DETAILED AND FULL REPORT OF SWOT ANALYSIS - TANZANIA

General Approach and Procedure

USAID Feed the Future Sustainable Intensification Innovation Lab
Partnership Meeting with
CIAT, NARS and local institutions
S.G. Premium Resort - Nairobi Road, Arusha, Tanzania
27 and 28, March, 2014

Introduction:

To develop a successful proposal grounded in country-led and national priorities, Kansas State University (K-State) held three special events inviting potential partners to participate in an interactive meeting to assess Strengths, Weaknesses, Opportunities and Threats (SWOT) on various components of sustainable intensification (SI). The meetings were designed to seek input on identification of a geographical focus, existing knowledge, priorities, gaps, and the potential for partnerships. In addition, the K-State team was interested in identifying needs in geospatial and farming systems research, capacity building, gender, nutrition, appropriate scale mechanization and effective communication strategies for the local partners.

These participatory events produced volumes of useful information that serves as the foundation, focus, and rationale for the proposed SIIL. As indicated in the proposal, the selection of the of the geographical focus, countries, partners, and areas of inquiries were based on the country-defined priorities and with active engagement of the various stakeholders, value chain partners, government organizations, national agricultural research systems (NARS), international centers including Consultative Group on International Agricultural Research (CGIAR) centers, non-governmental agencies (NGOs) and private industry.

This report provides an overview of the facilitated sessions, the methodology, the SWOT analyses from each event, as well as participant documentation from the sessions. The report is organized by providing a summary table of the results from the combined SWOT analyses sessions that provide the evidence for the areas of inquiry that SIIL will concentrate, along with the individual results from each country. The results sections include the agenda from each event, the participant list, and the results from the meetings. Interestingly, despite the geographic difference of the regions the SI needs were very similar.

Methodology:

In order to seek input from a variety of participants in Eastern and Southern Africa, meetings were held in three different locations. The first meeting was held at SG Resort in Arusha, Tanzania on 27th and 28th March, 2014 in partnership with the International Center for Tropical Agriculture (CIAT) and Selian Agricultural Research Institute (SARI) in Tanzania.

Twenty-four participants (10 females and 14 males) attended the Tanzania event. Each agenda reflects the availability and needs from the host country, and therefore have slight variations in regard to time and sequence. The Tanzania event was scheduled for two days. Each event covered similar topics as described above, and all three covered a SWOT analysis exercise. Participants were asked to brainstorm ideas and compile feedback on various aspects in regard to SI.

For clarification purposes, a SWOT analysis is a strategy commonly used in strategic program planning. It provides a simple framework for an entity to scan both the internal and external environment. The SWOT analysis provides information that is helpful in matching the entity's resources and capabilities to the environment in which it operates. It also acts as a filter to reduce the information generated through the exercise to a manageable number of key issues.

As the name implies, a SWOT analysis consists of four categories: strengths, weaknesses, opportunities, and threats. These categories can further be defined as either internal or external factors. Strengths and weaknesses are often internal to an entity. Opportunities and threats tend to be external factors, often beyond the control of the

entity/organization, but that impact and/or influence operations. The following matrix presents the components of the SWOT analysis.

SWOT Matrix	Competitive Advantages	Institutional Challenges
Internal Factors	Strengths	Weaknesses
External Factors	Opportunities	Threats

A number of questions guide the SWOT analysis. Participants were asked to consider the following questions as they worked through the exercise:

Strengths:
- In regard to SI, what do we do well?
- What areas are vibrant and healthy, or distinctively positive?

Weaknesses:
- What do we do less well?
- What areas of "weakness" do we encounter?

Opportunities:
- What are the needs of the stakeholders, and what trends can we take advantage of?
- What is changing in the community or in society?

Threats:
- Are there new rules and regulations that place demands and limits on the stakeholders?
- What is changing in the community or country that will impact us?

During the SWOT exercise, each participant received sticky notes, three for each SWOT category. The participants were instructed to work individually and write down three strengths, weaknesses, opportunities, and threats on the sticky notes, representing each of the four SWOT quadrants. Once all the quadrants were complete, participants were asked to group like ideas and then label the "cluster."

The participants reflected on the outcomes from their activities and agreed that the clusters were representative of the assets, opportunities, and challenges as it relates to sustainable intensification.

The facilitators at all three sessions reminded the participants that the purpose of the exercise was to generate ideas and feedback, not come to consensus on any particular item or issue. Rather, it was entirely conceivable that an issue could be identified in multiple categories (i.e., be both a strength and a weakness). As such, all ideas posted on the walls were documented and are included in the results section.

Tanzania: Agenda

Feed the Future Sustainable Intensification Innovation Lab
Partnership Meeting with Kansas State University
S.G. Premium Resort - Nairobi Road, Arusha, Tanzania
27 and 28, March, 2014

Program Outline

DAY ONE:		
8:00 - 8:30 a.m.	Registration	
8:30 - 8:40 a.m.	Welcome remarks	Mr. Jean-Claude Rubyogo and Dr. Deborah Bossio, CIAT
8:40 - 8:50 a.m.	Official Opening	SARI-Director - Dr. Mboyi Mugendi
8:50 - 9:00 a.m.	Introduction of participants	
9:00 – 9:10 a.m.	Program Overview and Plan of Action: Why are we here? What are you being asked to do? What will be the results from our time together?	Dr. Gary Pierzynski and Dr. Jan Middendorf, Kansas State University
9:10 - 9:25 a.m.	Overview of Sustainable Intensification Innovation Lab	Dr. P.V. Vara Prasad and Dr. Gary Pierzynski, Kansas State University
9:25 - 10:10 a.m.	Discussion of Sustainable Intensification What does sustainable intensification mean to you and your organization at the Local level; Regional level, and/or; National level?	Moderated by Dr. Jan Middendorf
10:10 - 10:30 a.m.	*Coffee/Tea break*	
10:30 - 1:00 p.m.	Sustainable Intensification SWOT Analysis: Identify strengths for impact across the field, farm, household, community, landscape, and/or regional scales; Identify weaknesses or areas of need for impact across the field, farm, household, community, landscape, and/or regional scales;	Moderated by Dr. Jan Middendorf
1:00 - 2:00 p.m.	*Lunch*	
2:00 - 3:00 p.m.	Sustainable Intensification SWOT Analysis (continued) Identify opportunities for impact across the field, farm, household, community, landscape, and/or regional scales; Identify barriers or constraints for impact across the field, farm, household, community, landscape, and/or regional scales.	
3:00 - 4:00 p.m.	Identifying research themes, strategies, and capacity building needs based on SWOT analysis: Adaption Strategies (Farming Systems) Appropriate Scale Mechanization Geospatial Capacity and Needs	Moderated by Dr. Jan Middendorf

4:00 - 4:30 p.m.	*Break*	
4:30 - 5:45 p.m.	Identifying research themes, strategies, and capacity building needs based on SWOT analysis (continued) Impacts on Gender and Nutrition Capacity Building Needs Communication Strategies	
5:45 p.m.	Recap of Day One and Plans for Day Two	All
6:00 p.m.	Adjourn	
DAY TWO:		
8:00 - 8:30 a.m.	Welcome Back /Overview of Day 1	
8:30 - 10:00 a.m.	Discussion of national priorities in Eastern and Southern Africa: Geographical Focus Existing Knowledge	
10.00 - 10:30 a.m.	*Coffee break*	
10:30 - 1:00 p.m.	Discussion of national priorities in Eastern and Southern Africa: Priorities and Gaps	
1:00 - 2:00 p.m.	*Lunch*	
2:00 - 3:00 p.m.	Prioritization of Sustainable Intensification Innovation Lab	All
3:00 - 3:30 p.m. Wrap-up and Next Steps	Wrap-up and Next Steps	
3:30 p.m.	Closing Remarks	

Tanzania: List of Participants

Feed the Future Sustainable Intensification Innovation Lab Partners Meeting
Arusha, Tanzania, 27th and 28th March, 2014

FULL NAME	NAME OF INSTITUTION	JOB TITLE	PROFESSION	CITY, COUNTRY
Dr. Deborah Bossio	International Center for Tropical Agriculture (CIAT)	Director	Soil Science	Nairobi, Kenya
Mr. Charles S.A. Yongolo	Ministry of Agriculture Food and Cooperatives (MAFC)	Principal Agricultural Research Officer	Agric. Agronomist	Dar Es Salaam, Tanzania
Ms. Scola Ponera	Oikos - East Africa (OEA)	Project Manager	Natural Resource Management Agriculture	Arusha, Tanzania
Dr. Hellen Biseko Bradburn	Women Agriculture Development and Environmental Conservation (WADEC)	Executive Director	Agriculture Scientist-Crop Science	Arusha, Tanzania
Mr. Erwin Kinsey	ECHO East Africa Impact Center (ECHO E. Africa)	Director	MSc. Rural Dev./BSc. Animal Science	Arusha, Tanzania
Mr. Damian James Sulumo	Mtandao wa Vikundi vya Wakulima Tanzania, (MVIWATA – Arusha)	Programme Officer	Agronomist	Arusha, Tanzania
Mr. Sosthenes Kweka	Selian Agricultural Research Institute (SARI)	Principal Agriculture Research Officer	Plant Breeder	Arusha, Tanzania
Dr. Kelvin Mtei	Nelson Mandela African Institution of Science and Technology (NM-AIST)	Lecturer	Agronomist	Arusha, Tanzania
Mr. Wilfred Mariki	Selian Agricultural Research Institute (SARI)	Conservation Agriculture	Agronomist	Arusha, Tanzania
Mr. Charles J. Lyamchai	Selian Agricultural Research Institute (SARI)	Zonal Research Coordinator	Agricultural Meteorologist	Arusha, Tanzania
Mrs. Marcelina Minja	Tanzania Livestock Research – West Kilimanjaro (TALIRI)	Research Coordinator & Extension &	Processing of Dairy Products & Marketing	Moshi
Dr. Eligy J. Mussa Shirima	Ministry of Livestock and Fisheries Development (MLFD)	Principal Livestock Research Officer I	Researcher Livestock	Dar Es Salaam
Ms. Meckline Merchades Babyegeya	Tanzania Meteorological Agency (TMA)	Meteorologist	MSc Urban Environmental Management	Dar Es Salaam
Ms. Rose Matiko Ubwe	Selian Agricultural Research Institute (SARI)	Senior Agriculture Research Officer	Agricultural Socio-Economist	Arusha, Tanzania
Mr. Jackson Lyimo	Faida Market Link (Faida Mali)	Monitoring and Evaluation Officer	Agronomist	Arusha, Tanzania

FULL NAME	NAME OF INSTITUTION	JOB TITLE	PROFESSION	CITY, COUNTRY
Dr. Delphina Peter Mamiro	Sokoine University of Agriculture, Faculty of Agriculture (SUA)	Senior Lecturer	Plant Pathologist & Seed Specialist	Morogoro,Tanzania
Dr. Thomas Dubois	The World Vegetable Center (AVRDC)	Regional Director	Regional Director	Arusha, Tanzania
Dr. Kristina R. Nowina	International Institute of Tropical Agriculture (IITA) Headquarters and West Africa	Proposal Development Coordinator	Agronomist/ Scientist	Ibadan, Nigeria
Dr. Peter Craufurd	International Maize + Wheat Improvement Center (CIMMYT)	Strategy Leader, Sustainable Intensification	Agro-ecologist	Nairobi, Kenya
Dr. Catherine Madata	Agricultural Research Institute – Uyole (ARI-Uyole)	Principal Research Officer	Plant Breeder	Mbeya, Tanzania
Jean Claude Rubyogo	International Center for Tropical Agriculture/Pan Africa Bean Research	Seed Systems Specialist	Researcher	Arusha, Tanzania
Dr. John Elias Sariah	Selian Agricultural Research Institute (SARI)	Agric. Researcher	Maize Agronomist	Arusha, Tanzania
Amithay Kuhanda	World Vision Tanzania (WVT)	Associate Director, Livelihoods	Soil Science & Land Management	Arusha, Tanzania
Eva H. Ngallo	International Center for Tropical Agriculture (CIAT)	Administrative Assistant	-	Arusha, Tanzania
Prof. P. V. Vara Prasad	Kansas State University (KSU)	Professor of Crop Physiology	Professor	Manhattan, USA
Prof. Gary M. Pierzynski	Kansas State University (KSU)	Professor of Soil and Environmental Chemistry, Head,	Professor and Department head	Manhattan, USA
Dr. B. Jan Middendorf	KSU - Office of Educational Innovation and Evaluation (KSU-OEIE)	Director	Director of Evaluation Center	Manhattan, USA

A. Tanzania - SWOT Analysis: Report

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I. Discussion of Sustainable Intensification

a) What does sustainable intensification mean to you and your organization?

***Group 1*: The Meaning of Sustainable Intensification**
Is a system of production that incorporates various aspects (Agriculture systems, research, extension and involvement of beneficiaries) that expands agriculture in a sustainable manner.
Examples:

- Cereal/legumes context appropriate cropping systems that includes seed production and farmers trainings.
- Provision of effective and specific climate services information such as start and end of season rainfall, temperatures etc.
- Participatory R&D, technology development e.g. Azolla plant for nitrogen fixation in rice fields, use of composite etc.

***Group 2*:**
Is a production system that utilizes appropriate integrated technologies which are environmentally friendly in order to optimize production?
Examples:

- Conservation Agriculture
- Integrated Soil and Watershed Management (ISWAM)
- Integrated Pest Management (IPM)
- System of Rice Intensification (SRI)
- Farmer Managed Natural Regeneration (FMNR)
- Bio intensive Agriculture
- Zero grazing (Integrated Crop Livestock Management)
- Holistic Management.

Group 3: What is sustainable intensification (AGRI)?
Equitable increased productivity land, labor with minimum consequences on natural resources and humans, livestock.

- Efficiency (land, labour, capital, water)
- Equity holding, gender/age (youth)
- Diversification (enterprises/commodity)
- Biological diversification nutrition
- Market linkages/value addition (market pull)
- Favorable policy
- Infrastructure
- Standards
- Genetic resources e.g. climbing beans
- Institutional organizations
- Private sector/agri-business
- System integration.

Group 4: Sustainable Intensification

- Existence and continuity of technology
- Availability
- Adoption
- Effectiveness
- Intensification without damage to environment.

Examples

1. Conservation agriculture SIMLESA/FACASI – regional

    - Cereal – Legume intercrop (maize/pigeon pea)
    - Minimum tillage – machinery (small 2 wheel tractor)
    -

2. Crop – livestock Integration (COSTECH) – National
    - Manure vs Feed

***Group 5*: Sustainable Intensification**
Sustaining high productivity, income and nutrition without degrading the environment.

Features:

Land Management:	Proper land use plant (land tenure system) Conservation / Natural regeneration Integrated soil fertility and soil health management Proper or efficient use of inputs
Water Management:	Strategic infrastructure – irrigation schemes, watersheds, bridges Water harvesting methods Conservation of water resources (practices)
Integration of Crops/Trees and Plants:	Crop Rotations Intercropping Afforestation – integration of agroforestry with crops
Livestock Integration:	Proper and efficient use of puts Breeding resistant breeds (same with aquaculture) Pasture, forage and fodder management – integrated with crops Land holding capacity – managing resources Improved animal husbandry practices

II. Sustainable Intensification SWOT Analysis:

a) **Identify Strengths, Weaknesses, Opportunities, and Threats for impact across the field, farm, household, community, landscape, and/or regional scales**.

Strengths:

- A strong pool of available technical and indigenous knowledge
- Advanced tools for planning, targeting, scaling, monitoring, and information exchange
- Agriculture is source of income →80% of Tz are farmers, getting their daily requirement from farming
- Appropriate technologies available for different systems
- Availability of investors / donors of funds to support sustainability in agriculture
- Availability of land
- Availability of land and adaptable and indigenous livestock
- Available arable land
- Available farmers organizations
- Better use of crop residues for livestock feeding
- Capacity for research
- Crop-livestock, use of crop residues in feeding livestock
- Emerging private sector (private / public partnerships)
- Experience in collaborative research
- Farmer/stakeholders capacity; capacity for innovation
- Improved breeds/varieties of crops, livestock, pasture
- Land is available (farmers own land)
- Lot of existing knowledge and experience to use and build on
- Maize and pigeon peas intercropping in Northern and Eastern Tanzania
- Many existing networks and collaborations
- Market for produce
- Market/nutrition led crop breeding (existing)
- Meetings, workshops, networks
- Multi-disciplinary
- National Regional Policy conducive
- Participatory research for development
- Policies are in place to support Agriculture practice
- Policies which supports (Agricultural, Land) at the national level
- Productivity-based technologies
- Public private partnership existence
- Regional institutions & market & commonalities
- Research applications and usage of technologies
    - Research institutes in place
    - Willingness to collaborate, e.g., East Africa IPM-IL
    - Researchers
- Research experts exist
- Several well-researched technologies available
- Small holder farmers already handles at the same time diverse crop, livestock and forest trees
- Small mechanization is already underway
- Stock of promising technologies/innovations
- Strengthening communications pathways for disseminating technologies
- Suitable soils and agro-climate
- Supportive national policy
- There is awareness of the situation for need of sustainable intensification
- Willing farmers for transformation

Weaknesses:

- Access to information limited to urban centres
    - Weather
    - Extension
    - Market
- Agriculture not attractive as profession (by youth)
- Agriculture production "ACTS" with departments – Policy fragmentation/silos
- Agriculture production depending mostly on rainfall and not irrigation
- Bushfires
- Climate change effect
- Commodity/Staple crop focus
- Corruption in the government system
- Counterfeit agro-chemical and seeds in the market
- Crop bias
- Dependence of rain fed agriculture – irrigation only 1%
- Difficulties in scaling out technologies
- Disorganized food market; low profitability for farmers
- Fake farm input available in market
- Few human resources (Aging skilled human resources)
- Food Safety Issues
- Fragmented farmers' plots, e.g., most of them less than 5 acres
- Free marketing of agricultural inputs which jeopardize price and quality
- High dependence on grants by poor countries to rich countries or nations
- Inadequate access to financial services (farmers) in agricultural sector
- Infrastructure problems
- Lack of access to credit or financial services
- Lack of budget priorities for supporting development sectors; e.g., health or education sectors
- Lack of capital financial instability (donor dependents)
- Lack of financial stability
- Lack of incentives (farm, system, landscape) for sustainable land management
- Lack of social research
- Land tenure
- Land tenure; issues on ownership of land; gender dynamics
- Less utilization of appropriate technologies
- Limited capital for farmers to buy inputs
- Limited financial resources allocated to research
- Limited knowledge and information about sustainability
- Limited linkage between research and users
- Limited or lack of knowledge (agriculture) for small scale farmers
- Limited support from government to farmers
- Livestock crop conflict
- Low or non-implementation of good government policies that are in place
- Most investment (current) is in conventional approaches that are not climate smart
- No reliable markets for farmers produce
- Policy instability
- Poor control of climate changes and increasing environment degradations
- Poor control of market access by small holder farmers
- Poor dissemination of weather information to support agriculture
- Poor dissemination pathways of agricultural technologies
- Poor extension services – or technology transfer
- Poor research coordination
- Poor rural infrastructure
    - Roads
    - Power
    - Storage
- Siloed ministries and disciplines (lack of integration)
- Slow or poor change in farmers mindset
- Small farmers by default
- Sometimes production and markets tend to forget balancing land and other resources
- Technology push
- Too many partners to manage effectively
- Try to everything
    - Scale
    - Disciplines

- Unstable market prices
- Weak agricultural extension systems
- Weak implementation of policy (Institutional capacity for implementation)
- Weak linkages among partners along the value chain

Opportunities:

- Agro-processing industries to add value and reduce perishability
- Alternative uses of other sources of energy like gas, coal is emerging
- Availability of donor funds
- Availability of donors to support climate change adaptations
- Availability of export market that can motivate farmers to improve production/productivity
- Availability of government institutions
    - Some running costs covered by government – subvention
    - Availability of experts – certifications, increased levels of Ph.D.
- Availability of research institutes
- Availability of resources – human and physical
- Availability of scientists to provide weather information services
- Availability of skilled manpower and natural resources, e.g., land and water
- Available appropriate technologies – varieties, integrated crop management
- Banks are willing to offer loans for agricultural production and marketing
- Build on /integrate available technologies
- CA, other there technologies are effective and causing synergies of Private/Public/Faith-based institutions
- Chance or means to add value – research and outcome – to component – based research
- Competent scientists available
- Consistent policies
    - CAADP
    - NASS
    - KILIMO KWANZA
- Consumer awareness (of nutrition, standards, labels, …)
- Crop- Livestock – Forage system intensification can be sustainable equitable and environmentally friendly
- EA Regional Integration
    - Markets
- Ecosystem services landscape integration to bridge gaps
- Existence of demand for agriculture organic products
- Existence of different agro-ecological system to suite different crop/livestock production
- Existence of different agro-ecologies and farming systems
- Existence of supporting policies
- Existing similar projects
- GIS, spatial mapping are impacting pastoralist land/ water management use
- Good policies are in place
- Growing food market (national and regional)
- Improved food security
- Improved social life
- Institutions in place; e.g. ARI's Agriculture Livestock, universities
- Make a national priority – not donor-driven
- Manpower if well prepared especially, youth >60% of the population
- Natural resources
    - Arable land
    - Lakes, rivers, underground water for irrigation
- On-going research on sustainable agriculture
- Plenty of arable land suitable for agriculture including good seasonal rains
- Presence of political will – government stability
- Price subsidy (tax exemption) to agricultural inputs, e.g., agro-chemicals, agro-machineries
- Public – Private partnerships for investment; general economic growth

- Readiness/willingness in training farmers on sustainable agriculture
- Reduced time, labor and costs of producing
- Region collaboration for innovation
- Regional research networks
- Responsive farmers (ready to adapt)
- Room for introducing new crops
- SME (Small Medium Enterprises)
- Successful, ongoing intensification models/scalable
- Support of R&D institutions
- Unemployed youth/population
- Various livestock, crops, genotypes availability
- Youth as farmer businessmen
- Youths to be encouraged to work in agriculture
    - Secondary & Primary leaving
    - University graduates

Threats (Barriers):

- Aging of staffs (scientists, technicians, etc.)
- Bush Fires
- Climate Change (2)
- Climate change impacts (drought, rainfall variability)
- Climate variability (2)
- Crops and animal diseases
- Danger of linear thinking in scalability
- Decline of soil fertility
- Disease Outbreak, i.e., Rift Valley fever/ Corn lethal necrosis
- Diseases, e.g. Malaria to human resources
- Drastic changes in weather conditions
- Drought and infestation of pests and diseases in the farms
- Drought-ness
- Economic sanctions
- Emergence of new pests due to climate change (diseases, insect pests, weeds)
- Environmental degradation
- Expectant women and nursing mothers
- Green House effects and global warming?
- High costs of agro-inputs SHF fail to afford caused by increased taxation
- Ignorance
- Incentives to change
- Increasing inequity
- Increasing urbanization that creates pressure on land resulting in decrease of agricultural land
- Institutional bureaucratic delays (blocking implementation)
- Insufficient financial resources
- Lack of Crop Boards for food crops such as maize, beans, etc.
- Lack of impact orientation
- Market vs. Nutrition (it's a tradeoff)
- Migration of youth to urban areas
- Natural Disasters
- Neglect of youth, decline in quality of education at expense of quantity
    - 75:1 students/teachers
    - < 2 hrs/day tuition
    - Neglect of public school system
- No support from other institutions to "enable" impact
- Non supportive marketing policy of grains (esp. maize); Export Ban by government
- Outbreak of insect pests and diseases in crops (2)
- Pests and diseases (climate change induced), Regional trade (plants, livestock)
- Plant genetic erosion
- Policy changes
- Political instability
- Political Stability (War)
- Poor Infrastructure (Roads)
- Population growth vs. environment & food coping capacities
- Population growth vs. environment and food (coping and capacities)
- Poverty
- Privatization of seed systems/genetic resources
- Seasonal unavailability of food
- Severe drought
- Silo-thinking - difficulty to integrate different aspects
- Socio-cultural taboos and values

- Some partners fail to adhere to production-market contract, hence discouraging farmers
- Superficial Treatment of "Gender"
- Technology Push
- Terminal diseases such as HIV/AIDS and T.B.
- Trans-boundary crop and livestock diseases
- Unplanned privatization of land which drives out small farmers from traditional lands
- Unplanned urbanization which drives farmers to marginal areas
- Unpredictable weather
    - Early cessation of rain
    - Prolonged draught
    - Flooding
- Unreliable weather condition that may hamper agricultural production
- Urbanization & cheap food

III. Clusters/Concepts* Categorized by Participants:

*Clusters are organized in alphabetical order and the following letters indicate: (S) Strength, (W) Weakness, (O) Opportunity, (T) Threat/Barrier. After the clusters were created participants were asked to identify strategies to address gender, nutrition, farming systems and capacity building. All results are below.

Overarching concept: Superficial Treatment of "Gender" (T)

BIOTIC STRESSES

- Crops and animal diseases (T)
- Disease Outbreak, i.e., Rift Valley fever/ Corn lethal necrosis (T)
- Diseases, e.g. Malaria to human resources (T)
- Outbreak of diseases and pests (T)
- Outbreak of insect pests and diseases in crops (T)
- Population growth vs. environment and food (coping and capacities) (T)
- Terminal diseases such as HIV/AIDS and T.B. (T)
- Trans-boundary crop and livestock diseases (T)

Gender:

- Labor saving technologies for women (women and children men and women)
- Campaign to reduce stigma and HIV AIDS
- Compare to reduce population growth
- Educating girl child = population growth

Nutrition:

- Sensitize farmers plus consumers on post-harvest discuss / pest e specially toxins, zoonotic in livestock
- Through lab testing of new varieties prior to release

Farming Systems:

- Incorporating resistant varieties and adapted animals; IPM
- Predictive mapping
- Vaccination for poultry and livestock

Capacity Building:

- Global plant clinics (CABI), example field based training
- Strengthening boundary controls.

CAPACITY:

- Aging of staffs (scientists, technicians, etc.) (T)
- Availability of research institutes (O)

- Availability of resources – human and physical (O)
- Capacity for research (S)
- Competent scientists available (O)
- Consumer awareness (of nutrition, standards, labels, …) (O)
- Existing similar projects (O)
- Farmer/stakeholders capacity; capacity for innovation (S)
- Few human resources (Aging skilled human resources) (W)
- Ignorance (T)
- Institutions in place; e.g. ARI's Agriculture Livestock, universities (O)
- Lack of social research (W)
- Limited knowledge and information about sustainability (W)
- Limited or lack of knowledge (agriculture) for small scale farmers (W)
- Lot of existing knowledge and experience to use and build on (S)
- Meetings, workshops, networks (S)
- Neglect of youth, decline in quality of education at expense of quantity (T)
    - 75:1 students/teachers
    - < 2 hrs/day tuition
    - Neglect of public school system
- Participatory research for development (S)
- Public private partnership existence (S)
- Readiness/willingness in training farmers on sustainable agriculture (O)
- Research experts exist (S)
- Support of R&D institutions (O)
- Weak agricultural extension systems (W)

Gender:

- Deliberate effort to train women farmers
- Mainstream gender issue in development programs
- Design and develop promotional materials relevant to gender needs and context
- Awareness campaigns at all levels
- Long term training MS, PhD
- Train more women in extension
- Include youth
- Train the trainers

Nutrition:

- Radio
- Demonstration on high nutrition value genotypes
- Training of nutritionists at all levels
- Value addition on various food commodities
- Building consumer awareness of different food quality/availability, communication pathways (media, newspapers, posters, etc.)
- Training of existing staff on new innovation/technologies
- Establish linkage between research/extension/farmers to bridge the knowledge gap

Farming Systems:

- Train extensionists for whole farm system (not just commodities)
- Training of scientists on new methods (spatial systems landscape)/innovations/emerging opportunities)
- Social component to be reorganized and understood in the farming system
- New curricula development at different levels
- Documentation of success stories, case studies, make available to farmers
- On farm experimentation

CLIMATE CHANGE:

- Agriculture production depending mostly on rainfall and not irrigation (W)
- Availability of donors to support climate change adaptations (O)
- Availability of scientists to provide weather information services (O)
- Bushfires (W)
- Climate Change (T)
- Climate change (T)
- Climate change effect (W)
- Climate change impacts (drought, rainfall variability) (T)
- Climate variability (T)
- Climate variability (T)
- Dependence of rain fed agriculture – irrigation only 1% (W)
- Drastic changes in weather conditions (T)
- Drought and infestation of pests and diseases in the farms (T)
- Drought-ness (T)
- Emergence of new pests due to climate change (diseases, insect pests, weeds) (T)
- Existence of different agro-ecological system to suite different crop/livestock production (O)
- Existence of different agro-ecologies and farming systems (O)
- Green House effects and global warming? (T)
- Most investment (current) is in conventional approaches that are not climate smart (W)
- Natural Disasters (T)
- Pests and diseases (climate change induced), Regional trade (plants, livestock) (T)
- Poor control of climate changes and increasing environment degradations (W)
- Poor dissemination of weather information to support agriculture (W)
- Seasonal unavailability of food (T)
- Severe drought (T)
- Unreliable weather condition that may hamper agricultural production (T)
- Unpredictable weather (T)
    - Early cessation of rain
    - Prolonged draught
    - Flooding

Gender:

- Multipurpose irrigation systems – domestic water point, livestock troughs, irrigation stream
- Climate smart agriculture (CSA) – options for women (reduce labor)
- RWH for domestic + agriculture and livestock
- Ensure entitlement during crises
- Facilitate NR (natural resources?) plans to ensure HHS (house hold service) on fuel and water

Nutrition:

- Nutritional sensitive crop breeding
- Improve storage practices and systems
- Reduce crop loss
- Value addition
- Diversification
- Shift small livestock in drier areas
- Improve post-harvest and handling processing
- Preserve/share knowledge in wild species under severe stress

Farming Systems:

- Appropriate livestock holding capacity
- Crop and animal diversification
- Predictive targeting for adaptation
- Diversification

- Seasonal forecast
- Index Insurance
- Carbon sequestration development technologies
- Introducing drought tolerant crops
- Introduce water harvesting techniques
- Introduce index based livestock and crop insurance

Capacity Building:

- Training farmers on EWS
- Mitigation of climate change
- Prediction of Weather
- Introduction of new crops
- Training farmers on use of weather information on agriculture
- Reintroduce indigenous practices (including crop for climate change adaptation
- GIS

FINANCIAL ISSUES CAPITAL AND CREDIT:

- Availability of donor funds (O)
- Banks are willing to offer loans for agricultural production and marketing (O)
- High dependence on grants by poor countries to rich countries or nations (W)
- Inadequate access to financial services (farmers) in agricultural sector (W)
- Insufficient financial resources (T)
- Lack of access to credit or financial services (W)
- Lack of capital financial instability (donor dependents) (W)
- Lack of financial stability (W)
- Limited capital for farmers to buy inputs (W)
- Limited financial resources allocated to research (W)

Gender:

- Formalize women based self-help groups (SGH) / community based groups
- Sensitize MFI to needs of women
- Favorable policies for women
- Facilitate VSL (VICOVA)

Nutrition:

- Stimulate financial support for non-staple crops
- Banks and GIS to support groups doing processing (e.g. value addition)

Farming Systems:

- Introduction of farming contracts and crop insurance
- Policy support to increase availability of credit
- Identify viable business opportunities for farmers (especially for youth and women)

Capacity Building:

- Facilitate group information
- Training farmers to business / accounting to increase access to credit
- Banks need to understand ag production systems to be able to give loans / credit

INFRASTRUCTURE:

- Infrastructure problems (W)
- Poor rural infrastructure (W)
    - Roads
    - Power
    - Storage
- Poor Infrastructure (Roads) (T)

Gender:

- Increase water availability (domestic and irrigation) – link to item two in FS;
- Lower tariff for electricity business pumping and cooking
- Small scale distributed water development and ground water – link to item two in FS

Nutrition:

- Proper post-harvest storage structure

Farming Systems:

- Introduction of low cost hatcheries
- Small machinery for transport and processing
- Advocacy on budget allocation at LGA to improve rural infrastructure

Capacity Building

- Low tech energy solving technologies
- Renewable energy – solar energy

INPUT AVAILABILITY AND ACCESSIBILITY:

- Counterfeit agro-chemical and seeds in the market (W)
- Fake farm input available in market (W)
- High costs of agro-inputs SHF fail to afford caused by increased taxation (T)
- Price subsidy (tax exemption) to agricultural inputs, e.g., agro-chemicals, agro-machineries (O)

Gender:

- Communities' sensitization about importance of agricultural inputs
- Credit systems - equitable

Nutrition:

- Targeting inputs to non-traditional crops / livestock (rabbits) / other crops vegetables
- Promotion of traditional crops and traditional pest management
- Nutritional education and food safety issues

Farming Systems:

- Subsidies for balanced + OM, Fertilization, seeds, medicines (vet), livestock feed (holistic approach for agro livestock inputs)
- Development, enforcement of regulatory systems
- Farm inputs for IPM, and ISFM

Capacity Building:

- Impart entrepreneurship to all productive gender categories
- Expand QDS for seeds
- Training in IPM and proper use of fertilizer

- Reintroduce coops and SACCOS
- Introduce warehouse receipts and voucher systems for subsidies

LAND AND WATER USE ISSUES

- Availability of land (S)
- Availability of land and adaptable and indigenous livestock (S)
- Availability of skilled manpower and natural resources, e.g., land & water (O)
- Available arable land (S)
- Bush Fires (T)
- Decline of soil fertility (T)
- Ecosystem services landscape integration to bridge gaps (O)
- Environmental degradation (T)
- Fragmented farmers' plots, e.g., most of them less than 5 acres (W)
- Increasing urbanization that creates pressure on land resulting in decrease of agri. land (T)
- Lack of incentives (farm, system, landscape) for sustainable land management (W)
- Land is available (farmers own land) (S)
- Land tenure (W)
- Land tenure; issues on ownership of land; gender dynamics (W)
- Natural resources (O)
    - Arable land
    - Lakes, rivers, underground water for irrigation
- Plenty of arable land suitable for agriculture including good seasonal rains (O)
- Sometimes production and markets tend to forget balancing land and other resources (W)
- Suitable soils and agro-climate (S)
- Unplanned privatization of land which drives out small farmers from traditional lands (T)
- Unplanned urbanization which drives farmers to marginal areas (T)

Gender:

- To improve access to safe and clear water
- To ensure land access for women
- Water harvesting technologies at household levels
- Public education to the village traditional leaders on inheritance of land for women, children
- Identify and celebrate champion role models
- Understand women's use of resources in landscape

Nutrition:

- Develop and introduce crop varieties with high nutritive value
- Water availability and safety
- Introduce fruit trees to demarcate boundaries and contours and alley cropping
- Water harvesting for home garden (kitchen garden) (ensure year round)

Farming Systems:

- Land use demarcation needed between farmers and livestock keepers/urban areas
- Land tenure and ownership issues must be understood and advanced to ensure land access for women
- Improve irrigation systems
    - Invest in irrigation infrastructure
    - Land degradation
- Farming system design/analysis
- Introduce technologies which intensify land and water use
- Improve water conservation
- Land management trade offs
- Conservation agriculture

- Farmer-managed natural regeneration

Capacity Building:
- Create awareness on causes/effects of environmental degradation
- Degree and non-degree capacity building to youths (male and female)
- Water-user rights
- Review of village by-laws on grazing post-harvest
- Training farmers on conservation ag technologies
- Introduce water efficient crops

MARKET ACCESS:
- Availability of export market that can motivate farmers to improve production/productivity (O)
- Disorganized food market; low profitability for farmers (W)
- Existence of demand for agriculture organic products (O)
- Food Safety Issues (W)
- Free marketing of agricultural inputs which jeopardize price and quality (W)
- Growing food market (national and regional) (O)
- Lack of Crop Boards for food crops such as maize, beans, etc. (T)
- Market for produce (S)
- Market vs. Nutrition (it's a tradeoff) (T)
- Market/nutrition led crop breeding (existing)(S)
- No reliable markets for farmers produce (W)
- Non supportive marketing policy of grains (esp. maize); Export Ban by government (T)
- Poor control of market access by small holder farmers (W)
- Regional institutions & market & commonalities (S)
- SME (Small Medium Enterprises)(O)
- Some partners fail to adhere to production-market contract, hence discouraging farmers (T)
- Unstable market prices (W)
- Weak linkages among partners along the value chain (W)

Gender:
- Value addition targeting women groups / entrepreneurs
- Access to loans to women and youth as drivers of marketing and small businesses

Nutrition:
- Create demand for nutritious diversity (example recopies)
- Nutritional education

Farming Systems:
- Develop and strengthen functional market information systems (for sight)
- Anticipate changes based on urban demands
- Use ICT tools / Social Media
- Access to highly marketable varieties / crops

Capacity Building:
- Enhance knowledge of markets
- Group marketing skills
- Market info systems on mobile phones
- Business skills training

PARTNERSHIPS AND MANAGEMENT

- Availability of investors / donors of funds to support sustainability in agriculture (S)
- Available farmers organizations (S)
- Emerging private sector (private / public partnerships) (S)
- Experience in collaborative research (S)
- Limited linkage between research and users (W)
- Many existing networks and collaborations (S)
- No support from other institutions to "enable" impact (T)
- Poor research coordination (W)
- Region collaboration for innovation (O)
- Regional research networks (O)
- Responsive farmers (ready to adapt) (O)
- Too many partners to manage effectively (W)
- Willing farmers for transformation (S)

Gender:

- Participation/mainstreaming by women farmers and youth in setting research agenda
- Gender issues needs more donor attention
- Gender sensitive reporting is needed

Nutrition:

- Emphasize nutritional researchers to be engaged in the collaboration
- Document nutritional value of various foods and recipes

Farming Systems:

- Participatory evaluation of technologies by stakeholders in the value chain
- Partnership fora and platforms

Capacity Building:

- Facilitate formation of platforms/networks
- Institutional development is needed
- Strengthening relationships with public-private partnerships
    - More farmer friendly

POLICY ISSUES

- Agriculture production "ACTS" with departments – Policy fragmentation/silos (W)
- Availability of government institutions
    - Some running costs covered by government – subvention
    - Availability of experts – certifications, increased levels of Ph.D. (O)
- Consistent policies (O)
    - CAADP
    - NASS
    - KILIMO KWANZA
- Corruption in the government system (W)
- EA Regional Integration (O)
    - Markets
- Economic sanctions (T)
- Existence of supporting policies (O)
- Good policies are in place (O)
- Institutional bureaucratic delays (blocking implementation) (T)
- Lack of budget priorities for supporting development sectors; e.g., health or education sectors (W)
- Lack of impact orientation (T)
- Limited support from government to farmers (W)
- Low or non-implementation of good government policies that are in place (W)
- Make a national priority – not donor-driven (O)
- National Regional Policy conducive (S)
- Policies are in place to support Agriculture practice (S)

- Policies which supports (Agricultural, Land) at the national level (S)
- Policy changes (T)
- Policy instability (W)
- Political instability (T)
- Political Stability (War) (T)
- Presence of political will – government stability (O)
- Privatization of seed systems/genetic resources (T)
- Public – Private partnerships for investment; general economic growth (O)
- Siloed ministries and disciplines (lack of integration) (W)
- Supportive national policy (S)
- Weak implementation of policy (Institutional capacity for implementation) (W)

Gender:
- Identify and advocate on issues of injustice
- Participation and ownership
- Mainstreaming policy review

Nutrition:
- Engage nutrition researchers in this collaboration
- Public health, food safety strengthening by-laws (quarantine)

Farming Systems:
- Advocate for policies to safeguard pastoralists and open land for farming vs urbanization
- Resolve conflicts between pastoralists and farmers
- Review land privatization to investors

Capacity Building:
- Educate the public, local government, and community leaders on policies
- Representation 50F:50M
- Education scientists on how to interact with policy makers

SOCIAL AND CULTURAL ISSUES:
- Agriculture is source of income →80% of Tz are farmers, getting their daily requirement from farming (S)
- Danger of linear thinking in scalability (T)
- Expectant women and nursing mothers (T)
- Improved social life (O)
- Incentives to change (T)
- Increasing inequity (T)
- Population growth vs. environment & food coping capacities (T)
- Poverty (T)
- Silo-thinking - difficulty to integrate different aspects (T)
- Slow or poor change in farmers mindset (W)
- Small farmers by default (W)
- Small holder farmers already handles at the same time diverse crop, livestock & forest trees (S)
- Socio-cultural taboos and values (T)
- Urbanization & cheap food (T)

Gender:
- Family planning education
- Intervention to promote community sharing and activity (e.g. merry-go around)
- Gender sensitization: Equity – mainstreaming – gender balance

Nutrition:
- Affirm indigenous food / local tradition – food and practice that improve nutrition
- Post natal care of mother and babies
- Nutritional education for families and households

Farming Systems:

- Raise the status of farming my reintroducing in schools
- Change / transform world view as treading farming as viable business
- Policy balancing urbanization and farming

Capacity Building:

- Invest in public schools to equal private schools
- Awareness creating across gender categories
- Visioning and scenario building (participatory)
- Ensure interventions are socio-culturally appropriate / acceptable
- Asset management training
- Incentives for change needed

TECHNOLOGIES – AVAILABLE

- A strong pool of available technical and indigenous knowledge (S)
- Access to information limited to urban centres (W)
    - Weather
    - Extension
    - Market
- Advanced tools for planning, targeting, scaling, monitoring, and information exchange (S)
- Agro-processing industries to add value and reduce perishability (O)
- Alternative uses of other sources of energy like gas, coal is emerging (O)
- Appropriate technologies available for different systems (S)
- Available appropriate technologies – varieties, integrated crop management (O)
- Better use of crop residues for livestock feeding (S)
- Build on /integrate available technologies (O)
- CA, other there technologies are effective and causing synergies of Private/Public/Faith-based institutions (O)
- Chance or means to add value – research and outcome – to component – based research (O)
- Commodity/Staple crop focus (W)
- Crop bias (W)
- Crop- Livestock – Forage system intensification can be sustainable equitable and environmentally friendly (O)
- Crop-livestock, use of crop residues in feeding livestock (S)
- Difficulties in scaling out technologies (W)
- GIS, spatial mapping are impacting pastoralist land/ water management use (O)
- Improved breeds/varieties of crops, livestock, pasture (S)
- Improved food security (O)
- Less utilization of appropriate technologies (W)
- Livestock crop conflict (W)
- Maize and pigeon peas intercropping in Northern and Eastern Tanzania (S)
- Multi-disciplinary (S)
- On-going research on sustainable agriculture (O)
- Plant genetic erosion (T)
- Poor dissemination pathways of agricultural technologies (W)
- Poor extension services – or technology transfer (W)
- Productivity-based technologies (S)
- Reduced time, labor and costs of producing (O)
- Research applications and usage of technologies (S)
    - Research institutes in place
    - Willingness to collaborate, e.g., East Africa IPM-IL
    - Researchers
- Room for introducing new crops (O)
- Several well-researched technologies available (S)
- Small mechanization is already underway (S)
- Stock of promising technologies/innovations (S)

- Strengthening communications pathways for disseminating technologies (S)
- Successful, ongoing intensification models/scalable (O)
- Technology Push (T)
- Technology Push (W)
- There is awareness of the situation for need of sustainable intensification (S)
- Try to everything (W)
    - Scale
    - Disciplines
- Various livestock, crops, genotypes availability (O)

Gender:

- Introduce time saving technologies e.g. conservation agriculture and herbicides, water harvesting, fuel saving techniques, draft animals
- Avail crop varieties which enhance food availability at household levels e.g. early maturing varieties

Nutrition:

- Introduce postharvest technologies, including food drying, storage and utilization
- Incorporate nutrition traits in breeding
- Nutritional education
- Processing
- Introduce high nutrition genotypes
- Access to nutritious varieties and crops e.g., micronutrient rich (iron beans)

Farming Systems:

- Introduce conservation agriculture in adaptive ways
- Maximize crop/livestock intensification
- Use of most efficient irrigation systems e.g., center pivot, drip, hydroponics
- Stop the "technology push" thinking
- Ensure scalability
- Ensure system (food) stability

Capacity Building:

- Train lead farmers as trainers
- Farmer field schools (FFS)
- Degrees and non-degrees e.g. agriculture engineers, food processing, etc.
- Training of simple and available technologies
- Patenting and ownership
- Encourage youths to be innovative

YOUTH AND UNEMPLOYMENT:

- Agriculture not attractive as profession (by youth) (W)
- Migration of youth to urban areas (T)
- Manpower if well prepared especially, youth >60% of the population (O)
- Unemployed youth/population (O)
- Youth as farmer businessmen (O)
- Youths to be encouraged to work in agriculture (O)
    - Secondary & Primary leaving
    - University graduates

Gender:

- Encourage girls and women to enter agribusiness
- Ensure agribusiness schemes are equitable
- Reduce child labor / early marriages
- Seek access to land

Nutrition:

- Consumer training on nutritious food (create demand)

Farming Systems:

- Encourage market linkages and value chain strategies

- Mechanization one –stop shop
- Utilization new IT to attract youth to farming opportunities
- Encourage the use of hire services to attract youth in agribusiness opportunity (youth)

Capacity Building:

- Promote school gardens
- School syllabus update towards self-employment and creativity
- Training various entrepreneurship for above options

IV. TECHNOLOGIES AND PRACTICES – SUCCESS ADOPTION AND NON-ADOPTION AND WHY?

GROUP I
Technologies that Work:
Azolla Biofertilizer in Rice (MBEYA)
Why: Farmers saw impact (increase yield)
How: Training to rice farmers on benefits and method of technology

Irrigation Scheme in (Ruva – Area) for Rice Production
Why: Involvement of villages and village eldership (ownership- bottom up approach)

Conservation Agriculture in KARATU Area
Why: CA yield were higher and CA was less labor intensive
Simple farm implements
How: Farmers were given options and was coupled with theoretical and practical training
Farmers were given starter package of seeds
FFS on CA

Technologies that DID NOT Work:
Irrigation Scheme in MASWA
Why: District authority had minimal supervision
Misuse of funds
Lack of coordination / ownership
How: Top down approach

Poverty Alleviation Program in East MBYEA
Technology was agribusiness skills
Why: Donor driven
Village were not involved in identification of issues (not a felt need)
How: Top down
Farmers want tangible things
Alignment with stakeholder priority and donor priority
Build in concept of Change

GROUP II

Adoption Practices	(Un) Successes	Region/location
↑Cereal / Legume intercropping	a. Optimal use of land; b. Moisture / fertility use c. Less weeding d. Traditional adoption e. Spreading risk	S, E, NW, N and SH Zones
↑Use of climbing beans	a. From above	N, NW, SH, Zones
↑Micro-dosing in cereals / legumes intercropping	b. From above	N, SH Zones
↑Adding value in cereals/ legumes intercropping	f. Increased income g. Improved nutrition status h. Diversified food products i. Attract markets	E, N, SH, NW Zones
↓Introducing drought resistant crops (sorghum, millet and cassava)	(a) Bird damage, diseases, livestock encroaching, striga weed, low yields	Central Zone
↑I-2 New Castle Diseases vaccinations	j. Afford by poor k. Easy to apply l. Does not need cold storage if used before 1 week m. Chickens owned by poorest n. Local chickens have higher value	N, C, W Zones
↑↓E. Coast Fever immunization	(b) too expensive 10,000/calf o. One time in life time of animal, highly effective p. Environmental friendly	N Zone
↑Watershed management/ terraces with fodder grass, fodder trees, fruit trees	q. Water and fertilizer available r. Source of fodder, fuel, fruit, food, stakes s. reduced erosion	N Zone
↑Zero Grazing – dairy cattle/ dairy goats	a,f,g,h,i from above	All Zones
↑↓CA with ox-drawn equipment (plowing mindset, control of weeds difficult)	b,c,q above r-less labor	N
↑Hoe-based CA (FGW/FF)	s. linked to faith-based b,c,q,r, from above	N, Lake Zone
↑Producer-market groups with warehouse receipt system and voucher system	t. Input/output market access	N Zone
↑QDS (quality-declared seed) groups	u. seed availability f. from above v. improves timely availability of seeds w. affordable prices	E, NW, SH, N Zones

GROUP III

What Works:

MALAWI: Small packet voucher scheme for hybrid maize and fertilizer (cover support and subsidies)
ZIMBABWE: Planting basin – government support / subsidy under ORP or DRP
MALAWI: CA – NGO provide technical support / herbicide at subsidized rates (intensive = saving labor); legume (groundnut) price is good (incentive and rotate maize and legumes) and livestock
TANZANIA: (Rwanda/Uganda/Burundi) Climbing beans + intercrop management (staking, soil fertility, pest control). Land pressure = demand to intensify: high production three times yield; highly marketable and nutritious crop. Participatory research / PVS.

***What did not Work*:**

Legume market is poor, disorganize and inefficient
TANZANIA: voucher scheme, seed/fertilizer/ pesticide

- Voucher and inputs – not timely delivery
- Input did not reach farmers (diverted) – but vouchers were used and reclaimed
- Selected inputs that were not acceptable to farmers
- Only small number of farmers were covered
- Not enough finance for Ministry to implement
- fake inputs

CA in many places – competition for crop residue to livestock; need more investment (labor and inputs)
TANZANIA: Western region introduced agroforestry in tobacco farming – plenty of forest to cut; introduced species were not appropriate

TANZANIA: Climbing beans – stakes were not available / easy; have to be mono-cropping; and cannot be grown with maize

***Missed Opportunity*:**
Emphasis on good agronomy (timeliness, weeding, spacing, fertilizer)
Maximizing G x E x E; and Market (M); and Nutrition (N)

***What Works*:**
Small seed packets to disseminate varieties; affordable, right amount of seed, helps farmers test new varieties, benefit to women.

GROUP IV.

1. Conservation agriculture

1999-2003: 912 project, top down, worked with individual farmers (Karath, Hanang)
Failure: low adoption
Cause: no district level and extension involvement
2004-2010: Farmer Field Schools (Meru, Ansha, Babati, Hunang, Karath)
Success factors: 1) research and district and NGO and private sector, 2) district adopted and supported with credit/finance, 3) bottom up identification of problems (extension to farmer to farmer facilitators)

2. 2011 to date: (Karath, Mbulu) tillage practice (agronomy inputs) – crop husbandry process was field days, IP, demo plots
Success factors: herbicides, intercropping, innovation platforms (farmers + transporters + village leaders + agro input dealers + extension), support by village by-laws.
Challenges: crop residue management, cause – conflict for forage, mis-match to systems.
Way Forward = forage and intensive livestock

3. *Success* case: improved milk production in indigenous cattle (Sigide/Dodoma districts) 1999-date
    - cross-breeding indigenous-exotic
    - off spring survival good
    - government subsidy
    - top down but worked, supported by government
4. *Failure*: Feed conservation using wooden bailers (Sigide/Dodoma districts) 1999-date
    - lack of machinery
    - lack of feed due to drought
    - top down technology push but not suited to environment and system

GROUP V.

Failures:

Artificial insemination (Arusha pastoralists)
- Lack of storage facilities
- Low response of farmers
- Cultural beliefs

Use of wild watermelon as source of water for livestock (Kilimanjaro pastoralists)
- Relocation of resources
- Stakeholder involvement

Vegetable drying solar drier (Shinyanga)
- Lack of market
- High cost of standardization

Dent hybrid maize varieties (Highland of Tanga)
- Pool milling quality
- Poor flour after local processing

Successes:

Processing of sunflower oil (Simgida, Dodoma Manyara)
- Availability of market
- Nutrition value
- Consumer awareness
- Multiple products

Process of milk and milk products (Hari, Karatu)
- Participatory
- Multiple products
- Willingness of farmers to undertake research

Grafting of fruit trees (country-wide)
- Economic benefits
- Nutritional benefits

Detection of land mines using rats (Imorogoro)

Participatory variety selection – improved crop varieties (beans, maize) (Tanzania)
- High yielding
- Participatory
- Involvement of different stakeholders
- Acceptability

Water harvesting technologies (e.g., water pan households) (Manyara, Kilimanjaro, Tabor, Tanga)
- Farmer to farmer visits

Seed multiplication (quality declared seeds)
- Farmer training
- Extension training
- Participatory
- Demand

Improvement of local chicken use Rhode Island Red cockrels (Moshi, Karata)
- Willingness of farmers to undertake research

Participatory
Low capital

V. Communication Strategies:
Small Holder Farmers:
Strategies:

- Meetings using extension and village leaders to convene the group (Village wide and smaller group with vested interest)
- Exchange Visits
- Utilizing local or appropriate language
- Demonstrations, (e.g. Cattle shows, or farm based, can be group or individuals) at the farmers location / on-farming technologies
- Faith-based meetings – after church / local contact (i.e., trusted source) and leaders
- Farmers platforms
- Social cultural events

Medium:

- Dramas/songs
- Local radio stations
- Cultural programs
- Word of mouth
- Letters from village leaders
- Speakers (mega-phone)
- Walking, bicycling, trucks
- Traditional drums
- Cell phones / SMS
- T.V. Programs
- Shamba – Shape-up (farms)

Local Governmental Authority (extension):
Strategies:

- Field days
- Formal communication and letters, official correspondence
- Exchange visits
- Trainings
- Platforms
- Documentaries

Medium:

- Email, workshops, cell phones
- Technical Reports
- Local newspaper
- Press releases
- Involvement in activities with related costs
- Radio
- Social media, facebook, twitter
- Mobil phones
- Computers

Women and Youth:
Strategies:

- Women groups (informal and formal)
- Special events/ceremonies
- Merry-go-rounds (savings and loan programs)
- Depends on the objectives
- Schools
- Churches/faith-based
- Sports and entertainment and social events
- Agricultural shows

Medium:

- Cell phones, smart phones (when available)
- Similar strategies to the small scale farmers
- Look to intermediary groups to address those populations, e.g. NGOs, women focused type of organizations

VI. Geospatial Expertise and Needs:
Remote Sensing

- There is expertise in some organizations and they are working with some, but they need support
- Land use, indices based, mapping in flora and fauna with Maasi
- Mapping of soils

GIS

- There is expertise in some organizations and they are working with some, but they need support
- CIAT
- NARS

Crop/Soil/Water/Livestock Models

- There is expertise in some organizations and they are working with some, but they need support
- University of Dar es Salaam, for example

VII. Higher Education Needs:

- Curriculum Development strengths in all areas
- Review CAADP plan for Tanzania

- Agricultural Materials
- Agro-business
- Agronomy
- Biological Soil Management
- Biotic technology
- Engineering, Mechanical Engineering
- Farm Systems
- Food Processors
- Gender Specialists
- GIS specialists
- Librarians
- Nutritionists
- Planners
- Plant and Animal Breeders
- Social Economists

- Soil Scientists
- Statisticians
- Vocational Training

VIII. Appropriate Technologies & Limitations

What are the appropriate technologies opportunities for small share farmers and what are the limitations.
*Technologies are numbered and limitations are bulleted

- 1. Agromechanization – Ploughing, planting, weeding and sprays
  2. Artificial Insemination – for animal breed improvement.
    - Capital – limited
    - Knowledge - is limited
    - Infrastructures – poor
- 1. Value addition post-harvest processing - examples: soy milk production, fortified bean flour, avocado shampoo.
  2. Small pumps for water lifting – river and ground water irrigation
    - Scale, size, quality control, requires community involvement?; Small *(limitation for #1)*
    - Cost, cost of diesel
- THERE IS NEED FOR (make scale mechanization)
  1. Knowledge – needs training
  2. Availability
  3. Affordability
  4. We need to reduce labor, time and cost
    - Location specific (has to fit in different geographical land relief and soil types)
    - Crop type

  Way forward: Introduce the machine, training farmers→Demo, promote local manufactures, provide services – hiring, maintenance

- 1. Utilization of solar power technology to provide electricity/power at rural areas
  2. Harvesting of rain water techniques – traditional
    - Electricity used for, water pump, radio, TV, etc. *(limitation for #1)*
    - Irrigation, home use *(limitation for #2)*
  - Alternative Source of Energy – Solar
  - Alternative source of H2O – Rain

- 1. Motorized power tiller tractor with implements for youth.
- 2. Limitations:
    - Inadequate awareness
    - Low purchasing power
    - Inadequate skills
    - Maintenance capacity
    - Change of mindset for youth to like agriculture
    - Market
    - Loan for inputs
- 1. Plougher – oxen, motorized
  2. Planter
  3. Weeding – mechanized implements
  4. Thresher

5. Transport (farm produce)
6. Irrigate
7. Power
    - Inadequate exposer
    - No supply chain
    - Capital
    - Lack of understating / Lack of focus

- 1. Threshing
  2. Post-harvest processing – cleaning, sorting, milking
  3. 2 wheel tractors and transport opportunity (tillage, weeding, transport)
    - Cost, linked to:
    - Lack of local manufactures
    - No suitable local equipment available
    - Business development needs support
    - Light enough weight for women
- Appropriate Scale Mechanization: Regarding farmers, still over 90% are hoe-based (Jab or Le planters) and they should not be left out, but more efforts for ox-based technologies in No. Tanzania.
- Limitations for Mechanization:
    - Local manufacturers cannot produce efficiently w/out larger offers; they cannot afford always to produce prototypes but there is no guaranteed existing market for (e.g.) CA implements such as rippers and sub-soilers and planters (direct seeders).
    - Need for finance to promote both production of machines and for their promotion.
- 1. Oxenization: land available – small to med. / draft animals are available – e.g. donkeys, oxen
    - Labor intensive
    - Health maintenance of animals (Oxen)
- 1. Oxen – animals are available and farmers are willing to use
    - With land pressure animals are decreasing – hence animals are becoming few.

- 1. Small tractors suitable for small field plots
  2. Constant water supply for irrigation to ensure sustainable production
    - They are not available. / The introduced power tiller: most of them were not suitable because of lack of adequate research. *(limitation for #1)*
    - High cost of putting them in place; however TZ is full of rivers and lakes just pouring water to the various oceans. *(limitation for #2)*
- 1. Using tractors
  2. Artificial fertilizers
  3. Plough
    - Expensive *(limitation for #1)*
    - Limited knowledge on how to use *(limitation for #2)*
    - Time consuming *(limitation for #3)*
- 1. Cultivating Tractors
  2. Animal cultivation tools/hoes
    - They are expensive *(limitation for #1)*
    - Not all farmers can access them *(limitation for #2)*
- 1. Tillage
  2. Plough: power tillers
  3. Animal power

4. Threshers, Dryers
5. Harvesters
    - Costs for some farmers
    - Maintenance
    - Availability
    - Expertise

- 1. Tractor (ploughing and plant seeds)
  2. Power tiller
  3. Ox-plough
  4. Chemicals
    - High cost of running
    - Attainability
    - Lack of operators
- 1. Hand held motorized devices
    - Cost
    - Soil management (erosion?)
    - Gender-based
- 1. Tractorization
  2. Oxenization – ox-driven
  3. Farm implement in Agric. →simplifies work
    - Gender bias – male operated
    - Maintenance costs and spare expensive
    - Lack of skills and knowledge
- 1. Oxenization (using ox-driven implement in agriculture) – (user friendly for youth)
    - Take long term to breed good oxen
    - Not suitable for all areas especially for hilly land/areas
    - Inadequate number of experts in this field
    - Need to establish training centers
- 1. Direct seeders (planters)
  2. Crop threshers
  3. Milling machine
  - All the above operated by small tractors (e.g. 2WT or 4WT with horse power < 30)
    - Spare parts
    - Financial capability
    - Cost of fuel
    - Operators
  - Hire service can work