determined	<ul style="list-style-type: none"> - Community analysis - Jump start projects - WUR farming systems survey 	<ul style="list-style-type: none"> - Documented over-arching community constraints/challenges - Operational farm typologies identified for use in targeting interventions
3. Potential impact of various SI technologies in different development stages assessed	<ul style="list-style-type: none"> - Literature review / jump start projects - Identification of potential SI interventions with ex-ante economic analysis 	<ul style="list-style-type: none"> - Inventory of available potential technologies - Inventory of promising technology options for enhanced system productivity derived from <i>ex ante</i> and <i>ex post</i> evaluation and simulation modelling - Recommendations to inform the design of integrated programs involving agriculture and environmental conservation
4. R4D and Innovation platforms influencing stakeholder practices established	<ul style="list-style-type: none"> - Engage partners - Planning and learning workshops 	<ul style="list-style-type: none"> - At least one R4D or Innovation Platform constituted in all ESA Action Sites - Platform action plans agreed by all stakeholders

Progress towards delivering Program Output 1

Ideally this output would have been completed before Output 2 was initiated in order to provide a baseline, allow for partnership building, community mobilisation and R4D platform establishment. Although this was not possible due to the implementation process, steady progress has been achieved.

Intervention sites, development domains and baseline surveys: Two action districts in Tanzania (Kongwa in Dodoma Region, Kiteto in Manyara Region) were selected based on the presence of NAFKA, a USAID-funded Feed-the-Future (FtF) activity operating in many villages in these Districts. The third action district, Babati in Manyara Region, was selected based on targeting research in a different AEZ, as well being a potential future NAFKA site. In Malawi, sites were pre-selected by MSU based on-going research activity, as well new sites to ensure research across a wide range of AEZ. Detail of sites was shown in Table 3 in the last section.

Surveys: IFPRI's baseline survey started in Malawi during July 2013 and in Tanzania later the same year. Both have been completed and results are now available. In addition discipline-specific surveys were conducted prior to IFPRI's baseline, concurrently with Output 2 research activities. These included:

- Soil health and characterization
- Farmers' maize yields and management practices
- Livestock feeds and feeding systems using a Feed Resource Assessment Tool (FEAST)
- Factors contributing to high postharvest losses including mycotoxin contamination
- Socio-economic characterization of vegetable production and consumption patterns
- Plant disease and pest monitoring providing information on pests and diseases of maize and common bean, including MLN
- Economic, social and institutional constraints to technology adoption in Malawi

Farm households characterized and typologies determined. A Farming Systems Analysis study was completed by WUR during mid-2014 that characterised farming households and identified a farm typology and potential intervention areas, including:

- *Tanzania:* education and knowledge to make better-informed decisions, pest and disease management, cash crops and agricultural diversification, improved livestock feed and improved manure storage.
- *Malawi:* improving quality and quantity of manures, improved crop residue management, doubled-up legumes, encouraging seed saving and livestock intensification and fencing of crop fields, although the last intervention is largely impractical and high cost.

Potential impact of various SI technologies in different development stages assessed. Although the "Jump start" projects and surveys provided useful information on potential technologies, it would be useful to synthesize from these an inventory of potential technologies which can be subjected to ex ante and ex post evaluation to inform farm systems analysis and future trials.

Socio-economic support. This Output is expected to provide socio-economic including gender analysis support to Program Output 2 by drawing together the themes under test. Little analysis has yet taken place. Participatory budgeting comparing farmer and new practices as set out in research protocols needs to be undertaken both when protocols are designed and after trials have been completed, providing *ex-ante* and *ex-post* analysis.

Farm system models. The WUR study is intended to provide a basis for detailed diagnosis and exploration of promising technologies. This also needs to consider gender-based households typologies for targeting in scaling approaches. Participatory budget economic data could feed into

the system components and different farm types. This can then lead into the proposed trade-off analysis within the models.

R4D and Innovation platforms influencing stakeholder practices established: District-level R4D Platforms have been established across all Districts, although they remain at an early stage of development. Their role both in ensuring that research is demand led and appropriate development activities are initiated cannot be overstated. The strategy for scaling, or achieving ‘increased adoption of technologies’ will depend on full participation of partners in the R4D Platforms. These need to be established not only at District but also Community or Village level, the former concerned with strategy and the latter operational issues. Both will require on-going facilitation to ensure appropriate representation, objective setting, agreement on roles and plans, and regular meetings to assess progress. Achievements and challenges from ongoing research needs to be presented / communicated to the platforms in an easily understandable form with agreed ways forward, based on priorities agreed by the platforms. It is through the platforms that development partners can be encouraged to support scaling of successful research in adjoining areas. Participatory monitoring and learning from progress with R4D platforms will be important so that corrective action can be taken where required.

Specific commodity value chain stakeholders can also be identified and linked through the R4D platforms and encouraged to identify opportunities for addressing input and output marketing and processing constraints.

Challenges	Ways Forward
Delays in producing base-line data by IFPRI and farming systems work by WUR has meant that their input has not yet been used	Synthesize from the surveys an inventory of potential technologies which can be subjected to evaluation to inform farm systems analysis and future trials
Lack of cost benefit and gender analysis (participatory budgeting, gross-margin and partial budgets) that includes disaggregated labour requirements and costs	Undertake cost-benefit and gender analyses of technical 'solutions' identified for participatory testing as routine procedures to be undertaken both before and after farmer testing.
Limited attention given to possible gender inequity arising from changes in production systems, and gender-specific programming that entrenches women in the domestic sphere with little scope for their advancement.	<p>All partners need to engage in developing a gender strategy that should involve the collection of sex disaggregated information, on participants and others, and move beyond seeing women as the focus of a gender strategy.</p> <p>As part of this strategy, the program needs to question assumptions about women's and men's roles, needs and interests, and to seek to identify areas of ongoing change that may or may not be beneficial for everyone involved.</p>
Encouraging major actors, NGOs and the private sector to participate or continue participating in IPs (including Farm Africa and Minjingu Fertiliser Company in Babati, and INADES in K&K)	Provide the motivation through IP facilitation to ensure each stakeholder participates in identifying and implementing activities related to their role in the development process.
Weak links between District A4D platform with village level committees	<p>Establish R4D platforms at two levels, District (strategic) and Village (operational),</p> <p>Provide facilitation for R4D IPs, ensuring linkages between the two levels of IPs.</p>
Platform establishment can be reduced to a bureaucratic procedure leading to the concentration of power of existing power holders, especially for platforms established at village level, where the number of members in a position to 'make change happen, is likely to be small.	<p>Platform functions and links between platforms formed at different levels need to be clarified avoiding bureaucratization of innovative process.</p> <p>Provide facilitation for platforms by experienced local language speakers</p>

Program output 2: integrated systems improvement

This Program Output addresses challenges relating to: Improved cropping and crop-livestock cropping systems; land management strategies to intensify crop-livestock production; agricultural water management for intensive crop and livestock production; improving cattle, sheep and goat production; intensifying rural pig and poultry production; and technologies to improve household nutrition.

Africa RISING ESA identified a number of integrated Work Packages (WPs) and Work Themes (WTs) to deliver nine project outputs for the WPs (2012-2013 and 2013-2014 workplans) and five outputs for WTs (2014-2016 workplan). Although the configuration of the themes varies between countries and Districts, they have been grouped together for this review, broadly under crops, livestock, NRM, postharvest and nutrition. The WTs for each District are shown in boxes immediately above the project outputs and activities related to the WTs, along with the deliverables expected by September 2016.

CEREAL-LEGUME-VEGETABLE-LIVESTOCK-EMERGING PROBLEM WORK THEMES

CROPPING SYSTEMS

Work themes

Babati: Crop management efficiency, Integrated livestock and watershed/landscape management, Integration of vegetables into maize-based systems, Management of MLN disease

K & K: Packages for genetic intensification, integrated crop, soil health and livestock technologies for ecological competitiveness

D & N Integrated maize-legume production systems

Outputs	Activities 2014-16	Deliverables 2016
Output 5: Innovations that increase resilience and productivity of farming systems deployed and Output 8: Innovations that address emerging agricultural production challenges (MLND) deployed	Crop management - Introduce and evaluate new improved crop and crop varieties for use in study sites	- Inventory of new crops and new varieties (Best-bet technologies) grown by farmers - % of farmers growing at least one new variety or type of crop in each intervention site - Acreage under new ecologically and economically sound practices per intervention site ¹ - MLN resistant/tolerant hybrids fast tracked and appropriate management practices developed (Tanzania) - Integrated crop-livestock innovations increase productivity by 25%
	Vegetables - Introduce and evaluate new vegetable varieties MLND - Technologies addressing MLND challenge evaluated and promoted	

¹This deliverable is likely to be delivered post 2016 after cost-benefit and gender analysis of technologies have shown they are suitable for promoting to scale.

Progress in delivering outputs

These WT address challenges of genetic intensification, testing new varieties of cereals, beans (dwarf and climbing), cowpeas, groundnuts, pigeon pea, soya beans, inter and double cropping of legumes, alternative fertiliser and manure management combinations, the use of aflasafe in maize for aflatoxin control.

Several promising technologies included cereal-legume rotations, cereal-legume intercrop and doubled-up legumes have been developed along with complementary technologies that include different fertilizers applied at different rates and methods and integration with in-situ water harvesting and conservation technologies across the three sites.

In Babati, activities are being conducted at 308 sites of which most are technology adaptation evaluations and 54 are demonstration in nature. Trials include:

- **Crop varieties** selected on both agronomic performance and farmer assessment. Stress tolerant maize hybrids are being tested to identify adapted varieties for use in intercropping trials and for subsequent release. A micronutrient rich mid-altitude climbing bean and five drought tolerant bush-types have been tested under different fertilizer regimes with responses often being site specific, indicating the importance of targeting innovations.
- **Intercropping trials** of maize-pigeon pea with Minjingu Mazao fertilizer being the preferred source of P for maize, followed by Minjingu Phosphate rock (PR-granular) and Di-ammonium phosphate (DAP). Reasons given were prices for the Minjingu fertilizers being lower than DAP, easy access and the multi-nutrient composition of Minjingu Mazao. Response to manure use was generally low compared to inorganic fertilizers.
- **MLN disease control** undertaken in both Babati requires an approach that includes use of host resistance, strong sensitization on the importance of using certified seed, applying good agronomic management practices, good pest management, and inspection of fields to remove diseased plants at early stages and encouraging crop rotation and timely planting. Research activities have included:
 - Identifying MLN resistant varieties from available commercial, farmers and experimental maize varieties grown under high disease pressure.
 - Establishing the prevalence of MLN and identifying causative virus strains sampled from diseased maize plants in Africa RISING research sites.
 - Assessing the effectiveness of different cultural disease management practices in reducing MLN
 - Determining key biophysical factors of MLN epidemiology
 - Developing capacity for diagnosis of MLN viruses, including diagnostic lab and training
 - Identifying MLN resistant hybrids to be validated in 2015 and beyond, fast track release by including varieties in multi-location and National Performance trials for possible release in 2016.

It is apparent that a new phase will be required for commercialization and scaling of any released MLN resistant varieties

- **Aflatoxin bio-control** has been based on the use of *Aspergillus flavus* strains that do not produce toxins and naturally outcompete toxin producing strains, reducing their population and hence aflatoxins. Efficacy tests of the Tanzanian atoxigenic *A. flavus* have been recently conducted in two villages with eight strains being used for the tests. Currently 8-10 sites in each village are being treated in maize.

- **Vegetables** have recently been introduced following a baseline survey and sensitisation meeting, training, site selection and establishment of demo-trials. First results were available in late 2014. Integrating poultry improvement technologies with vegetables commenced in Feb 2015. Some early conclusions indicate tremendously increased vegetable yields compared to standard farmer practices, the need for good quality seed/healthy seedlings, integrated pest management, increased training to speed up technology transfer; training in farm business skills and postharvest handling to complement farm productivity and ensure diversified income and nutrient availability from vegetable integration

In Kongwa and Kiteto, 20 researcher-managed sites and 140 farmer-managed baby plots have been established. These include:

- **On-station trials at Hombolo and Makutopora research stations** for new unreleased material of pearl millet, bambara nuts and sorghum.
- **QP maize, sorghum, millet, groundnut, pigeon pea and bambara nut varieties** have been tested across five villages with improved varieties out yielding local checks. Farmers' preference is for high yields and early maturity, with resistance to pests, grain size, colour, taste being important for some crops
- **Optimum P rate trials for maize** established that 30kg/ha P is required for a yield range of between 4-5t/ha, but maize response to N fertilizer was poor, suggesting the existence of other compounding factors. Deep tillage improved yields with ox-ripper and ridger tillage increasing yields by 25% and 30% respectively, although higher yields were obtained with tractor drawn implements.
- **Identification of a number of component technologies** including crop varieties, soil fertility and water management technologies, as well as livestock and poultry based technologies.

In Malawi, Dedza and Ntcheu, 20 mother sites and more than 1300 baby trials were established in 2014-15. Trials comprise:

- **Legumes.** Cowpea, groundnut, soya beans, common bean, pigeon pea with different crop mixtures of maize/legume intercrops and legume–legume intercrops, a doubled-up legume technology based on different crop growth architecture. Farmers consistently ranked beans, groundnut, soybean and cowpea as good across all sites, but had reservations on long duration pigeon pea varieties as these required more labour to guard against animal damage after the main harvest period.
- Follow up work with 2013-14 baby farmers found that most (87%) were still participating with larger plot sizes and expanding their trials to new fields, often trying more than three technologies and creating new ones.
- **Different soil nutrient management regimes** comprising organic-inorganic nutrient mixes. Both are supported by student work on pigeon pea–soya bean systems with P fertilizer, above and below ground biomass additions in pigeon pea based intercrops, soil organic matter and farm management, and local processing and utilisation of grain legumes. Student work on goat nutrition was reported but was not seen in the field.

Nutrition workshops have been held in the action sites.

Challenges include

- Complaints from some farmers about late planting, although it is recognized that farmers spread their planting dates as a risk-reduction strategy and are often able to take advantage of early rains. Late planting was attributed to funding arrangements sometimes only being finalised after early rains.
- Lack of social, gender and economic analysis of trial protocols and results
- Soil erosion in genetic intensification and crop variety trials, especially in K&K
- The technical difficulties/process/duration for identifying MLN tolerant maize varieties
- Ensuring collaboration between Africa RISING ESA research activities and between other research projects operating in the same areas

Farmer concerns

- Ensuring fair compensation for farmers when research fails
- Seed and fertilizer availability and affordability with many farmers using recycled seed or grain purchased at markets combined with a lack of interest by seed companies in producing legume seed; non-availability of inoculants for soya beans
- Maize marketing difficulties as yields increase

Ways forward

- Developing stepwise SI recommendations, based on low, medium and high productivity options that reflect farmer typologies and are derived from ex-ante and ex-post socio-economic and gender analysis. This could use the context analysis (Figure 1) for this purpose.
- A critical lesson is that a context-specific approach is required that takes into account the fertility status of the soil, the availability of organic inputs and the ability to access and pay for mineral fertilizers. Making ISFM profitable also depends on output markets and the value of farm products. This varies enormously across sites, within AEZ and even between villages and fields (Figure).
- Given resource constraints of soil fertility inputs, both labour and cash, maximising the agro-economic efficiency of input use must be a key objective of soil fertility management. Without such an approach, resources will be wasted and production boosts may be inadequate.
- Encouraging closer integration of Africa RISING ESA R&D activities, through encouraging technology learning hubs in each District, where mother and baby trials are concentrated along with NRM demonstrations. Scaling by development partners can utilise these hubs for exchange visits, field days and farmer field schools supported by baby demos in other villages.
- Encourage cooperation with other research projects that may be operating in the same Districts, especially Malawi, for example with SIMLESA.

For a new phase

- Revisiting value chain analysis undertaken as Africa RISING “jumps starts” and undertaking others to establish opportunities for either research or development interventions. These should be presented to R4D platforms to prioritise and individual stakeholders to take forward.
- Addressing opportunities for potentially high value crops suited to each AEZ. These include potatoes in Babati, sunflowers in K&K, cotton in D&N. Although these may not be high priority for USAID, they often form part of the cereal-legume cropping system with opportunity for SI and increased incomes.
- Investigating the use of low lying wetlands (dambos in Malawi) for dry season high value crop production including vegetables and seed production.
- Expanding vegetable systems using schools as sites for demonstration and training.

- Introducing aflatoxin control practices in Malawi, linking with ICRISAT’s ongoing activities.
- Linking with seed regulators and inspectors for community-based QDS legume seed production, given the lack of interest by seed companies in legume and OPV vegetable crops.
- Encouraging input suppliers such as Minjingu fertiliser factory and agro-dealers to establish demos close to points of sale.

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Figure 1: Socio-economic and bio-physical soil fertility management context¹

Socio-economic context Profitability & affordability varies across households (between men and women) depending on socio-economic differentiation	High returns land tenure, market and other production constraints less important	Mixed strategy Organic and inorganic appropriate	Application of inorganic fertilisers appropriate market based
	Poor returns due to high input prices, low prices of farm products with poor market and transport linkages	Low external input options Mostly organic appropriate	Efficient application critical (such as micro dosing) market assisted
		Low Low organic matter, low rainfall	High High organic matter, high rainfall
		Bio-physical context Inherent soil fertility and potential	

¹Both axes can vary over very short distances, as agro-ecologies and market conditions change
Source: Adapted from Scoones, 2015.

LIVESTOCK SYSTEMS

Work themes

Babati: 2)integrated livestock and watershed/landscape management

K & K: 2)..... livestock technologies for ecological intensification

D & N 2)livestock intensification

Output	Activities	2016 Deliverables
Output 5 (continued) Innovations that increase resilience and productivity of farming systems deployed	Livestock - Introduce and evaluate new livestock breeds and management practices	- Inventory of new livestock breeds and types reared by farmers - % of farmers using ecologically and economically sound livestock husbandry practices ¹ - Inventory of ecologically and economically livestock husbandry practices used by farmers - Productivity of fodder trees and market potential determined, profitability of dairy production determined, increased participation in goat and dairy products - Integrated crop-livestock innovations increase productivity by 25%

¹This deliverable is better delivered post 2016 after cost-benefit and gender analysis of technologies have shown they are suitable for promoting to scale.

Progress in delivering outputs

To date these WT are addressing challenges of: i) improving feed supplies through testing alternative grass, fodder legume and tree species for cows and goats, which also improve NRM, and ii) improving indigenous poultry and integrating poultry with use of vegetable waste. They have not yet addressed the productivity of livestock and subsequent results of who benefits and how from varying livestock at household level.

Babati. The WT has focused on the integration of improved forages in existing crop livestock systems and the effect on field and landscape management, enhancing the use of crop residues through chopping, and utilizing local feed resources to enhance productivity of indigenous chickens. This included a situation analysis using FEAST with entry points being introduction of improved forages, enhancing utilization of crop residues and integrating indigenous poultry in existing systems. This has included:

- On-station screening at LITA, Tengeru, Arusha of 16 improved fodder (grasses, legumes and trees) and subsequent bulking at Tengeru Livestock Research Station in Arusha. These include improved *Brachiaria* varieties.
- On farm participatory research with new varieties installed on 9 farms in 3 villages.
- A community fodder nursery set up in each of the three villages, also providing learning space for farmers
- Demonstration of small scale mobile forage choppers for fodder and crop-residues chopping , tested with farmers after harvest
- Expanding more forage options and to new areas, costs and benefits of improved forages and model potential impacts of improved forages on farms and landscapes (CIAT)

- Expected outputs include at least two forage 'best fit' species suitable for target niches identified in different farming systems, packages for integrating forages into existing system and for processing and utilizing crop residues as well the impact of these on soil, water and nutrient cycles

K&K. Research includes two clusters (Cluster 3. Landscape based Agro-forestry Options and Cluster 4: Livestock - Crop integration)

- Cluster 3 concerns intercropping and double legume arrangements with *Gliricidia sepium*; shelterbelts and boundary tree planting; woodlots for fodder banks and wood supply; characterisation of grazing and management systems and improving grazing lands through planting with fodder trees; characterization of livestock management systems and improving feeding and nutrition with introduced exotic species generally outperforming indigenous species;
- Cluster 4 concerns characterisation of the indigenous chicken population and enhancing production on-farm through improved feeding and nutrition. Productivity of local chicken is limited by extensive management, poor housing, feeding and nutrition, diseases and lack of proper breeding, with improvement requiring knowledge on housing, feeding and nutrition, diseases management; community vaccinator - contagious diseases- New castle disease, a sustainable supply of chicks from parent stock among farmers with extra eggs consumed- improved health/ sold- income giving quick returns from sales of eggs, live chickens as well as nutrient recycling: manure- soil fertility & droppings for feeding ruminants and nutrient enrichment - aquaculture

Malawi: The WT, involving ICRAF and LUANAR has addressed the challenge of livestock feed as a major challenge to dairy intensification, with research including: an inventory of fodder species and areas; selecting and supporting 80 farmers (45% female) to establish fodder banks; nursery establishment, out-planting and collecting and analysing data such as number of trees, area of stands and leaf biomass yield. In addition 22 farmers were supported in establishing maize-grain legume-Tephrosia Intercropping trials. This included two mother trials (Maize, Tephrosia, pigeon peas, beans) and 20 baby trials

Limited work has so far been done on intensification of goat production and year-round feeding of dairy cows.

Challenges	Way forward
Some varieties of grass legume and tree fodder have proved unsuitable for the targeted AEZ (Lablab in highlands; Guatemala grass in semi-arid areas)	Use existing knowledge and/or experience in selecting varieties for introduction
Introduction of the Napier stunt disease in some nurseries	Ensure destruction of diseased material
Farmer concerns about the lack of seed or planting material	Take steps to accelerate planting material and fodder species availability through community-based seed/nursery production.
Insufficient availability of manure/compost/urine in quantities to meet that being applied in trials	SI of livestock practices to increase quantities of manure/compost/urine
The introduction of mechanisation for fodder cutting and preservation creates new issues	Address issues of ownership, financing, repair and maintenance
High mortality rates of young chicks indicative of the need to improve housing and management of young birds.	Ensure management problems are addressed as cost effective feeding packages are tested
Lack of integration of livestock activities with other components, especially in Malawi, although it is recognised that in many areas livestock ownership is very low	Ensure integration with other SI farming system components, where feasible
Agronomic management of introduced fodder species and their utilization in feeding packages not introduced to farmers	Ensure farmers are trained on management practices for optimum fodder production from fodder species (Leucaena, Desmodium, Gliricidia, Napier) as well as their utilization in feeding packages for dairy production (Babati, Dedza).

For a new phase there is a need to: i) Undertake livestock value chain analysis especially for dairy and goat production to identify opportunities for interventions that are considered by and prioritised by R4D platforms, ii) Develop livestock feeding packages through feeding trials to increase milk, meat and manure production working with existing dairy and goat groups and at the same time increasing manure and urine use on high value products, probably vegetables, and iii) Address livestock health problems, improving livestock housing and management practices.

NATURAL RESOURCE MANAGEMENT

Work themes

Babati: 1) crop management efficiency, 2) integrated livestock and watershed/landscape management,

K & K: 2) integrated crop, soil health and livestock packages for ecological competitiveness,

D & N 1) integrated maize-legume production systems

.Output	Activities	2016 Deliverables
Output 6: Crop-nutrition and water efficient innovations introduced, evaluated and adapted	<ul style="list-style-type: none"> - Test ecologically and economically sound integrated nutrient management practices for enhanced productivity without detrimental effects on the environment - Test ecologically and economically sound integrated land and water management practices for enhanced productivity without detrimental effects on the environment 	<ul style="list-style-type: none"> - % of farmers using external nutrient resources (organic/inorganic) efficiently - Inventory of improved land and water conservation practices used by farmers - Acreage under crop-nutrient and water efficient practices¹

¹This deliverable is better delivered post 2016 after cost-benefit and gender analysis of technologies have shown they are suitable for promoting to scale.

Progress in delivering outputs

These WTs address challenges of nutrient and water management (ISFM & SWC, landscape management, crop establishment and management practices (flat, tied ridges, rip, fanya juu as well as grass, legume and agro-forestry practices for fodder, erosion control and windbreaks)

Some elements have already been mentioned under the sections on crops and livestock. Other elements are addressed in this section.

Babati. Intercropping trials with maize-pigeon pea with Minjingu Mazao was the preferred source of P fertilizer by farmers for maize, followed by Minjingu (granular) Phosphate rock and then Di-ammonium phosphate (DAP). Reasons were: prices for the Minjingu fertilizers were lower than DAP, easy access and the multi-nutrient composition of Minjingu Mazao.

K&K. This concerned two clusters, integrated soil fertility management and integrated land and water management.

- Integrated Soil Fertility and Crop Management with activities being establishing the soil Fertility Status in mother research sites in KK, the development of fertiliser guidelines, optimum rates for semiarid agro-ecologies being 30 kg P/ha for phosphorus and 60 kg N/ha for nitrogen, with P micro-dose applications options . Training was provided on basic agronomy for ISFM technologies (fertilizer/manure use, intercropping, tillage practices, plant density, improved crop variety and other management practices) using demo plots.

- Integrated Land and Water Management technologies, showing rainfall runoff in ridged treatments being lower than with conventional ploughing, with maize yield increases relative to the conventional ploughing being 64 % higher for ripping and 107 % higher for ridging
- Engaging farming communities for large scale adoption of fanya juu, shelter belts and in-situ rain water harvesting

D&N. This includes work on different crop mixtures of maize/legume intercrops and legume–legume intercrops, a doubled-up legume technology based on different crop growth architecture and different soil nutrient management regimes comprising organic-inorganic nutrient mixes

Challenges	Way forward
Although important, long term monitoring soil and nutrient movements in the landscape with infiltrometers is unlikely to provide useable outputs work in a 5-year project , while run-off plots can provide an ideal demonstration	Providing guidelines on best practices with recommendations on the size of fanya juu, distances between contour bunds, best fodder varieties for bunds, their management and maintenance requirements
Soil erosion on mother trials, especially K&K	All trials should include best practice NRM to avoid soil erosion Demonstration and training sites should be established for different rainwater harvesting techniques in close proximity to mother-baby trial areas.
Serious land degradation especially in K&K Conflicts between crop farmers and pastoralists Free grazing of crop residues during dry months damaging grasses and trees planted along contours and in wind breaks.	Preparing a position/advocacy paper setting out the causes of degradation, the consequences of inaction and options for redressing the situation. The paper should be targeted at R4D District and community level platforms, with a view to involving Regional and National decision and policy makers in supporting village and District action plans. Options are likely to include the need for support of community-based nursery, tree and pasture establishment with community supported bye-laws for grazing control and protection of NRM practices, structures and management
High mechanisation/labour requirements for tied-ridge making,	These may be supported by farmers if the returns are high

POST-HARVEST STORAGE, VALUE ADDITION, FOOD PROCESSING AND NUTRITION

Work themes		
Babati: 4) Food storage, value addition and mycotoxin management		
K & K: 3) Aflatoxin mitigation to improve nutrition, safety and market competitiveness		
D & N 3) Food processing and nutrition		
Outputs	Activities 2014-16	Deliverables 2016
Output 7 Innovations that increase availability and consumption of safe and nutritious food products deployed	<ul style="list-style-type: none"> - Evaluate post-harvest approaches that minimize product losses and enhance quality - Mycotoxins mitigation technologies evaluated and promoted - Introduce and evaluate new vegetable varieties - Improve and diversify household nutrition product - Identify market oriented approaches 	<ul style="list-style-type: none"> - % of farmers using new/improved postharvest technologies to store produce and reduce pest infestation and losses in Tanzania - Inventory of mycotoxins mitigation technologies used by farmers in Tanzania - % of farmers growing new vegetable varieties/types - List of new vegetable varieties and types grown by farmers (Tanzania) - % of farmers growing QPM per intervention site - Acreage under QPM¹ - % and types of households with increased vegetable and QPM consumption¹

¹These deliverables are better delivered post 2016 after cost-benefit and gender analysis of technologies have shown they are suitable for promoting to scale.

Progress in delivering outputs

These WT's are addressing challenges of food wastage, grain storage and drying ensuring aflatoxin control, as well as mechanised shelling, food processing and improving nutrition with all deliverables in 2106.

In Babati this has included.

- **Mechanised maize threshing.** This saves time (500kg per hour) compared to traditional methods, reducing labour input especially by women as well reducing chances for mycotoxin contamination
- **Warehousing.** Large-scale storage of maize using the improved hermetic bag storage structure has been initiated in three villages with the aims of reducing losses due to storage pests (quarterly sampling), reducing risks for contamination with mycotoxins (quarterly sampling) and delaying sales to obtain better price (price monitoring),
- **Introducing high protein recipe involving common bean:** This is taking place in three villages (Long Seloto and Sabilo, raising awareness of nutrition problems (such as stunting, wasting, lack of protein in diets, etc), developing six highly nutritious foods with lab analysis of nutrient densities, supporting the establishment of pilot processing, community-based nutrition training.
- **Aflatoxin and fumonisin work** has involved quantification in maize and beans in field and store, agronomic practices associated with aflatoxin and fumonism contamination have

been assessed across three villages as well as assessing post-harvest losses in maize in three storage structures.

- **Assessment of nutritional status of the diet for children.** This has examined the possible impacts of food losses and high mycotoxin in foods, insufficient household foods, poor quality of nutrients in household diets, unsafe foods and malnutrition in children less than five years, lactating women and the elderly, frail or sick people.

In K&K work has also involved

- Aflatoxin mitigation to improve nutrition, safety and market competitiveness. Aflatoxin contamination has been confirmed and hot spots have been mapped and awareness raised through training 30 lead farmers on aflatoxin management.
- With regards improving nutrition, 20 randomly selected mothers with children <3 months old from five villages were involved in a mini-survey to obtain information on foods and child feeding practices. 100 mothers from the same villages have now been trained on importance of good nutrition and hygienic practices. Future plans involve recipe formulation, analysing nutrient content of the recipes, analysing aflatoxin content in the ingredients of complementary foods, and raining mothers on grading to mitigate aflatoxin and recipe preparation

In Malawi, work is progressing to evaluate different local food processing approaches. This has encompassed a survey on food consumption patterns over the year, quantification of food samples, providing training on nutrition values, preservation and processing techniques. Work is based on trials of improved practice (TIPS) partially processing legumes, which are then used for child feeding.

A challenge has been that legumes especially groundnuts and soya beans are insufficient, with men often marketing stored legumes as money is urgently required and hence household-stores run out 3-4 months after harvest. The main challenges faced have been late provision of funding from MSU to LUANAR, resulting in a year's delay.

Challenges	Way forward
Post harvest mechanisation and storage Need for scaling up the use of the triple bag and grain drying techniques with issues of affordability and material availability needing to be addressed; ownership, credit funding for purchase, maintenance and repair concerns being challenges for the maize shellers	Commissioning a study on the maize value chain with a gender lens identifying challenges and opportunities for interventions by stakeholders that address the scaling up of triple bags, storage and mechanization with particular attention being given to ex-ante models of grain sheller ownership, credit needs and profitability, partial budget cost-benefit analysis of triple bags, warehouse and business management. Presenting studies to R4D platforms for identification of partners who can address the opportunities identified.
Food processing and value addition. No apparent baseline	Establishing a baseline for monitoring and assessing change. Considering a joint nutrition research program across Tanzania and Malawi focusing on children under two year's old, pregnant women and different household categories. This will require close links between R&D organisations presently working with Africa RISING ESA (AVRDC, IITA, ICRISAT, SUA and LUANAR in association with NAFAKA, Tuboreshe Chakula and INVC).

Program output 3: scaling and delivery of integrated innovation

This addresses challenges of

- Wider adoption of innovations being tested by Program’s output 2 within the Africa RISING action research sites
- Initiation of programs by the development community, based on the knowledge, tools and innovations developed and promoted by Africa RISING that are directed at developmental goals consistent with the Africa RISING aims

Work themes

Babati: 6) institutional cooperation and co-learning through R4D platforms.

K & K: 5) Socio-economic intensification through IPs.

D & N: 4) R4D platforms.

ESA outputs	Activities	2016 Deliverables
Output 9: Scaling approaches for targeted integrated innovations identified and piloted	<ul style="list-style-type: none"> - Analyze and map constraints to, and scalability of innovations - Establish long-term monitoring sites for system resilience, and sustainability - Train/back up development partners in use of technological innovations 	<ul style="list-style-type: none"> - List of scalable innovations with their appropriate areas of application - Number of farmers and area under prioritized innovations in the zones of influence of each development partner

Progress against deliverables

Identifying scaling approaches is linked with increasing levels of adoption of tested technologies, or parts of tested technologies. Adoption implies that tested packages will be visible in farmers’ fields.

The WTs associated with this output largely address institutional cooperation and co-learning and scaling within the intervention sites with demonstrations, training, field days, media communication and workshops as part of the implementation strategy for Program Outputs 1 and 2 as well as overlapping with Output 4.

A number of SI technologies are emerging, including improved varieties and agronomic practices. NRM technologies that integrate soil, water and fertility management reducing soil erosion and providing fodder for livestock compliment the varieties and agronomic practices. These include landscape agro-forestry options for erosion, energy, food and feed and In-situ water harvesting and erosion management. Market opportunities for improved post- harvest handling, storage and aflatoxin control are available. However economic and gender analysis are urgently required to explore trade-offs, perceived risks and determine suitability for scaling up by different farmer typologies. It also requires monitoring how technologies are being taken up by the farmers.

R4D platforms. The strategy for scaling, for achieving ‘increased adoption of technologies’ is likely to depend on the operationalisation of R4D Platforms. Since the platforms are potential sources of institutional learning, their involvement in the planning and implementation of these activities is essential. This requires that achievements and challenges from ongoing research should be communicated to the platforms in an easily understandable form and a way forward agreed based on priorities agreed with the platforms. The R4D platforms have a central role to play in organizing and enabling learning, with some platform players acting as brokers between stakeholders including helping farmers to organize into groups / small cooperatives. Others may be in a position to influence development activity and policy. This might include community-based seed production, credit and input availability, input prices, etc. Specific commodity value chain stakeholders can also be linked through the R4D platforms and encouraged to identify opportunities for addressing input and output marketing and processing constraints.

Development partners can be encouraged to support scaling up of successful research in adjoining areas. This will depend largely on those extension staff and NGOs, who include successful technologies in their own Programs, and agro-dealers providing inputs where these are needed.

Challenges	Way forward
Social and economic analysis, including gender, of best bet technologies requires strengthening.	Collating gender disaggregated data on household decision-making and labour utilization. Developing low, medium and higher input technology options targeted at different types of household or farmer typologies
The need to establish R4D platforms at Community or Village level with strong links to District-level ones. The former should be concerned with operational issues and the latter strategic ones. Both require ongoing facilitation to ensure appropriate representation, objectives and participant roles and plans are agreed, regular meetings take place and plans are implemented.	Communication, being the most basic requirement for the success of R4D platform is required to help partners acquire the skills to interact in platforms and undertake technical activities. Facilitation will be required in the establishment phases, Involve experienced local language speakers Ensuring USAID-Tanzania and USAID-Malawi and their bilateral projects, NAFKA in Tanzania and INVC in Malawi, continue to be informed about Africa RISING activities through representation on R4D platforms Monitoring and learning from progress within the R4D platforms will be important so that corrective action can be taken if required. In addition, future priorities need to be established with R4D platforms, identifying measurable simple indicators to assess progress. This will require researcher facilitation. At the same time individuals on the platforms should be identified to be responsible for their measurement through a system of participatory M&E.

Program output 4: Monitoring and evaluation

IFPRI's M&E support is aimed at providing data for timely reporting, helping stakeholders learn about the program's experiences to help inform the design and implementation of new interventions, as well as catalyzing adjustments to ongoing activities that might enhance efficiency and effectiveness (IFPRI, 2015). Considerable effort has been made to collect baseline data of intervention and counterfactual villages in order to be able to measure future impact against the wider "Feed the Future" indicators in Program countries. Household and community data have been shared with research teams for household characterization as well as analysis of various agronomic outcomes of Program beneficiary households. The base-line report provides data for indicators for enhanced capacity, enhanced technology development, dissemination, management and information, increased investment in agriculture and nutrition and increased resilience of vulnerable households in line with the FtF indicators.

IFPRI's M&E team is aware that there is still a need to integrate M&E actions into the Program's activities. This includes how the program can be evaluated based on its interrelated systems-based innovations. While some elements, such as a new crop variety or fertiliser type are easy to identify, a systems-based approach involves different components interacting increasing productivity and sustainability outcomes. It is recognised that NR-based innovations are often context specific, requiring local adaptation, farmer experimentation, as well as learning new skills. While there are sound practical reasons to believe that systems-based innovations will be beneficial, considerable cost-benefit and social assessment is required.

Although IFPRI's have indicated that their M&E effort may not be readily apparent at this stage, the team remains confident that their efforts will help inform targeting criteria, characterising adopters, assessing the bio-physical and socio-economic effects of technologies, as well as implications for scaling up and measuring impact (IFPRI, 2015). This will require considerable integration of IFPRI's work, the Africa RISING ESA socio-economic team and WUR's farming systems work.

Monitoring for learning: Although individual WPs/WTs have undertaken additional surveys and Africa RISING ESA is reporting to USAID against FtF indicators, little monitoring is taking place with little expectation of learning from the "jump starts". This would include preferred technologies, cost-benefit analysis, what adoption has taken place and by whom.

Each WP/WT now needs to include a detailed plan to monitor what has changed or is likely to change in crop, livestock, NRM, post-harvest and nutrition practices, intra household power relations and to answer questions about institutional and policy options:

- Were any of the new management techniques/ planting arrangements/ crops and crop varieties incorporated into the household livelihood system? If yes, what was incorporated,
- Where (on which plots, fields, or livestock), and how (who did the work, what other varieties/ crops were affected or moved to another site?). This monitoring should include how any changes made to usual practice influenced the way work had been done before, such as changes in labor allocations, how and by whom income was earned, and production controlled etc.
- A need to develop activities for monitoring shifts in management practices within household fields is required. These relate to households/individuals/groups of producers who have been involved in activities detailed in Output 2.

Assessing adoption. Because it is still early, it is difficult to say much about adoption so soon after new technologies have been tested by individuals and groups. However, discussions at the level of household/ individual fields should begin as soon as possible. Learning about adoption is learning

about farmer innovation and researchers need to detail unforeseen ways in which the packages or elements of the packages tested are being used. Research questions should be framed in the context of whole farm/ livelihood systems, with consideration being given to the impact of change on households, especially child nutrition and gender equity. This activity needs to be undertaken by researchers, breeders and others since its findings will influence future research, along with information that should be provided from the platforms.

Challenges	Way forward
Need to integrate IFPRI's M&E actions into activities on the ground.	Ensure that IFPRI's M&E actions within Output 4 integrate with and support those now being considered within Outputs 1, 2 and 3, especially activities of the Africa RISING ESA socio-economic and WUR farming systems work.
Little monitoring or learning from adoption is yet taking place as it is early in the project, but now requires consideration.	Questioning the hypotheses underpinning sustainable intensification. Outlining a program of gender research around technology development and adoption.
The format of WPs/WTs logframes require harmonization showing linkages between WTs and the project logframe At the same time indicators are generally not measurable, some being formulated in form of activities.	Ensure WTs logframes are aligned with the ARESA logframe Identify measurable indicators to monitor progress
Few indicators are available to assess outputs and outcomes, although discussions have been initiated about identifying measurable gender sensitive SI indicators at Program level. Additional custom indicators need to be developed in line with project logframe.	Ensure data, including socially and gender disaggregated data on household participants, is collected that allows participatory cost-benefit and gender analysis of the trials. Undertake studies on: how technology is incorporated into existing household livelihoods; comparative case studies of household food allocations; household labour allocations including the use of hired labour following the uptake of SI systems.
Scaling pathways need to recognise and build on existing farmer groups and networks, both formal and informal, as well as new ones	Undertaking "networking mapping" of babies and granddaughters to establish who is using which technologies, why and how these are being modified by different typologies of farmers Monitoring and learning from scaling approaches of development partners, specifically bilateral USAID-supported partners, NAFKA in Tanzania and INVC in Malawi. Following up on unexpected outcomes – specific studies of issues around how technology is incorporated into existing farm family livelihoods – in depth comparative case studies of household food allocations – labour allocations (including the use of hired labour) following the uptake of sustainable intensification systems, including questioning issues of gender.

Data collection and use data collection

There are two primary data types, i) that required for storage and retrieval for research and, ii) that required for communication and knowledge management.

Project Mapping and Monitoring Tool

<http://dev.harvestchoice.org/africarising>¹

The Project Mapping and Monitoring Tool is helping users to understand where and how Africa RISING activities are taking place and 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 PMMT can help inform decisions by allowing users to take geographic information about Africa RISING sites into account, whether it is the location of markets, related projects and partners, travel time, annual precipitation, or maize crop yields.
- *Communicate programmatic projects to key stakeholders.* A primary benefit to users of the PMMT is to see the spatial layout of Africa RISING activities relative to geographic context. Users have the ability to add their projects to the PMMT database and then to visualise 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 people's projects alone and alongside their own projects. This functionality provides the framework for multiple organisations to communicate vital strategic information together in a coordinated fashion.

The PMMT has two functional modules which perform specific and complementary functions, i) *Mapping Application*, which allows users to contextualise where Africa RISING activities are taking place and view data related to them, and ii) *Data Entry Application*, which allows users with the appropriate credentials to add additional data to the PMMT. This site provides a repository for:

Publications: In addition to monitoring data reports available from this website, Africa RISING research outputs are currently available from the [CGIAR CGSpace](#). This space provides public access to project briefs, reports, presentations, and other communications and M&E resources.

Datasets and Tools: All experimental and survey data are posted to [ILRI CKAN on-line catalogue](#) within one year of data collection. Results from agricultural field trials are also available from a dedicated [CGIAR AgTrials repository](#). Information can be stored, updated and used in a number of forms. Data base structure includes agronomic data from mother, baby and upscaling trials, livestock trials, and socio-economic data including surveys and other studies and socio-economic analysis on trials across the three regions

¹ All data created using USAID funds are the property of USAID, and proper citation and attribution is required.

A data management document regulating the use of the data and protecting owners for a specific period of time has been shared with partners. This is binding in all agreements, in line with CGIAR policy.

Challenges

- Despite training on how to use the data storage/retrieval system, some partners are still unaware of how it operates. As a result much data remains to be stored, including data on which to base cost-benefit analysis.
- Consideration needs to be given to data generated by, i) CGIAR partners where data from Africa RISING research forms only part of wider activities, such as crop breeding and, ii) NARS and Universities that may be difficult to incorporate into the PMMT.

Way forward

- Follow up training and mentoring on the use of the PMMT is required for both CGIAR and national scientists

Communications and knowledge management

Linking with ILRI managed Program level communication

<https://cgspace.cgiar.org/>: This website provides a repository for agricultural research outputs and results produced by different parts of CGIAR and partners including that of Africa RISING. It indexes reports, articles, press releases, presentations, videos, policy briefs and more. CGSpace is a collaboration of several centres and research programs. It is hosted by ILRI.

<http://africa-rising.net/>: This website reports on the activities of Africa RISING supporting the delivery of Program outputs and outcomes, through information sharing, knowledge and communication activities and reports of activities, outcomes and outputs. As such a valuable repository has been created for research outputs, photos, videos and films, posters and presentations, contributing to:

- Communicating to widen influence and impact
- Internal communication
- Knowledge sharing, learning and dissemination
- Photo journalism trips and annual Program learning events
- Translating research outputs into outcomes and getting knowledge into use

Challenges: Much of the communication strategy to date has been targeted at higher level stakeholders with less attention to R4D platforms, farmer groups and other beneficiaries.

Way forward: Consideration needs to be given how to target other stakeholders, strengthening links to reinforce the objectives of the Program.

Partnership

In both countries multi-stakeholder partnerships have been established and consolidated (Table 4). These include an impressive range of R&D partners, Universities, communities and USAID-funded bilateral projects involved in implementing activities through contracts, sub contracts, MoU or other working arrangements. IITA has responsibility for Babati, ICRISAT for K&K and MSU for Malawi. In addition IITA has contracted work with WUR for farming systems research across both ESA and WA, as well as recently strengthening its team to provide socio-economics, gender and communication support.

Table 4: Africa RISING partners in East and Southern Africa

Partners	PARTNERS		
	Tanzania Babati	Tanzania K&K	Malawi D&N
Research partners			
CG centres and international research institutions	IITA ¹ , AVRDC, CIAT, CIMMYT, ILRI & IFPRI ²	ICRISAT ¹ , ICRAF, CIMMYT & IFPRI ²	CIAT, ICRAF & IFPRI2
National Research Institutions	ARI-Selian, TALIRI	ARI-Selian & ARI-Hombolo	-
Universities	SUA & WUR ²	SUA, UoDOM & WUR	MSU ¹ , LUANAR & WUR
Development partners			
National Agriculture Extension	DAICO and R4D/IP members	DAICOs, IP members	DAES and R4D/IP members
NGOs	-	-	-
Other projects	NAFAKA iAGRI	NAFAKA, Tuboreshe Chakula iAGRI	INVC

¹ Managing partner; ² IFPRI and WUR have responsibilities for M&E and for farming systems research across both ESA and WA

Tanzania, Babati. IITA's partnership agreements are based on defined roles agreed through WTs. CG partners have either sub contracts with or pay expenses of national partners (

Table 5), although NARS preference is for sub-contracts. Principal Investigators (PIs) from each institution are responsible for their WT, drawing input from other scientists where required. District Agriculture and field extension staff provide invaluable support for project implementation.

Table 5: Babati partners and roles

International partners	Role
CIAT	Lead for WT1 on crop management and NRM technologies, involving ILRI, ARI-Selian, and TALIRI
ILRI	Lead for WT2 on livestock fodder and feed and indigenous poultry involving TALIRI
AVRDC	Lead for WT3 on vegetables also involving TALIRI on incorporating poultry into vegetable systems
IITA	Lead for WT4 on food storage, value addition and mycotoxin management, involving NMAIST for nutrition, and TFNC in nutrition food safety, and WT6 on R4D platforms.
CIMMYT	Lead for WT5 on MLN disease and other maize breeding with support from IITA on virology
WUR ¹	Farming systems
National partners	
ARI Selian	Lead for WT1 work on cropping systems (varieties and soil fertility)
TALIRI	Support for ILRI on fodder research activities and AVRDC on integrating poultry in vegetable production
NMAIST	Participant in WT3 with nutrition
Development partners	
DAICO staff	Participant in all field operations as well as participation on R4D platforms
District R4D/IP	DAICO, District Agronomist, Livestock, Horticulture & Nutrition Officers, lead farmers (one male and one female) from villages,

¹Includes both Africa RISING ESA and WA

Babati R4D platform. Institutional cooperation and co-learning is occurring through a District R4D platform and with farmers, farmer organisations, District officers, and policy makers. Good progress has been made with a constitution and a management committee is in place to support development and implementation of workplans, reporting progress to a General Assembly. However NGOs and the private sector are largely missing from the platform, notably Farm Africa, who have and continue to work in Babati, input suppliers and output purchasers.

Long and Seloto Village Farmers. Both male and female farmers are represented on the platform, although discussion with farmers in Babati showed little knowledge of the platform. It was also noted that existing community-based organisations had limited involvement in research activities. Farmers indicated appreciation for what has been achieved but their main concern was that relatively few had benefited to date. Challenges mentioned included: land shortage with a need to reduce to cattle numbers, climbing beans being incompatible with maize production, pesticide safety, the importance of potatoes with feed-back on a disease (possibly blight) being awaited (Table 6). Requests were for more support in scaling up cropping activities and training in crop processing.

Table 6: Benefits and challenges expressed by farmers in Babati

Benefits (what farmers like)	Challenges (what concerns farmers)
Long Village, Babati (61 men, 29 women)	
- New soya bean and climbing bean varieties	- Few people indicated benefits to date with little knowledge of the R4D platform
- Organic fertiliser	- Late planting as scientists are not ready on time.
- Awareness of mycotoxins	- No compensation for crop failures due to experimental design on mother plots Seed/plant shortages (maize, legumes, fodder species)
- Storage bags, maize dryers and warehouse (esp. women)	- Climbing beans incompatibility with maize production by some farmers
- Solar drying for vegetable preservation	- Shortage of land – need to reduce cattle, but how?
- Recipe training	
- Napier grass introduction	
- Exchange visits for training & awareness raising	

Benefits (what farmers like)	Challenges (what concerns farmers)
	<ul style="list-style-type: none"> Opportunities for improving livestock - Safety and quality of pesticides - Lack of electricity - The importance of Irish potato with feed- back awaited on a local disease (probably blight), Liver fluke problems in livestock
Seloto Village, Babati (33 men)	
<ul style="list-style-type: none"> - Use of mineral fertilizers - Maize storage - Improved agronomic practices for maize production - New varieties for maize, beans, pigeon peas, fodder crops - Vegetable solar drying 	<ul style="list-style-type: none"> - Late delivery on inputs on mother trials - Lack of compensation for failures on mother trials - Not respecting conditions of agreement to use the farmer's field as mother trial. Sometime scientists do not use all the plot and advise the farmer to use what they have not used when it is already too late. - Pests and diseases (maize viruses, stalk borers) - Grazing areas diminishing while feed availability is an issue - Risk of aflatoxin by using bad maize grain for livestock feeding. - No innovation platform at village level

Tanzania, K&K. ICRISAT has partnership agreements with CIMMYT, ICRAF, ARI-Hombolo and SUA based on agreed roles, as well as links with Naliendele, Selian and UDOM for specific activities, with UDOM now being responsible for livestock-related activities (Table 7). As with Babati, DAICOs and their staff play a key role on R4D platforms.

Table 7: K&K partners and roles

International partners	Role
ICRISAT	Project coordinator and lead for all WTs
CIMMYT	Lead for WTs in which maize is the dominant crop, especially QPM and MLN control
ICRAF	Lead in agro-forestry activities
National partners	
ARI-Hombolo	Lead for work on soil erosion and participant in other activities
ARI-Naliendele	Participant in activities focusing on groundnuts
ARI Selian	Involved in agronomy work in Kiteto-Njoro
Pasture Research Centre, Kongwa	Initial participant in livestock feed activities during the first year, but role taken over by UDOM
UDOM	Participant in livestock feed activities and lead in indigenous poultry, replacing the Pasture research Institute
SUA	Lead institution for nutrition work undertaken through EOs & Health centres.
Development partners	
DAICOs	Play a key role in District level R4D IPs bringing together decision makers, policy makers, politicians, NGOs and the private sector. .
NAFAKA	USAID-funded project supporting scaling-up production activities
Tuboreshe Chakula	USAID-funded project supporting scaling-up post- harvest and food nutrition activities

K&K R4D platforms. The main role of the platform was sharing information on research findings and allowing stakeholders to exchange ideas on what research should be undertaken. As such the platform is aligned to the Districts' own vision. The District chairman and District Director as well as crop and livestock farmers are members of the Kongwa IP. Strengthening links with village level

agriculture and environment committees will be important in supporting the platforms. It was noted that platforms for cassava and post harvest losses, formed by past projects are no longer functional.

Farmers. Farmers are represented on the platform but as with Babati, but links with village agriculture and environment committees could be strengthened. Farmers indicated appreciation for what has been achieved, including ownership of the research. Concerns included shortages of seed, lack of knowledge on use of inorganic fertilisers, pests and diseases and conflicts between crop and livestock farmers (

Table 8). Less than 5% of farmers use inorganic fertilizers, <20% use manure, although in Kiteto 75% of farmers own livestock. Groundnut, pigeon pea and maize are produced mainly for the market with sorghum, pearl millet and bambara nuts largely for household use. Marketing is seen as a problem with low producer prices.

The remains of introduced Napier grass planted on the contour by a past project was observed, having been largely abandoned due to grazing by livestock in the dry season. The same is likely to happen with the present fodder species (Napier, Gliricidia, and Leucaena) planted as part of an integrated NRM strategy unless local bye-laws are introduced to control free grazing. Erosion was observed to be a major threat to SI by scientists, although discussions with farmers did not necessarily reflect this view.

It was noted that farmers have established associations for dairy production, sunflower production and processing, associations which should be used in future research activities. People with livestock buy crop-residues from farmers without in exchange for manure and butter. Presently there is little interest from the private sector in technologies as returns are seen as being low especially maize.

Table 8: Benefits and challenges expressed by farmers in Kongwa and Kiteto

Benefits	Challenges
<ul style="list-style-type: none"> - Changes in farmers practices with large demand for improved seed - Farmer ownership of the research agenda with direct communication with farmers and working with scientists - Participatory selection of varieties/technologies is very important - Tanzania Agricultural Partnership, a farmers association have established farmers demonstration plots in five other villages, copying what Africa RISING is doing - Agro-dealers have joined the partnership with each required to establish a demonstration plot before obtaining a license to operate - Introduction of Gliricidia as a fodder 	<ul style="list-style-type: none"> - Issue of seed availability. Ground nut seed recycled for around five years - Investment in legumes seed production not profitable - Lack of know how on mineral fertilizers application - Crop pests and diseases particularly stalk borers during drought periods - Conflict between crop and livestock farmers as livestock graze crops.

It was noted that NAFKA has a large network of farmers in the Districts and is promoting maize and rice value chains, maize being produced for a market in Dar-Es-Salaam.

ICRISAT is supporting Hombolo Research Station to produce sorghum and millet seed and ARI-Naliendele is producing groundnut and bambara nut seed.

Division of Research & Development, Ministry of Agriculture, Food Security and Cooperatives,

Plans for the formation of an independent parastatal TARI have been completed with Cabinet approval now awaited for. This includes plans for a Technology Transfer Departments and Partnerships Unit. These will build on Zonal Information and Extension liaison Units (ZIELUs) presently located at each research institute. These make provision for experts in extension, communication, livestock and crops but many posts are vacant.

At present little is known about Africa RISING by MAFCO's Division of R&D in Dar-es-Salaam. Suggestions for the way forward included: occasional briefs for Tanzanian stakeholders, country specific learning events and participation of ZIELUs on RD4 platforms, where they have the capacity.

Commission for Science and Technology, Tanzania

COSTECH is a parastatal organization responsible to Government for co-ordinating and promoting research and technology development activities. The Commission has nine R&D Advisory Committees, of which those most are relevant to Africa RISING are Agriculture and Livestock, Natural Resource and Development and Transfer of Technology. COSTEH provides relevant research grants made to scientists through open competitive calls.

COSTECH, whose Director is a member of Africa RISING ESA's steering committee, was very positive about the project, but sees a need for additional support for strengthening the capacity of local scientists. Other suggestions included:

- The need for feed back to COSETECH's Agricultural and Livestock Committee on emerging research priorities
- The need for a Tanzanian learning event to share approaches, experiences and success stories of Africa RISING to ensure that ESA did not become isolated, as has been the case with other bilateral projects

- Opportunities for local scientists associated with ESA to apply for COSETECH funding for research grants
- Opportunity for submission of a briefing paper addressing land degradation for policy makers to COSTECH's Agriculture and Livestock Committee especially if this has the support of R4D platforms.

USAID- Tanzania

The main agriculture focus is on the use of value chain approaches with priorities being maize, rice and horticulture promoting use of best technologies with improving nutrition being a high priority. Projects (or activities) include: NAFKA managed by ACIDI-VOCA with maize and rice being their priority crops, TAP and TAHA (horticulture and flowers); Tuboresha Chakula (milling and processing of maize, rice and oils), evidence based policy; infrastructure, roads and irrigation; wild life management and biodiversity; power and energy. Future priorities are likely to involve horticulture and marketing.

Africa RISING has established a close working relationship with NAFKA and Tuboresha Chakula, as encouraged by USAID, as an additional component on scaling mature technologies.

It was noted that some opportunities for SI at ESA sites were not being addressed as these did not necessarily comply with USAID 's priority crops, examples being potatoes in Babati and sunflowers in K&K.

NAFAKA

Africa RISING ESA started working with NAFKA in 2014 with regions being targeted being Manyara, Dodoma and Morogoro, with Iringa and Mbeya being considered for the future. NAFKA's component parts include: IFDC for developing an agrodealer network, promoting water /irrigation management and QDS community based seed production; RUDI and MVIATI providing training on good agricultural practice (GAP) and advocacy for farmer groups and associations. Farmer groups are encouraged at Village level, associations of groups at ward level (presently 105 associations) and Apex Associations at Division level. FIPS is developing a network of Village Based Agricultural Advisors (VBAs) and DANYA is responsible for supporting behavioural change including gender, with 47% beneficiaries being women. 22 FtF indicators are being monitored.

Presently there are 890 GAP maize and rice demo plots with a typical plot comprising four improved varieties with and without fertiliser, compared with a local check . All Inputs are provided by the private sector, yield data is collected by lead farmers, having received training from NAFKA. At present there are 216 VBAs, supported by a network of 120 village-based agrodealers, who are linked to 14 hub-agrodealers connected to input supply companies. VBAs are encouraged to become input dealers with their demos and selling small input packs. Other initiatives include maize producers in Kitete being contracted by a local miller who employs an agronomist to provide advice. NAFKA ends in September 2017 having been given a one-year no cost extension from 2016.

Support provided by Africa RISING ESA includes expertise for GAP technologies for sorghum, millet and cowpeas, as well as protocols and analysis of demo plots. A Technology Scaling Specialist recruited by IITA is working with NAFKA's M&E unit. He is presently based at SUA in Morogoro.

Tuboreshe Chakula

This project addresses fortifying maize and rice flour and adding Vitamin A to sunflower oil to improve nutrition. It works with small millers to add fortification. The project closes in June with some functions moving to NAFKA.

Some of Tuboreshe Chakula's work is relevant to the SUA food nutrition group and some to IITA aflatoxins group. Hand-over of relevant data to ESA will be important.

The Innovative Agricultural Research Initiative (iAGRI)

iAGRI aims to strengthen training and collaborative research capacities of SUA and MAFC with the goal of improving food security and agricultural productivity in Tanzania. The project is aligned with the FtF initiative of USAID and the GoT 's ASDP. It provides i) advanced degree training in agriculture and nutrition for 135 Tanzanian graduate students (20 PhD and 115 MSc), strengthening the capacity of SUA bringing together research partners from the SUA, MAFC, and Ohio State University Consortium to conduct research projects addressing agricultural and nutritional issues as well as promoting cooperation with U.S. and Global South research and educational institutions. Partnership of iAGRI and Africa RISING starts by iAGRI requesting Africa RISING to provide topics for MSc or PhD research and once received, iAGRI submits topics that are responding to their own priorities to willing students. Students who choose those topics are introduced to Africa RISING to carry out their research. The student will be co-supervised by a scientist from Africa RISING as well as by a University supervisor. iAGRI will cover the full cost of the course (subsistence, tuition, research) although Africa RISING may complement to cover some extra cost of the field research. Challenges faced by the partnership between Africa RISING and iAGRI include inadequacy of supervisors in Africa RISING, Africa RISING researchers not stable as staff leave Africa RISING and others come in; and mismatch between Africa RISING cycle and the Universities cycle. In addition, collaborative research projects each valued at \$100k are funded. Current priorities for research include water and land management, nutrition, crop improvement, value chains management, climate change, policy analysis and extension systems.

Presently all funds are committed, but plans are being made to request a Phase II. For training, the focus will be on enhancing the leadership capacity of SUA top management; linkages with the private sector; strengthening classrooms units and library services. For research, projects will be commissioned, priorities including maize research (MLN disease, Striga, stalk borer, water stress) to support NAFKA; water resources management and agricultural risk management. Opportunity is therefore available for linking with Africa RISING.

Malawi. MSU has partnership agreements with CIAT, ICRAF and LUANAR based on defined roles, and an MoU for support for the USAID-Malawi INVC initiative (table 9). DAES plays a key role in R4D platforms and supporting field research activities

Table 9: Malawi partners and roles

International partners	Role
MSU	Responsible for project coordination reporting to IITA, includes MSU PhD and MSc students with back up support in Community development ¹ and Social Science ¹
CIAT	Lead for soils and bean studies
ICRAF	Lead for agro-forestry and livestock feed activities
National partners	
LUANAR	PIs for agronomy, livestock, nutrition and local level food processing each areas led by a lecturer supported by MSc students
DARS	Represented on Steering Committee
Development partners	
DAES	Lead for R4D platforms in Dedza and Ncheu Districts
INVC	USAID-funded project supporting scaling-up post harvest and food nutrition activities

¹with additional funding from MSU

Although Africa RISING ESA has made a contribution to breaking institutional and personal barriers resulting in improved integration, there are concerns that teams are operating independently and the LUANAR livestock component requires strengthening. A further concern is that funding flows from USAID to IITA and onwards to MSU and LUANAR, results in delays of critical activities at times. This is especially the case with LUNAR who are unable to pre-finance activities.

DARS, Chitedze

DARS as part of the MoA is responsible for coordinating all agricultural research activities in Malawi

Although DARS is represented on the ESA Steering Committee, DARS scientists have no direct research responsibility. For long term sustainability greater involvement should be encouraged

Key points made by the Director with concern to Africa RISING included:

- All new technologies must be approved by the “Agricultural Technical Clearing Committee. This includes new varieties and new agronomic practices. Clarity may be needed if this also applies to legume intercropping.
- It was confirmed that a “National Grain Legume” Platform whose secretariat is AICC could play a role in identifying constraints and opportunities.
- Legume seed shortages have been a problem for a number of years and QDS seed production by CBOs is possible.

LUANAR is a major Africa RISING partner involved with agronomy of cereals and legumes, livestock and nutrition. It was confirmed that legume work for soil fertility and nutrition as a source of protein has been ongoing since 2006 with emphasis now on scaling out best bets, increasing household consumption and providing commercial uses for legume crops. Challenges revolve largely around funding as LUANAR is unable to pre-finance activities and rely on funding transfers from MSU.

CIAT undertook soil mapping work in 2012-13 with drought resistant dwarf and climbing bean varieties (hopefully soon to be released) were introduced in 2013-14. Challenges included: beans not being a priority crop for USAID, the need for closer integration of partners especially the livestock component and for DARS to become more involved.

ICRAF is responsible for undertaking work with i) a dairy bulking group increasing fodder availability with leucaena and, ii) climbing bean, pigeon pea intercrop mother trial using tephrosia for bean

staking material. Challenges reported by ICRAF included insufficient budget for expanding their activities, a need for better integration with LUANAR on livestock activities.,

USAID-Malawi

The mission is addressing similar issues as Africa RISING through a FtF initiative - INVC with a US partner Development Alternatives Inc (DAI). Emphasis is being placed on improving nutrition and value addition targeting pregnant women, lactating mothers and children <3 years old. It presently operates in seven Districts targeting 275,000 households focusing on Lilongwe, Machinga and Dedza Districts, working through partners to raise farm productivity, improve food preparation, consumption and behavioural change. Partners include IITA for seed multiplication, MSU as a technical sub partner undertaking M&E surveys, NASFAM, FUM, CADECOM, Nicoma hospital, and the Agricultural Commodities Exchange. The project was initiated in 2012 and has recently been extended to Nov 2016. The scaling mechanism is through LFs and farmer clubs through NASFAM's structure working with 15-20 farmer associations. CA has been promoted but badly implemented.

A new project (\$20m) "Reseeding Malawi" involving ICRISAT, IITA, CIP and CIMMYT has recently been commissioned, but beans and pp are not priority crops for USAID,

Support from Africa RISING ESA for INVC is welcomed, this being provided by MSU.

Farmers: Farmers indicated appreciation for what has been achieved with their main concerns being about scaling (Table 10). With regards the Dairy Association the availability of more feed with increased milk yields reported, more farmers wanted to join, but access to loans was a problem . The Association wanted to process and sell their own milk but management problems associated with disease and poor housing need to be addressed. Formulating appropriate feeding packages to ensure year round feeding to sustain milk production is also a major concern. With regards to cereal-legume systems, maize is the most important crop with legume preferences varying according to AEZ with scaling up constrained by seed shortages (Table 10).

Table 10: Some benefits and challenges expressed by farmers in Dedza and Ncheu

Dedza District, Linthipe EPA, Dzaone Wekha Dairy Bulking group, delivering through CREMA to Lilongwe Dairy 71 farmers (43w, 28M) with 115 dairy animals	Dedza and Ncheu Districts, Golomoti, Linthipe & Nsipe EPAs, cereal-legume and soil fertility mother and baby trials, Discussions with farmers at various Mother Trial sites
Major benefits/preferences	
<ul style="list-style-type: none"> - 198 farmers obtained leucaena seed, 159 planted with 28,330 trees planted. - Milk yield increases since new feed used - Manure used for fertiliser, only topdressing needing to be purchased - Tobacco being replaced - Improved marriage relationships and reunions 	<ul style="list-style-type: none"> - Combining maize with legumes, maize being most important for both men and women. - Legume preferences vary with AEZ, men liking cash crops (SB and GN), women food crops (beans, PP & GN). - Maize-PP often the preferred option - CP & PP new crops in many areas, but PP and GN regarded as silver bullet.
Major challenges	
<ul style="list-style-type: none"> - More farmers want to join group - Inadequate animals, loans needed - Would like to process and sell own milk, - Mastitis and pneumonia - Poor housing - Year round feeding packages needed - Management practices for optimisation of fodder from Leucaena. 	<ul style="list-style-type: none"> - Little seed available, grain bought from traders or growing own seed harvested from trials often in dambos - Women look after the seed but men sometimes take and sell at market - Seed packages regarded as too small for men, - Stakes for climbing beans not available in some areas

Dedza District, Linthipe EPA, Dzaone Wekha Dairy Bulking group, delivering through CREMA to Lilongwe Dairy 71 farmers (43w, 28M) with 115 dairy animals	Dedza and Ncheu Districts, Golomoti, Linthipe & Nsipe EPAs, cereal-legume and soil fertility mother and baby trials, Discussions with farmers at various Mother Trial sites
	<ul style="list-style-type: none"> - PP having to remain in fields are destroyed by grazing animals - PP poor germination problems - Pest damage in cowpeas - Birds damage to young SB seedlings - Very few have livestock, hence availability of manure low
Other issues noted	
<ul style="list-style-type: none"> - Need for milk value chain analysis to be undertaken to identify opportunities for intervention. 	<ul style="list-style-type: none"> - EAs already undertaking participatory budgeting with farmers - A number of soil fertility-legume projects operating in the same areas (SIMLESA-CIMMYT-CA, ICRAF – CA, leucaena, interplanting, PP, Tephrosia, Gliricidia and fruit trees

CP=cowpeas, SB=soya bean, GN=ground nut, PP=pigeon pea, CA=Conservation agriculture

Challenges	Ways forward
Absence of a base-line institutional analysis has meant that important partners may have been missed and consequently past experiences not used. For example Farm Africa in Babati, INADES in K & K and other research projects, for example SIMLESA in Malawi. For the same reason participation of existing farmer organisations have not been involved. Those mentioned included a Babati Dairy Farmers Association, previously supported by Farm Africa, a Poultry keepers association, a Piggeries Association, a Goat Breeders Association, Savings and Credit Groups as well as a number of women's groups	Agree a clear vision of Africa RISING pathways through R4D platforms that begin with farmers and other partners in the design and roll out of the research agenda, as well as promotion and dissemination of research outputs. Undertake an institutional analysis to identify and involve missing NGOs and farmer groups on R4D platforms and where appropriate within the research Program, especially in Tanzania
Lack of communication with NARS, the Division of Research and Development in Tanzania and DARS in Malawi	Improve communication through occasional briefs for stakeholders, country specific learning events and involvement in research, in Malawi, where capacity exists. Consider involvement of Zonal Information and Extension liaison Units (ZIELUs) on R4Ds in Tanzania, where they have the capacity.
Partnerships with the private sector have been limited	Encourage development partners, both NGO and private sector, to establish demonstration plots in accordance with researcher designed protocols for baby trials in communities adjoining Africa RISING target communities Ensure two-way feedback of research results to and from R4D platforms and farmers to establish priorities for the remainder of this phase of the project as well as ideas for the future Sensitise private sector actors to participate in Innovation Platforms.

Management achievement and challenges

Responsibility for management of Africa RISING in ESA and WA within IITA has recently moved from its partnerships Coordination Office, to Regional Directors in East, Southern and West Africa as well the Director for NRM (Figure 2). At the same time staffing has been strengthened through the appointment of a communications officer in Ibadan, an economist in Tamale and a gender specialist in Arusha, each with technical responsibilities across ESA and WA.

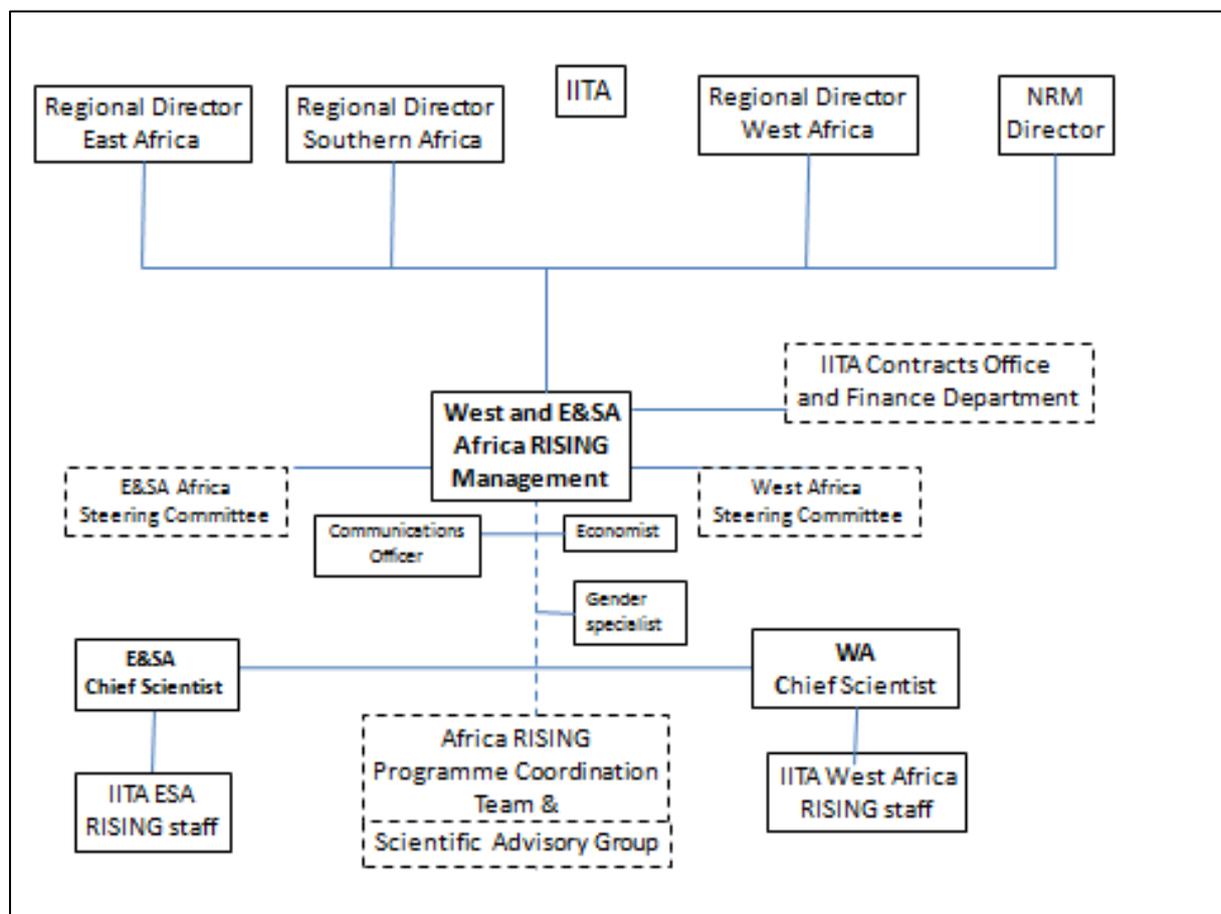


Figure 2: IITA management structure related to Africa RISING West & East and Southern Africa

Africa RISING-ESA has its own Steering Committee, chaired by the Regional Director (East Africa), responsible for approving annual work plans. At the same time, a Scientific Advisory Group for the three Africa RISING projects formed in 2014 advises the Program Coordination Team, comprising IITA, ILRI and IFPRI and USAID, which coordinates topics across the three Africa regions. Africa RISING ESA has both directly employed IITA staff and contracted partners (Figure 3) with contracts with both CG centres and national research institutes, with CG centre often having a number of sub contracts with other research institutions or Universities. The role of NARS, ARI's in Tanzania and DARS in Malawi, is important for long term sustainability. Although both have capacity problems, their involvement is seen as crucial.

Inter-institutional contractual agreements based on their associated work packages are signed after approval by the Steering Committee and after referral by in-country representatives to their international HQs. This is often the responsibility of DGs, who will only sign after consideration against other institutional Programs or projects. Delays may occur as this process is followed. In some cases contracting institutions are able to pre-finance expenditure provided IITA has provided a

written commitment that payments will be made. Clearly no such commitment can be made without USAID providing such assurances. NARS and Universities are often unable to pre-finance expenditure causing delays in implementation, sometimes at critical times. Although Africa RISING is a 5-year Program, contracts are renewed annually in line with USAID’s financial year (October-September) in contrast to most CG centre’s financial year (January-December). Once contracts are signed, IITA pays 80% of the agreed budget before the start of activities, retaining 20% for payment after technical and financial reports have been submitted.

IITA has established a project office in Arusha. Research plans for 2014-16 based on the logical framework and building on earlier activities are now in place providing the vision that allows scientists to plan their research from a longer term perspective. Total expenditure for Africa RISING ESA over the period 2011-2015 is in line with budgeted proposals (Table 12).

In Tanzania-Babati IITA management has been made easier by recruitment of Scientist responsible for coordination of research in the District through who contracted research institutions and individual scientists can work. The Coordinating Scientist is based at IITA’s project office in Arusha and plays a key facilitation role not only in coordinating scientists’ input but also networking between stakeholders and supporting the Babati District R4D platform.

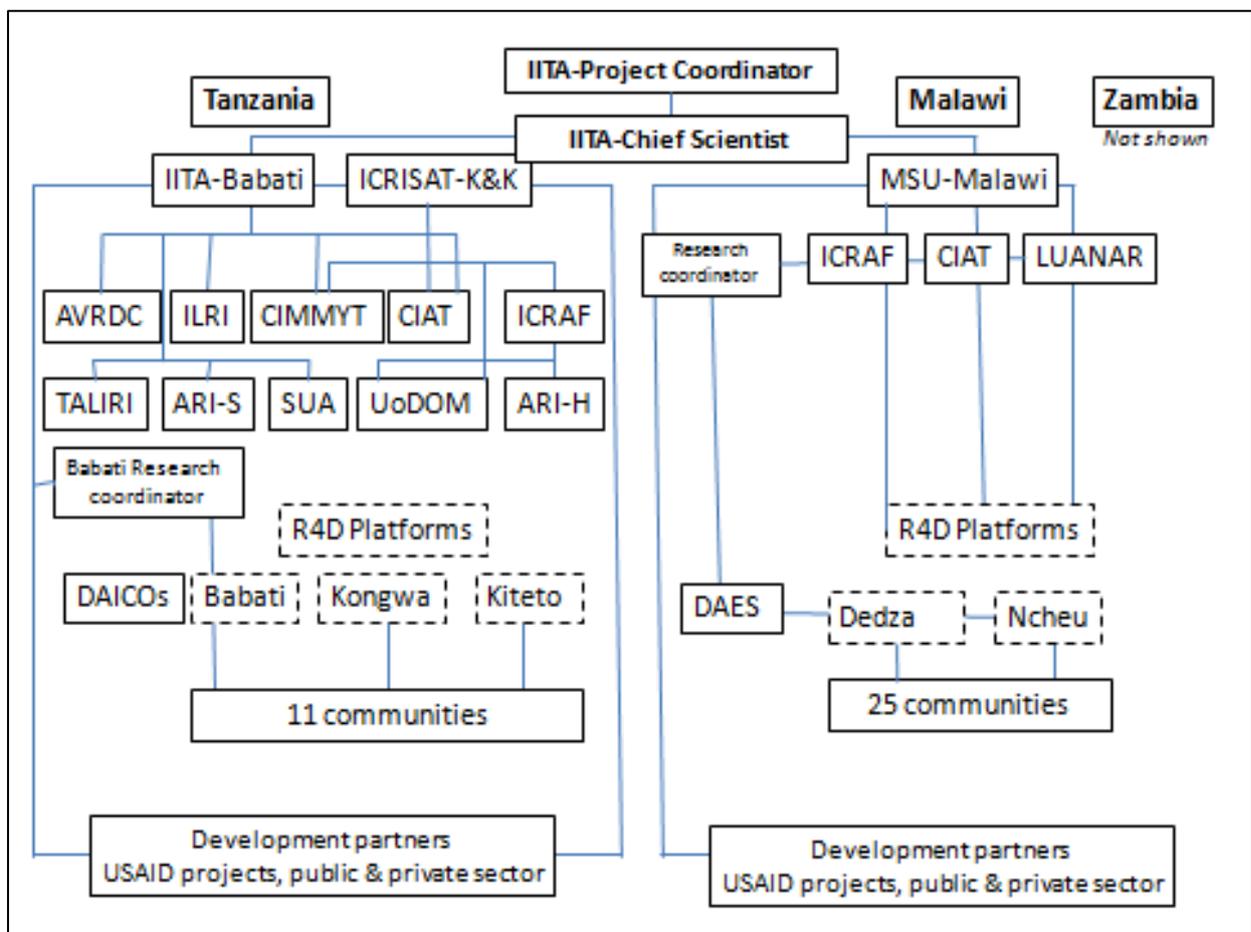


Figure 3: Africa RISING Eastern and Southern Africa management structure

The situation in Kongwa and Kiteto differs from that in Babati, with institutional coordination being undertaken by ICRISAT from their Lilongwe office. ICRAF operates from Dar-es-Salaam, CIMMYT from Nairobi, SUA from Morogoro, UoDOM and ARI- Hombolo from Dodoma. This can give rise to operational difficulties and high cost due to the long distances involved requiring considerable

support from ARI-Hombolo. Ideally research coordination should take place from K&K for local networking, communication and facilitation of R4D platforms.

The situation in Malawi is different again in that MSU is responsible for coordination and have appointed a research coordinator based in Harare, Zimbabwe, but who spends considerable time in Malawi. As with K&K, local coordination is considered ideal in order to ensure effective communication and networking.

Table 11: Management challenges and the way forward

Challenges	Ways forward
Delays in the signing of Inter-institutional contractual agreements may result in delays in starting research activities often at critical times specially when pre-financing is not possible usually for NARS and Universities	Encourage an accountable, responsive funding and reporting system that maximises timeliness in line with seasonal requirements Ensure that absence of in-country CG partners does not result in clumsy sub-contracts
Integration of activities varies between sites, being better in Tanzania than Malawi	Improve integration through team work committed to Africa RISING outcomes and holding team members mutually accountable, through regular meetings and seminars to share the expertise allowing lessons to be shared with other R&D partners Consider the appointment, as in Babati, of a full-time site coordinator for communication, facilitation, local networking and support for R4D platforms in K&K and Malawi
Lack of involvement of NARS scientists often caused by inadequate communication with Head Office as in Tanzania and changes in staff within DARS-Malawi.	Ensure CG centres work closely with NARS scientists. This goes beyond joint planning and implementation, graduate training, and short-term courses but should include improved two-way communication, mentoring and encouraging ownership of research results.

Table 12: Africa RISING ESA budgets 2012-13, 2013-14 and 2014-15 in US \$

Tanzania, Babati	IITA ¹	AVR DC	CIAT	CIM MYT			ILRI	ARI-SELIA N		Othe r	Total		
2012-13	1246 00		1176 76	1165 41			8909 3	7385 0			521760		
2013-14	2594 00	1102	2439 63	2003 5			1560 24			8440 0	874093		
2014-15	1465 00	7260 8	1501 31	1392 50			1332 60			7350 0	715249		
Total	5305 00	1828 79	5117 70	2758 26			3783 77	7385 0		1579 00	2,111,102		
Tanzania, K&K				CIM MYT	ICRA F	ICRIS AT		ARI-HOM BOLO		NAR ES	Total		
2012-13				2885 3	9897 4	1366 54		5255 0		1709 2	334,123		
2013-14				7287 5	2491 23	3478 55		9014 8			7600,01		
2014-15				6210 0	1466 25	2249 15		5136 0			485,000		
Total				163,828	494,722	709,424		194,058		17,092	1,579,124		
Malawi	IITA ²		CIAT		ICRA F		MSU		LUA NAR	NAR ES	Total		
2012-13	1200 0		7129 7		3000 0		2517 00		3500 0		399,997		
2013-14	2500 0		6000 0		6000 0		4889 98		1010 00	1500 0	749,998		
2014-15	1400 0		6000 0		7000 0		2660 00		6000 0	1500 0	485,000		
Total	5100 0		1912 97		1600 00		1006 698		1960 00	3000 0	1,634,995		
Grand total	581,500	182,879	703,067	439,654	654,722	709,424	6,698	378,377	267,908	196,000	47,092	157,900	5,325,221
%	11%	3%	13%	8%	12%	13%	19%	7%	5%	4%	1%	3%	100%

¹excluding management costs of ESA, ² Office and other logistical costs paid by MSU to IITA-Malawi

Source: IITA project proposals

Availability of human resources for implementation

It is recognised that capacity limits exist at scientist, service provider and farmer level, which are being addressed through staff recruitment, student PhD and MSc training, R4D facilitation and farmer involvement and training

The need for socio-economic and gender analysis has been addressed by the recent recruitment by IITA of staff into their Africa RISING team. This will require additional support from in-country representatives to develop a “community of practice”. A concern is the limited time a number of international scientists have working part-time on the project with a need to encourage greater involvement of NARS scientists. This could be overcome by consolidating work plans to provide more time for international scientists and greater involvement of national scientists. Babati has a full time scientist based in the District coordinating work, through facilitation, networking and support to part time scientists and students . Similar arrangements could be made for Kongwa and Malawi.

The number of students (Annex 5) involved in Africa RISING is impressive, 12 in Tanzania (comprising four PhDs, six MScs and two BAs), three of whom are funded by iAGRI and eight (4 PhDs and 4 MScs) in Malawi. The Malawi-PhDs are supported through MSU. Challenges faced have included matching iAGRI student interests with those of Africa RISING and subsequent supervision and ensuring funds are available when required to meet student field studies, a problem faced with LUANAR nutrition studies. In Tanzania, iAGRI’s funding for students is now fully committed but there are competitive research grants in line with national priorities available from both iAGRI and COSTECH for Tanzanian scientists

Although good progress is being made with R4D Platforms and IPs, they require ongoing facilitation and support to ensure that they remain representative of service providers and farmers, set clear goals with implementation plans based on interaction with researchers, both at District (strategic) and Community (operational) levels and do not become overly bureaucratic and consequently non-functional. In both countries decentralisation initiatives have created the environment for platforms to become established and to receive support from District Councils. In Malawi, both Dedza and Ncheu Districts are using DAECs as R4D/IPs. However they exclude farmers, although DACs include elected councillors from EPAs, and DSPs and ASPs include farmers. ASPs operating at EPA level are described as the entry point for planning and implementing interventions at EPA and village levels and can be regarded as an operational level IP. The District Stakeholder Panels with their intended farmer representation meet the criteria for strategic level IPs. It is therefore recommended that DSPs and ASPs become the focus for R4D IPS, while DAECs remain as coordinating committees for service providers operating in each District.

Challenges	Ways forward
Recent recruitment of an economist, communications officer and gender specialist covering Africa RISING in both ESA and WA has contributed to a number of socio-economic led activities being delayed, with very little gender work being undertaken.	Support needs to be given to IITA's socio-economic group , with researchers from institutions in both countries, to work together forming a "community of practice".
Each WT has input from between five and 15 scientists, sometimes with students, with the research led by a Principle Investigator. Where scientists are involved in a number of projects, coordination and logistical arrangements can be problematic.	Consideration needs to be given to ensuring an appropriately qualified person (research coordinator) is available for each site to coordinate research activities and partner arrangements, networking with other initiatives and facilitating R4D platforms.
Ensuring CGIAR scientists have sufficient time to give priority to Africa RISING activities.	There is also a need to address the issue of implementing work Programs with part time individuals. This could be achieved by consolidating work plans to increase contract size and at the same time encouraging greater participation of national scientists.
Ensuring long term commitment for student funding	Ensure Africa RISING funding is available to finance field work of ongoing commitments Ascertain from iAGRI and COSETECH the availability of competitive research funds for Tanzania national scientists
Ensuring that R4D/IPs are sustainable and play their intended role of prioritising research needs and supporting scaling processes	Encourage joint support from service providers and District Councils for R4D IPs at strategic and operational levels. In Tanzania, linking District with Village or ward level requires consideration. In Malawi DSPs and ASPs provide this opportunity. Provide ongoing facilitation to ensure joint prioritisation , planning, implementation and M&E of R&D activities. Monitoring the effectiveness of the approach is a valid research activity.

Contribution to the humidtropics and dryland CRPs

The Africa RISING research approach largely follow the approach of the Humidtropics CRP. For this reason IITA has mapped Africa RISING under Humidtropics. However ESA and WA projects are currently not within the geographical focus of Humidtropics' first phase, whose focus is on the humid tropical zones in Africa and not the moist savannahs or semi-arid areas. Many of Africa RISING intervention sites fall within the geographical scope of the Dryland Systems CRP with research being also reported by ICRISAT to the Dryland Systems CRP.

It is recognised that Africa RISING can make important contributions to and learn from both Humidtropics and Dryland CRPs. At the same time Africa RISING's contribution to USAID's "Feed the Future" is recognised and maintaining Africa RISING with a separate identity from Humidtropics and Drylands CRPs is likely to be important, especially with budget reductions for CRPs.

Research development for the next phase

In rural settings with low human population, where land is relatively scarce, livestock and crop production often occur separately. As population increases and land becomes scarcer, integration of crop and livestock production occurs with animal feed generated from within the system. In peri-urban environments characterised by increasing land scarcity and increasing human population, crop-livestock interaction and integration become important. These two kinds of mixed farming can be intensified through exchange of resources between animal and plant-based enterprises, mainly through manure use for crop production and feeding of crop residues to livestock, but also animal draft power for crop production and transport.

At higher human population pressure and greater land scarcity, as in urban areas, crop-livestock interactions may be separated to become specialized crop or livestock enterprises with greater value-added, for example horticulture. Intensification of livestock production can take place with purchased inputs, feeds and mineral licks, imported from outside the system. Although crop-livestock interaction and integration are important, opportunities to intensify livestock production, unrelated to on-farm resources, should be considered.

Since Africa RISING operates in both rural and increasingly peri-urban areas, this provides opportunity for the three forms of intensification. Opportunities for linking with other system-related CRPs (Dryland systems, Humidtropics and Water, Land and Ecosystems) should allow shared lessons and opportunities for Africa RISING in the future.

The review team recognises that a number of the recommendations made for new or existing activities are unlikely to be implemented before 2016, especially as new problems and opportunities emerge from ongoing work. The team has suggested which recommendations should be considered as part of a new phase. It will however be essential that these recommendations are prioritised by the R4D platforms in line with opportunities and farmer requests. Clearly priority should be given to work that can be concluded in the next 18 months and that completely new work is best addressed in a next phase. This will include:

- Monitoring technology use with a gender lens, developing and implementing plans for learning.
- Clearer targeting with more careful linking of research activities to derive synergies between on-farm and off-farm resources.
- Strengthening work on crop-livestock interaction and integration, including animal feed opportunities (crop residues with better preservation, improved use of fallows and innovative methods of maximising fodder production from food crops).
- Addressing livestock health delivery systems.
- Addressing wetland use and increasing opportunities for irrigation.
- In Malawi, future priorities could be given to work on post harvest technologies

Annexes

Annex 1: Terms of Reference, Mid-Term Review of Africa RISING, East and Southern Africa

Terms of reference

- i) Assess conformity of Africa RISING ESA project with the Program Research Framework
- ii) Evaluate how the project is fostering learning by stakeholders
- iii) Identify weaknesses and gaps in research
- iv) Identify data gaps and issues of data handling and sharing
- v) Assess the contribution of M&E activities by IFPRI to the research agenda
- vi) Review appropriateness of current partnerships, available human resource, current management structure
- vii) Provide recommendations to address identified issues

Key evaluation questions

- What progress has been made towards the Africa RISING program objectives and expected outcomes? What can realistically be achieved within the given time frame?
- How relevant and feasible is the current field research approach to achieve the three research outputs and the outcomes?
- To which extent has the project built on experiences of past projects in the intervention areas in terms of farmer-level learning? How can this be improved?
- Which data gaps exist to provide the scientific evidence for achievement of the three research outputs and the outcomes? How can they be addressed?
- What issues exist around data management and how can they be addressed?
- Which research areas are missing or need to be strengthened (economics, gender, scaling approaches, communication...)? How can the gaps be filled?
- How adequate are the available human resources to the successful implementation of the project? Which expertise needs to be strengthened or added?
- Are the current research and development partnerships adequate for a successful project?
- How effective is the collaboration, coordination, and working relationship among key partners?
- How relevant is the program and project management structure in terms of enhancing the implementation of the WA project?
- Which lessons have been learned by each key partner so far?
- To which extent is the project contributing to the Humidtropics and Dryland CRPs?
- How should the research be further developed in a next phase?

Deliverables

- A short written report for debriefing IITA management, focusing on issues posed by the TOR before leaving Malawi
- A draft report on detailed findings and recommendations for comments by the Africa RISING team
- A final report

Annex 2: Review Program

Date	Program
SUN 22-Feb	Arrival Arusha
MON 23-Feb	Meet project team at IITA office, bilateral meetings with AVRDC, CIAT, CIMMYT, ILRI
TUE 24-Feb	Meet with ARI-Selian, visit Babati, meet with district authorities and R4D platform members and District Executive
WED 25-Feb	Field visits, Babati
THU 26-Feb	Field visits, Babati
FRI 27-Feb	Travel to Dodoma
SAT 28-Feb	Meet K&K team, bilateral meetings with ICRISAT, ICRAF, ARI-Hombolo, University of Dodoma, District Agric Officers (K&K)
SUN 1-Mar	Review team meets
MON 2-Mar	Field visit, Kiteto
TUE 3-Mar	Field visit Kongwa
WED 4-Mar	Travel to Morogoro, meet iAGRI-SUA, USAID, NAFKA and TUBORESHE Chakula
THU 5-Mar	Travel to Dar, meet with IITA Reg. Director and staff
FRI 6-Mar	Meet with COSTECH, Ministry of Agriculture
SAT 7-Mar	Meet with IITA management
SUN 8-Mar	Travel to Lilongwe
MON 9-Mar	Meeting with project team, DARS and USAID mission
TUE 10-Mar	Meet with LUANAR, Dedza DALDO and R4D platform members
WED 11-Mar	Field visits, Linthipe EPA (Dedza)
THU 12-Mar	Field visit, Golomoti EPA (Dedza)
FRI 13-Mar	Meet with Ntcheu DALDO and R4D platform members, field visit Ntcheu district
SAT 14-Mar	Meet MSU, ICRAF, and CIAT
SUN 15-Mar	Prepare de-briefing report
MON 16-Mar	De-briefing with project team
TUES 17-Mar	Depart Lilongwe

Annex 3: Persons consulted and role

TANZANIA

IITA, ARUSHA

- Victor Manyong, Regional Director, Chair Steering Committee
- Irmgard Hoeschle-Zeledon, Africa Rising Project Coordinator
- Mateete Bekunda, Chief Scientist ESA
- Festo Ngulu, Babati Coordinator
- George Mahuku, Mycotoxin focal point
- Gundula Fischer, Gender Specialist
- Adebayo Abass, Post harvest, Food Technology
- Johnathan Odhong, Communications Officer
- Catherine Njuguna, Communications Specialist

AVRDC

- Victor Afari-Sefa, vegetable integration

CIAT

- Job Kihara, Agronomist
- Fred Kizito, Soil and water specialist

ILRI

- Ben Lukuyu, Animal Scientist
- Leonard Marwa, PhD student, SUA
- Gregory Sikumba, PhD student, SUA

CIMMYT

- Bright Jumbo, Breeder

ICRAF

- Antony Kimaro, Agro-forestry Specialist

ICRISAT

- Patrick Okori, PI K&K
- Moses Siambi, Steering Committee Member (email)
- Xx, Pigeon pea breeder

ARI, Hombolo

- Elirehema Swai, Soil and water conservation, Tillage

ARI-Seliani

- Charles Lyamchai, Asst. Director
- Stephen Lyimo, Agronomist, Soil Fertility
- Rose xxx, Socio-economist

University of Dodoma

- Francis Appiah, (Food Scientist/ Post Harvest Technology)

Sokoine University of Agriculture

- Emmanuel Rwambali, iAGRI
- Isaac Minde, iAGRI

COSETECH

- Hassan Mshinda, DG and Steering Committee member

Babati Local Government Office –

- Hassan Lugendo, Chair R4D platform
- Jetrida Kyekaka, DALDO
- Edgar Lyukrwa, Agronomist
- Rose Pallangyo, Horticulturalist
- Gilbert Mbesere, Livestock officer
- Bernadeta Tembo, Nutritionist
- Zainabu Mnubi, Horticulturalist
- Anarea Mayi, Farmer
- Bernard Sambali, Extension officer
- Ritia Mtatas, Farmer
- Anna Roman, Extension officer
- Donald Frank, Extension Officer
- Bernardo Tembo, District Nutrition Officer

K&K District Agriculture Offices

- Lucas Mirmabo, DALDO, Kiteteo
- Jackson Shia, DALDO, Kongwa

Dept of Research and development,
MoAFS&C

- Evarist Makene, Principla Researcher
- Jackson Nkubo, Asst, Director (Sp. Progs)
- Elia Marandu, Principal Research Officer
- Charles Yongolo, Asst. Director (Crops)
- Janet Kaya, Information&Comms

NAFAKA (ACDI-VOCA)

- Silvanus Mruma, Prod. Manager

Tuboreshe Chakula

- Rebecca Savoie, Chief of Party

Farmers

- Village Chairman and Executives in Babati, Kitete and Kongwa
- Farmer groups in Babati, Kitete and Kongwa

USAID-Tanzania

- Betty Maeda

MALAWI

MSU

- Singlinda Snapp, Country Coordinator
- Regis Chikowo, PI-Malawi
- Ramadjita Tabo, Regional Director
- Emmanuel Jambo, research Assistenat
- Timothy Silberg, PhD student
- Sarah Kopper, PhD student
- Erin Anders, PhD student

CIAT

- Rowland Chirwa, Bean breeder
- Gist Ndengu, Senior Research Assistant
- Barthomlew Chataika, Program technical Officer

ICRAF

- Aston Mulwafu, Training, M&E
- Betserai Nyoka, Agroforestry fodder

DARS

- David Kamangira, Director DARS
- Felix Chipojola, Bvumbwe Research Station, Steering Committee member

LUANAR

- George Kanyama_Phiri, Vice-Chancellor
- MacDonald Mwinjilo, Deputy Dean, Faculty of Agriculture
- Wezi Mhango, PI Agronomy
- Agnes Mwangwela, PI Food & Nutrition
- Soflet Mwafulirwa, MSc student (Nutrition)

- Edward Mzumara, MSc student (Agronomy)

Ntcheu Local Government

- Annily msukwa. DADO
- Charles Tepeka, COOM
- Jamilla Chimara, NASFAM
- Edith Ngwaya, AEDEC
- Emma Sikoya, DAHLDO,
- Goodwill Katsonga, Livestock Officer
- E Mthinda, Council Chairperson
- R Bonjesi, Concern Universal
- Previous Chantsi, Assisyant DADO
- A Chioza, Agriculture Committee
- F Mwalw AEDO

Dezdza Local Government

- Owen Kumwenda, DADO
- J J Kanyaangalasi, DC
- Arnold Nthala. DAHLDO
- Franlin Gomani, LRCO
- Bessie Ndovi, FNO, EMO
- Joseph Mtewa, Crops Officer
- Gladson Chatayika, World Vision
- Shynet Botomani, FUM
- Aaron Kalamile, CADECOM

Farmers

- Farmer groups in Dedza and Ncheu

USAID-Malawi

- John Edgar

Prior to the field visits, skype and/or email discussions were held with Carlos Azzari – IFPRI-M&E, Kwesi Atta-Krah – IITA-Director Humidtropics, Per Hilbur – IITA consultant-R4D platforms, and Jeroen Groot, farming systems, WUR Netherlands.

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Annex 5: Africa RISING PhD and MSc students

Student	G	Country of origin	Country of Research	Africa RISING Supervisor	University	Degree	Period
Semeni Ngozi (iAGRI)	F	Tanzania	Tanzania	Per Hillbur	Egerton, Kenya	MSc	2015
Marco Sanka (iAGRI)	M	Tanzania	Tanzania	Per Hillbur	Makerere, Uganda	MSc	2014
Maria Klerfelt Johansson	F	Sweden	Tanzania	Per Hillbur	Gothenburg, Sweden	BA	2014
Marcus Bengtsson	M	Sweden	Tanzania	Per Hillbur	Gothenburg, Sweden	BA	2014
Christopher Msongore	M	Tanzania	Tanzania	Adebayo Abass	SUA, Tanzania	MSc	2013 - 2014
Chacha Nyangi (iAGRI)	M	Tanzania	Tanzania	Fen Beed	SUA, Tanzania	MSc	2013 - 2014
John Joseph Malley	M	Tanzania	Tanzania	Fen Beed	SUA, Tanzania	MSc	2014 - 2015
Leonard Joseph Marwa	M	Tanzania	Tanzania	Ben Lukuyu	SUA, Tanzania	PhD	2014 - 2017
Alphonse Haule	M	Tanzania	Tanzania	Ben Lukuyu	SUA, Tanzania	MSc	2014 - 2015
Mawazo Shitindi (iAGRI)	M	Tanzania	Tanzania	Mateete Bekunda	Tuskegee, USA	PhD	2013 - 2016
Gregory Sikumba	M	Zambia	Tanzania	Ben Lukuyu	Nairobi, Kenya	PhD	2013 - 2016
Isaac Jambo	M	Malawi	Tanzania, Malawi & Zambia	Mateete Bekunda	Wageningen, Netherlands	PhD	2014 - 2017
Michelle Hockett	F	USA	Malawi	Robert Richardson	MSU, USA	MSc	2013 - 2014
Alex Smith	M	USA	Malawi	Sieg Snapp & R Chikowo	MSU, USA	MSc	2013 - 2014
Sarah Kopper	F	USA	Malawi	R Richardson	MSU, USA	PhD	2014-2017
Timothy Silberg	M	USA	Malawi	Sieg Snapp & R Chikowo	MSU, USA	PhD	2014-2017
Edward Mzumara	M	Malawi	Malawi	Wezi Mhango	LUANAR, Malawi	MSc	2013 - 2014
Soflet Mwafulirwa	F	Malawi	Malawi	Agnes Mangwela	LUANAR, Malawi	MSc	2013 - 2014
Erin Anders	F	USA	Malawi	Sieg Snapp & R Chikowo	MSU, USA	PhD	2013 - 2016
Justin Chipomho	M	Zimbabwe	Malawi and Zimbabwe	Sieg Snapp & R Chikowo	Zimbabwe	PhD	2013 - 2016

Annex 6: Work plans and work themes, 2012-2016

Area	2012-13	2013-14	2014-16
Tanzania	Identification of the key biophysical constraints	Crop management efficiency	Crop Management Efficiency
Babati	Introducing improved food and feed varieties	Maize Lethal Necrosis	Food storage, Value addition and Mycotoxin management
	Introducing improved fodder species	Fodder and feed	Improved Livestock Feed
	Evaluation of mycotoxin contamination	Mycotoxin contamination	
	Integrating postharvest nutrition technologies	Improved postharvest technologies	
	Promoting SI thro local phosphorus	Dietary diversification	Vegetables in farming systems
		water and nutrient flows, degradation and restoration indigenous chicken	Maize Lethal Necrosis Disease
		Socio-economic research and R4D platforms	Socio-economic research and R4D platforms
Tanzania K&K	On-farm evaluation of legume and cereals	Legumes and cereals; & MLN disease management	Technology packages for genetic intensification
	Integrated soil fertility	Soil fertility and water management	Integrated crop, soil and livestock technologies
	Crop livestock and poultry integration	Livestock and poultry management	
	Post harvest processing, utilization and nutrition	food and nutrition security	Aflatoxin mitigation
	Characterization of Africa RISING sites	R4D Innovation Platforms	Socio-economic intensification through IPs
	soil and water conservation	Lesson learning, networking and coordination	
Malawi D&N	Project coordination	Project coordination	Project coordination plus research support
	Diagnosis, characterization and situation analysis	On-farm adaptive agronomic experimentation	Integrated maize-legume production systems
	Feasibility, design and trade-offs analysis	Integration of climbing beans	
	Innovation support and technology testing	Livestock intensification	Livestock intensification
	Dissemination, impact and networking	Nutritional status improvement and diversification	Nutrition and food processing
		Dissemination, impact and networking	R4D platforms and networking