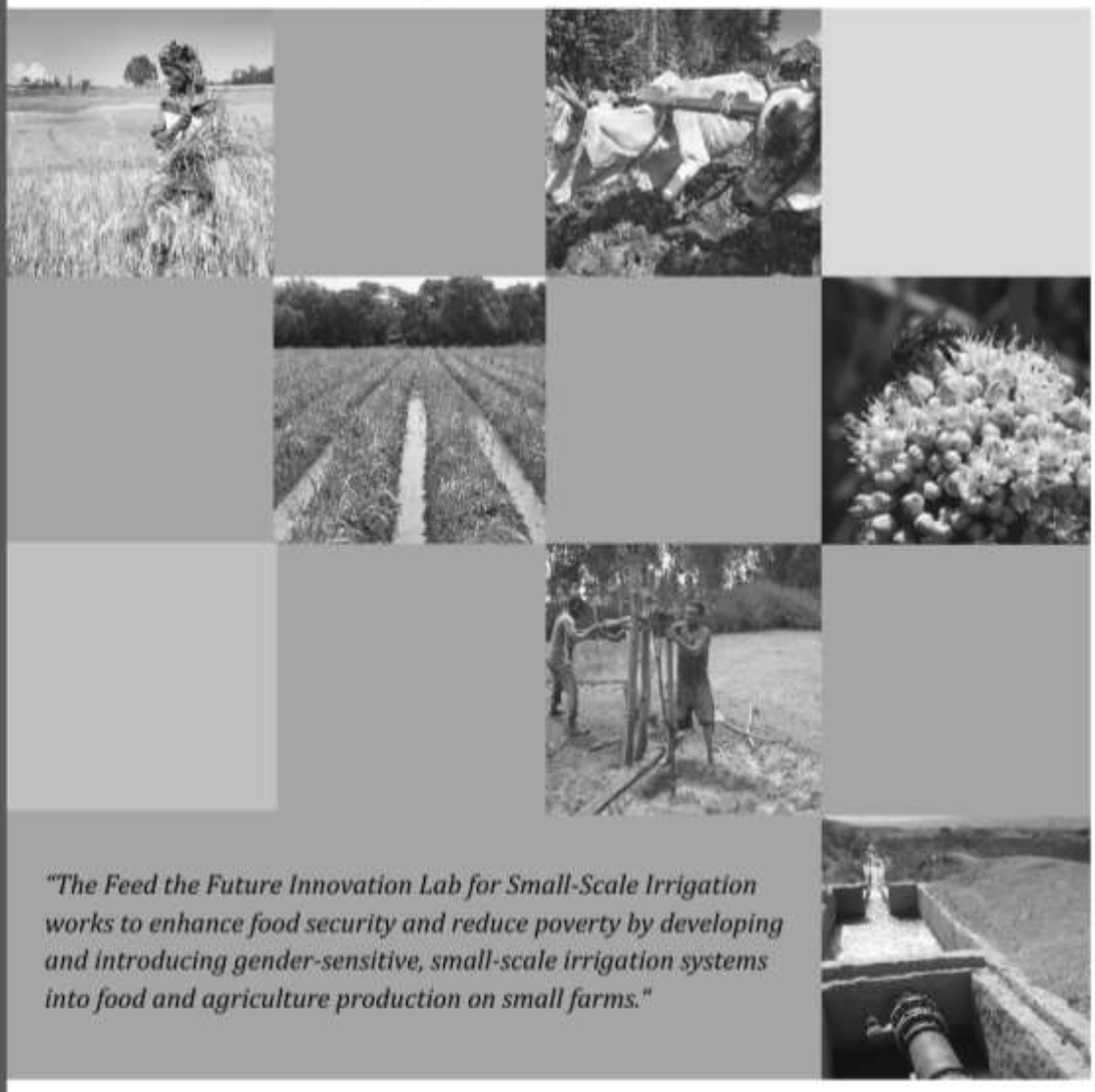
Stakeholder Consultation Report

Feed the Future Innovation Lab for Small-Scale Irrigation: Ethiopia

Proceedings documentation

Addis Ababa, 20th January 2014



"The Feed the Future Innovation Lab for Small-Scale Irrigation works to enhance food security and reduce poverty by developing and introducing gender-sensitive, small-scale irrigation systems into food and agriculture production on small farms."

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I Introduction and Background

The Innovation Lab on Small- Scale Irrigation (ILSSI) is a cooperative research project to be implemented through the United States Agency for International Development (USAID) through the Feed the Future (FtF) program. The project will be implemented in Ethiopia, Ghana and Tanzania. The project aims to increase food production, improve nutrition, accelerate economic development and contribute to the protection of the environment through a partnership and engagement approach to ensure continual learning; responsiveness to local needs, demands, and realities; complementarities with national goals and initiatives; and the uptake of outputs and recommendations by farmers, researchers, policy makers and investors. The project seeks the desired development and environmental objectives by identifying, testing and demonstrating technological options and promoting dialogue among stakeholder communities and policy makers. A research partnership comprised of the International Water Management Institute (IWMI), the International Livestock Institute (ILRI), the International Food and Policy Research Institute (IFPRI), North Carolina A & T State University led by the Texas A & M University System will collaborate with national partners to: 1) identify promising small-scale irrigation technologies, 2) demonstrate and assess feasibility of solutions, 3) develop context specific technological and strategic recommendations, and 4) train agricultural development students and professionals. The project builds on knowledge and experiences gained from earlier interventions, including the recent AgWater Solutions project.

2 Objectives of the Workshop

The first one day Stakeholder Consultation Workshop brought major stakeholders together to:

- Share experiences and lessons on promising small-scale agricultural water management and fodder integration opportunities;
- Review, discuss and propose potential water delivery and management technologies for small-scale irrigation in Ethiopia that may be field-tested and piloted under ILSSI project;
- Review, discuss and propose potential irrigated fodder technologies for small-holders in Ethiopia that may be field-tested and piloted under the ILSSI project.

Anticipated outputs from the Stakeholder Consultation were:

- Stakeholder networking for future consultation and dialogue on potential interventions.
- Identified sets of interventions, experiences and research on small-scale irrigation
- Prioritization of potential intervention for small-scale irrigation and irrigated fodder

3 Participants

Participants of the consultative workshop came from research and academia, non-governmental development organizations, relevant ministries of the Government of Ethiopia and the private sector. A complete list of participants is available in Annex 1 of this report.

4 Workshop proceedings

4.1 Opening

Dr Simon Langan (Head of Office, IWMI East Africa and the Nile Basin) welcomed participants and briefed them on the processes and efforts made towards securing the project. He mentioned that the process has been highly competitive. He described the main features of the project, the anticipated outcomes, and the activities to be carried out. He said Texas A &M University is leading the project and intends to engage multiple partners. It is being implemented in Ethiopia, Tanzania and Ghana, which were all involved in the Ag Water Solutions project. Dr Langan elaborated on the objective of scaling-out through capacity development (engagement, trial and modelling) and working on the system of water allocation (source, delivery, storage and use of water in rural agricultural communities). He said multi-stakeholder participation inclusive of farmers, NGOs, policy makers, development agents, communities and researchers are sought in the identification of potential interventions and implementation of the project. He concluded by saying this workshop was the start of a process of continued engagement for the project.

The workshop was attended by approximately 30 people drawn from the key organisations involved in irrigation (see Annex 1). From the Government of Ethiopia side this included MoA, MoWIE (Water, Irrigation and Energy) and from the research side this included national universities and CGIAR centres, as well as representatives of associated irrigation projects LIVES and Africa Rising. Following introductions by participants who briefly explained their respective areas of involvement relevant to Agricultural Water Management (AWM) and Small-scale Irrigation (SSI), Dr Alan Duncan (Senior Livestock Scientist) of ILRI gave an introduction to the consultation process and the expected outcomes. Dr Duncan mentioned the need for the research to be embedded in the research community and research programs, and for activities to be demand-driven. He said the project builds on the experiences, knowledge gained and lessons drawn from successes, as well as failures, of earlier interventions in small-scale irrigation development. He mentioned a community of practice created in the framework of the Nile Basin Initiative of the Challenge Program on Water and Food, Africa Rising and others from which the project could immensely benefit. Dr Duncan said outcomes in livelihood and nutrition improvement as well as environmental sustainability, are anticipated.

In a short exchange of ideas just before the start of presentations, remarks were made from the MoA participants that the ministries (MoA and MoFED) need to be updated and reported to regularly to ensure smooth implementation and mainstreaming into the overall development program.

4.2 Presentations

Two presentations were made in the workshop which provided the basis for discussions that followed.

4.2.1 Experiences and alternative technologies for water delivery and management

The presentation had four parts: 1) problem setting, 2) learning from previous interventions, 3) challenges and opportunities, and 4) proposed interventions. To begin, the presenter explained problems associated with extreme weather, variability of rainfall both in quantity and distribution, and the different forms of land and water degradation as they impact on the production and livelihoods of

small subsistence farmers. Dependency of the economy on rainfall, low capacity to cope with and adapt to climate change were mentioned as major challenges. Population pressure is also an underlying factor for degradation, which leads to overgrazing and deforestation, expansion of cultivation into marginal lands, and practices of unsustainable forms of natural resources. The multi-faceted consequences of watershed degradation (floods, erosion and siltation hazards) are major contributors to the problem. Tillage related problems, such as the formation of hard-pan in cultivated fields prevent water percolation, and affect production and productivity and contribute to loss of water through run-off.

Making reference to recent previous experiences, the presenter indicated the positive results gained from watershed management and rainwater harvesting in terms of surface as well as ground water recharge from which small farmers have considerably benefited. The in-situ soil and water conservation results attained through rehabilitation and turning degraded lands in to productive ones through integrated soil and water conservation measures were mentioned as experiences to draw lessons from. This situation has led to increasing adoption of smallholder irrigation technologies, in turn contributing to increased farm income, diversification of income sources, and reduced risks associated with production and with vulnerability to extreme weather events.

The presentation showed how smallholder irrigation development could be part of the solution. Successes are found in terms of small farmers' engagement in small-scale irrigation and the socio-economic benefits that have resulted. It has also shown how the marginalized, resource poor and women have benefited from engaging in small-scale irrigation.

Referring to the challenges, it was mentioned that there has not been a "one size fits all" solution and that efforts are needed to identify site specific technological solutions. Different people in different physical as well as socio-economic settings have different problems, needs and priorities that need to be considered. The challenges relating to institutions, equity, sustainability and efficiency have also been shown, which this project needs to take in to consideration. The presentation concluded that there is huge potential that could be tapped in SSI development.

In a short discussion that followed, the policy gaps and institutional arrangements were noted, particularly the lack of a legal framework on WUAs at a national level, despite some efforts in Oromia to close the gap. The proclamation under preparation at the federal level is expected to contribute to the improvement of conditions for SSI. Traditional irrigation schemes by smaller groups, although without recognized legal status, can continue as usual and can benefit from support.

4.2.2 Experiences and technologies to integrate fodder into small-scale irrigation

Dr Amare remarked that the consultative workshop was exceptional in providing a forum where fodder and irrigation experts could meet for discussions and joint action, which was not common in the past. Growing anthropogenic pressure and growing demand for livestock products were given as rationale for the integration of fodder into irrigation. In the first part of the presentation, he described the problem situation in which he showed the poor performance of the livestock sub-sector when seen against the drastically increasing demand for livestock products. Meeting growing demands for livestock products production and supply-side interventions requires the development of livestock feed to improve

quantity and quality. Under the existing situation in which there is already a huge gap/deficit in animal feed, the challenge is appears overwhelming. The monthly/seasonal livestock feed deficit in the different zones of the Amhara region were presented to show the gravity of the problem. The animal feed deficit is a problem in all agro ecologies and zones, despite the differences between them.

It was shown that the feed deficit increases during the months of the dry season and the quality of feed also declines considerably, as shown in the in-vitro digestibility test results. Under such feed quality deterioration, most of the animal feed consumed goes into covering only maintenance; it does not translate into higher productivity. The huge qualitative and quantitative gap in animal feed supply impacts negatively on the natural resource base, and contributes to increased Green House Gas emissions. The problem situation underlined the importance of integrating fodder into small-scale irrigation.

Constraints limiting the integration of fodder into small scale irrigation were outlined: lack of fodder seeds, lack of awareness on fodder crops and benefits, shortage of land, and high prices of fodder seeds. Survey results and experience in integrating fodder into SSI is shown to be limited to fodder planted on bunds, followed by alley cropping and intercropping.

The presentation concluded by showing the huge potential benefit to be gained from integrating fodder production into SSI and then explained a framework to guide the integration of fodder into SSI.

4.3 Plenary discussion and feedback

The plenary discussions were facilitated with the following guiding questions:

1. In addition to the proposed interventions, which other potential interventions would you suggest both for irrigated crop and fodder?
2. Which of the potential interventions would be the most socially beneficial, particularly for the poor farmers and women?
3. What combination of those technologies/interventions would you think would bring positive nutritional impact?
4. Which potential interventions would be the most suitable in terms of environmental impact?
5. What are the criteria we should apply in selection of intervention sites, proposing technologies/interventions in irrigated crop and fodder production?

4.3.1. Summary of discussions

Management of water resources

- Regulation: When dealing with the common resource water, it will be absolutely crucial to regulate and properly manage water use and application both from the point of view of sustainable use of water, as well as avoiding and managing conflicts.
- Institutions: Water User Associations (WUAs) are important and have a key role. A proclamation has been passed by the House of Representatives which will provide legal backing and recognition to these grass-root associations.

- Institutions and equitability: A value-chain approach will help to ensure benefit to small farmers and sustainability of small-scale irrigation. It was pointed out that this is the mandate of cooperatives and not WUAs.

Sources of water and conveyance:

- Doubt was expressed on the use of groundwater for small-scale irrigation; water development and conveyance are beyond the capacity of small farmers.
- Pilots in different ecological zones, experiences gained from the Ministry of Agriculture, the Agwater Solutions project and others suggest that shallow groundwater is a viable option.
- Regarding conveyance of groundwater, the project should look into technological options such as drip irrigation, if there are experiences with less expensive and more affordable technologies.

Socially beneficial approaches

- In-situ rainwater harvesting, ground and surface water recharging, and soil fertility management technologies (including deep tillage) are will help to make water available to small farmers and promote small-scale irrigation. This is the most socially beneficial intervention proposed.

Environmentally beneficial approaches

- Conservation-based agriculture involving watershed development-based irrigation to be the most suitable in terms of the environment.

Participatory approaches to interventions

- Building on the knowledge of farmers is important; Mekelle University has experiences to share.

Fodder irrigation:

- The focus should be on harvesting and preserving fodder from the wet season, rather than allocating/committing land to forage production where land is already scarce.
- Decisions on small-scale irrigation development interventions in specific areas need to be based on comparative analysis on competitiveness between irrigated crop production and fodder production. GIZ-SLM experiences in watershed management have shown successful, encouraging integration of fodder production in irrigation-based production of small farmers.
- It will be important to demonstrate fodder crops on farmers' plots and show different options including intercropping, relay cropping, etc. It is important to show potential economic benefits.
- Selection of the appropriate fodder species is another crucial point. Experience shows alfalfa is a good crop due to its fast growing characteristics and nitrogen fixation.
- The challenge of pests should be seriously considered.
- Unavailability of fodder crop seeds is a limiting factor. This should be considered from the point of view of livestock production, as well as income generation from the sale of fodder seed.
- Generally farmers focus on immediate benefit and land allocation to fodder could be difficult. But participants were also optimistic that some lead farmers could take the risk and try. The bottom line is to demonstrate that integrating fodder into small scale irrigation is paying when it is properly planned and executed.

- It was suggested that in addition to the proposed fodder species fodder plants such as lablab, elephant grass alfalfa should be given due consideration.
- It was also suggested that such integration should also try upstream downstream approaches and planning the upstream sites for fodder production
- Focus should be given to capacity building
- Fodder seeds are so expensive. In addition to community nursery private nursery should be promoted and seed production can be a business model
- Mechanisms to integrate perennial forage pasture into annul crop filed particularly in the intercropping model needs care
- Species selection and integration into SSI need to take the water delivery to the system and the plan into account.
- Networking and information sharing is key issue for success.
- Credit group organization and also conservation agriculture were discussed as important areas of intervention.

4.3.2. Additional potential interventions proposed

The following were proposed to be added to the priority intervention list:

1. Credit access for SSI technology adoption
2. Communal pasture/grazing land improvement and development through irrigation
3. Conservation-based agriculture techniques
4. Regulatory mechanisms for watershed development (management, benefit sharing)
5. Networking and information sharing
6. Demand-side development and intervention (fodder and livestock)
7. Promotion of water efficiency and multiple use systems (MUS)
8. River diversion for SSI where appropriate

4.4 Group work sessions: Discussions and recommendations

Priority areas of interventions proposed and those additionally suggested in the workshop were discussed by groups within the consultation for feedback, observations and recommendations.

4.4.1 Group work assignment: Identify implications for socio-economic and equity, sustainability and nutrition.

Two groups were formed to deliberate on the potential interventions based on a discussion paper shared with the participants, the presentations made and plenary discussion. The proposed potential interventions are listed below in Box 1.

Box 1. Potential Interventions for ILSSI field testing

Potential interventions proposed by the project

1. Demonstrate in-situ rainwater harvesting, ground and surface water recharging, and soil fertility management technologies (including deep tillage)
2. Analysis of gender and institutional constraints and opportunities
   - Constraints and challenges (start-up capital and taxes, etc.)
   - Financing mechanisms (e.g., credit arrangements, opportunities for pump rental markets); and
   - Possibility for private sector engagement (locally produce, assembled irrigation technologies).
3. Piloting of a combination of water lifting irrigation technologies with various water sources
   - Review/identify water sources/storage, delivery, application of irrigation water where smallholder irrigation technologies suit better.
   - Study optimum depth, groundwater recharging zones and strategies to protect them, well spacing; and types of water lifting technology that suit a specific source of water.
4. Integrating fodder into small-scale irrigation using technologies such as bund planting, intercropping, ally cropping, and community and private nursery development

Potential interventions suggested by participants

1. Credit access for SSI technology adoption
2. Communal pasture/grazing land improvement and development through irrigation
3. Conservation agriculture
4. Development of regulatory mechanisms for watershed development (management, benefit sharing)
5. Networking and information sharing
6. Demand side development/action (fodder as well as livestock)
7. Promotion of water efficiency and multiple use systems

Group 1 examined socio-economic and equity implications of the proposed priority interventions, and Group 2 discussed sustainability aspects. Both groups discussed nutrition implications. In consideration of time, the groups decided to discuss the issues across the set of proposed potential interventions, rather than dealing with each and every proposed intervention separately. The guiding questions for groups are listed in Box 2 below.

Box 2. Questions for discussion for group work

1. ***Socio-economic and equity guiding questions***
   - What are the key economic and equity issues related to the various potential interventions?
   - Within the scope of this project what action would you suggest to address socio-economic and equity issues to benefit the poor and women?
   - How does the current smallholder irrigation scheme gets institutionalized and what are the major gaps?
2. ***Sustainability guiding questions***
   - Which technologies and their combinations are most likely to be environmentally, socially and economically sustainable?
   - From social sustainability perspective, what are the key factors affecting access to the different technologies by the different social groups and women?
3. ***Nutrition guiding questions***
   - What are the major factors that limit the nutritional impacts of smallholder irrigation schemes and what would you suggest as solution?
   - What would the trade-offs (both negative and positive) be for example, if smallholder irrigation schemes focus on nutritionally rich crops and fodder?

4.4.2. Results of Group work

Socio-economic issues and recommendations

Targeting /location

1. Selection of intervention sites, farmer groups and technologies need to be based on established criteria. High rainfall areas can be targeted if justified based on actual needs for supplementary irrigation, while low rainfall areas could be targeted to meet full irrigation requirements.
2. Selection of technologies should be based on the analysis of typologies of farmers, physical, and socio-economic specificities.
3. Marginalized groups, particularly women and the poor need to be deliberately targeted and supported to engage and benefit from SSI.

Marketing Risk and opportunities

Success of SSI depends on effective market linkages for products and sustainable income to cover costs of technologies and inputs. Introduction of contract farming and provision of proper market extension are seen as solutions to minimize market risks and adequately harness opportunities.

Labor shortage

1. Labor dynamics (migration and seasonality) need to be understood in order to meet labor demands of introduced technologies, particularly during critical farm operations.

2. Gender considerations in technology selection are indicated as very important particularly to suit conditions of labor-deficient households and women.

Investment capacity

Access to credit is identified as a critical factor, particularly to cover up-front investments and technology acquisition. Linkage to microcredit and introduction of revolving fund mechanisms are considered as possible solutions. Income gap analysis provides a basis for decisions to be made and supports to be channelled.

Capacity

Training demonstrations and experience exchange visits are seen as measures to fill capacity gaps in SSI.

Water allocation

Studies on water availability, water use regulations and by-laws were identified to be critical to regulate water allocation in SSI not only to ensure sustainable use of the natural resource, but also to minimize or avoid conflicts over water.

Benefit sharing (Women, poor and marginalized)

Up-stream–downstream benefit sharing in watershed-based interventions need to be incorporated during design and implementation of SSI to benefit the landless poor, women and marginalized groups.

Irrigation and institutions

1. Understanding the linkages between irrigation and watershed development initiatives and programs is crucial.
2. Interventions need to be effectively linked to institutions and updated on institutional changes, because public institutional structures for irrigation take various forms and are evolving.
3. Marketing cooperatives and channels play significant role in irrigated agriculture.
4. Regional research institutions need to be increasingly involved in SSI development.
5. NGOs operating in different areas have valuable direct experiences and need to be included.

Sustainability issues and recommendations

According to the group sustainability is determined on the following factors:

Farmer willingness and capacity

To ensure sustainability, interventions need to be demand-driven taking into consideration priorities and suggestions of stakeholders, including farmers.

Community willingness

Communities in which interventions are made need to endorse and support SSI interventions and water use and abstraction. Grass-roots institutions, such as WUAs, are important in regulating and sustainable management of the schemes.

Context specific

1. Interventions need to be made based on thorough analysis and understanding of physical as well as socio-economic specificities.

2. Priority interventions for context specific analysis include: In-situ water harvesting; Piloting water lifting technologies; Institutes and gender; Integration of fodder
3. Rigorous analysis of costs and benefits of the introduction fodder or other crop production into the system of SSI is needed.
4. The cost of investment in technologies, as well as the operating expenses associated with them, needs to be manageable by target farmers. The operation and maintenance of the technologies should be manageable by farmers and their closest service providers.

Sustainability and impact

1. Selection of easily adaptable crops and multi-purpose animal feed has implications in terms of the benefits, as well as sustainability of interventions.
2. Environmentally sustainable should include issues such as minimizing fossil fuel consumption. It may include interventions which attract carbon credits, as well.
3. Soil improvement and soil quality (irrigation water quality) should be considered.
4. Farmer-to-farmer peer groups-learning may be useful to share knowledge. Fostering a knowledge base within the communities ensures sustainability of interventions, while peer group learning (farmer experimentation and shared learning) contributes to wider adoption (scaling up of technologies) and ensures sustained use of technologies after project closure.
5. The use of river diversions for landscapes with steeper gradients should be considered.
6. Integration of cost-benefit of the technology, the energy source, ease of operation and repair, and low operation costs need to be considered to ensure that farmers are able to access and continue to use technology beyond the project.

Nutrition issues and recommendations

Regarding nutrition**,** the group believes that SSI could by and large improve nutrition through increased food production and income. However, possible allocation of incomes derived from SSI to needs other than health and nutrition would have a negative impact. As such, education and awareness are required as part of the irrigation intervention.

4.4.3. Prioritization of interventions

Top priority interventions for socio-economic and equity impact, in order of importance:

1. Integrating fodder into small scale irrigation using technologies such as bund planting, intercropping, ally cropping and community and private nursery development
2. Piloting of a combination of water lifting irrigation technologies with various water sources.
3. Demonstrate in-situ rainwater harvesting, ground and surface water recharging, and soil fertility management technologies (including deep tillage)

Top priority interventions in respect of sustainability, in order of importance:

1. Piloting of a combination of water lifting irrigation technologies with various water sources.
2. Demonstrate in-situ rainwater harvesting, ground and surface water recharging, and soil fertility management technologies (including deep tillage)
3. Development of regulatory mechanisms for watershed development (management, benefit sharing)

4.4.4. Evaluation of the workshop

The workshop was evaluated by participants during the concluding session by an exit poll against 3 criteria: structure, content and logistics. None of the participants recorded any negative responses the majority considered all elements to be excellent and/or good.

5 Significance of the workshop

The stakeholder consultation succeeded in bringing major stakeholders together and forging working relations between them. The priority interventions proposed in the stakeholder consultation were endorsed by participants who found the interventions to be in line with government sector policies and a complement to national priorities and programs. Participants also identified potential partner institutions for future collaboration. The consultation process achieved consensus on processes and procedures to be followed in the targeting and selection of intervention sites, as well as identification of site-specific suitable SSI technologies. The workshop deliberations indicated and underlined the importance of considering and building on existing local knowledge in SSI. Participants highlighted potential bottlenecks and hindrances to be considered during implementation, while also assessing opportunities for success and improved impact.

Annex 1: List of participants

List of Participants at the Stakeholders Consultation Meeting on January 20, 2014					
No	**Name of invitee**	**Ministry/Organization**	**Position**	**Email**	**Telephone number**
1	Ato Abiti Getaneh Gebremeskel	Ministry of Water, Irrigation and Energy	Director, Research and Development	abitigetaneh@yahoo.com	911670313
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11	Mr. Diriba Geleti Challi	Ethiopian Institute of Agricultural Research-Debrezeit Center		dgeleti2005@yahoo.com	923262786
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13	Mr. Aklilu Dogisso Abbu	Send A Cow-Ethiopia	Country Director	aklilud@sendacowethiopia.org	116477233/4
14	Mr. Kinde Teshome Nida	Send A Cow - Ethiopia	Program Manager	kindet@sendacowethiopia.org	911544187

15	Firehiwot Tesfaye Firde	Send A Cow - Ethiopia	Natural Resource and Improved Animal Management Assistant Trainer	firehiwott@sendacowethiopia.org	913602298 or 116477233
16	Mr. Dejene Abesha	Minstry of Agriculture (MoA)		dejeneabesha@yahoo.com	911246267
17	Mr. Olani Witru Wakjira	iDE-Ethiopia	Program Director	kayele@ideorg.org	912188792 or 114672906/ 7/8
18	Dr Samuel Gameda	ATA/IFPRI	Director, Soil Health and Fertility	s.gameda@cgiar.org OR sam.gameda@ata.gov.et	930000344
19	Dr Girma Medhine	Private	Consultant	ggmedhin@yahoo.com	
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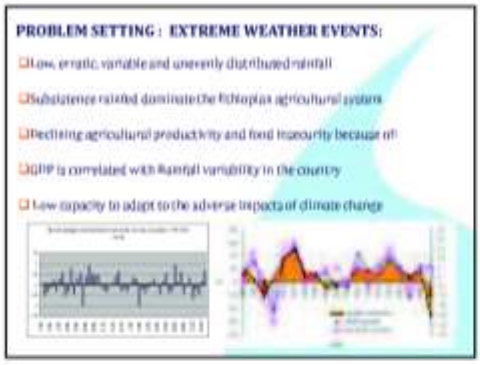
Annex 2: Presentation 1

Experiences and alternative technologies for water delivery and management



Population pressure leads to:

- Overgrazing
- Deforestation
- Expansion of cultivated land
- Unsustainable use of natural resources

Watershed degradation leads to:

- Flooding, crop damage
- Sever gully erosion
- Reservoirs siltation

- Soil management problems related to **tillage practices** lead to the development of **plough pans**
- Limit infiltration & soil water storage capacity

LEARNING FROM PREVIOUS EXPERIENCES:

I. RAINWATER HARVESTING & WATERSHED MANAGEMENT

Experience show that government and community efforts on watershed development and rainwater harvesting activities have resulted in improved ground water and stream recharge from which smallholders are benefiting in different forms.

- Some examples follow


Communities/farmers are improving food security and environmental resilience through in-situ soil and water conservation


Rehabilitated landscape
Change degraded area into productive cultivated land
Growth fruits, forage, trees
Reduce flooding and sedimentation on low-lying area


Improved crop production


Gully rehabilitation
Improved surface and ground water recharge
Enhanced access to water

- Increased in adoption of smallholder irrigation technologies
- Increased farm income
- Reduced risk of production and vulnerability to extreme weather events
- Diversified income sources

LEARNING FROM PREVIOUS EXPERIENCES:
II. SMALLHOLDER IRRIGATION TECHNOLOGIES AS PART OF THE SOLUTION

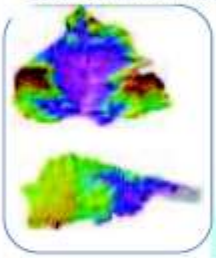
- Initiated and financed by smallholder farmers themselves
- Owned and managed individually or in small, self-initiated groups
- Areas are small, typically less than 2 ha, and technologies are low cost
- Farmers cultivate high value crops for the market
- Draws from a diversity of water sources

- Give opportunity to produce dry season cash crops for market

Offer Opportunity for female farmers to support their family

CHALLENGES & OPPORTUNITIES: CHALLENGES

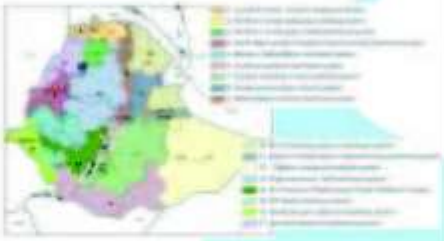
- "One fits all" approach and the challenge to identify site specific suitable technology.



Good hydrological linkages between upstream and downstream is observed when

- The watershed has concave shape and larger scale (e.g. Abraha Atsebeha)
- The watershed has permeable lithology with good storage capacity (e.g. sandstone, colluvial deposit) and sandy dominated soil texture
- No excessive use of water took place on the upstream part of the watershed

Different people in different situations have different needs.
For example, different farming systems



- Absence of institutions/systems of benefits & responsibility sharing
- lack of sufficiently detailed and accurate data and maps regarding soil, hydrogeology and water resource
- **Equity**
  - ✓ Pump-owners are generally male, better-off farmers.
  - ✓ High upfront investment costs, absence of financing tools, and limited access to investment and marketing information.
  - ✓ Limited choice, high taxes and high transaction costs.

- **Sustainability**
  - ✓ Spontaneous and unregulated phenomenon
  - ✓ Many small dispersed points of water extraction
  - ✓ Risks of resource depletion and sustainability and
  - ✓ Increase risk of conflicts between users
- **Efficiency**
  - ✓ Poorly developed equipment supply chain, low quality pumps, Lack of information and knowledge on irrigation, seeds, marketing and equipment
  - ✓ Output markets dominated by middlemen, who exercise excessive power in setting market prices.

OPPORTUNITIES:

- High Irrigation Potential (between 2.7 and 4.3 Mha, but only 7 to 10% of the potential is currently irrigated (MoA4D, 2009).
- High ground & surface water potential

- Conducive policy environment
- Diverse AWM options

PROPOSED INTERVENTIONS

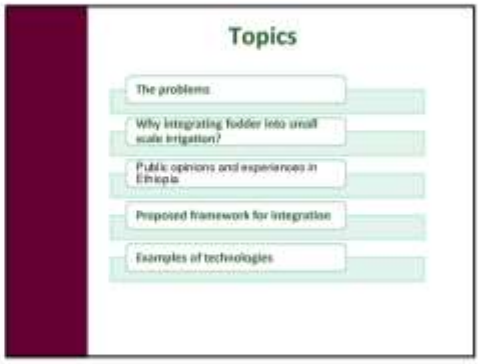
- **Piloting of a combination of water lifting irrigation technologies with various water sources.**
  - Review/identify water sources/storage, delivery, application of irrigation water where smallholder irrigation technologies suit better
  - Study optimum depth, groundwater recharging zones and strategies to protect them, well spacing, and types of water lifting technology that suit a specific source of water

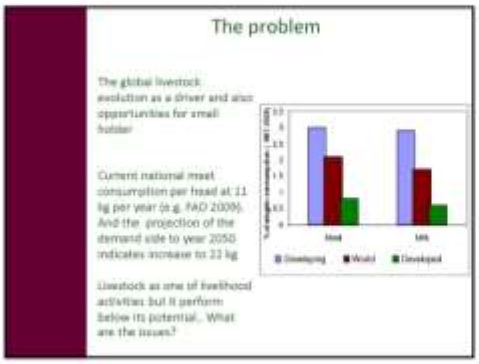
- **Demonstrate in-situ rainwater harvesting, ground and surface water recharging, and soil fertility management technologies (including deep tillage)**
- **Analysis of gender and institutional constraints and opportunities for potential interventions**
  - Constraints and challenges (start-up capital and taxes, etc)
  - Financing mechanisms (e.g., credit arrangements, opportunities for pump rental markets); and
  - Possibility for private sector engagement (locally produce, assembled irrigation technologies).

Thank You !

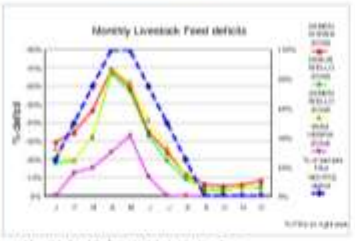
Annex 3: Presentation 2

Experiences and technologies to integrate fodder into small-scale irrigation



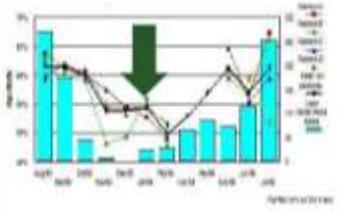


The problem



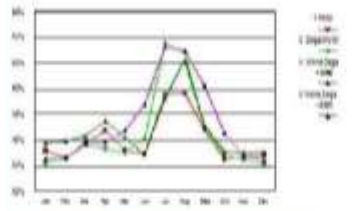
Monthly Feed Deficits in Administrative Zones,

The problem



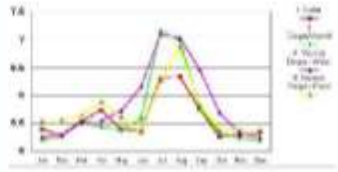
Monthly in vitro digestibility of natural pastures in four paddocks at Hirbeta Research Station 1983-1988

The problem



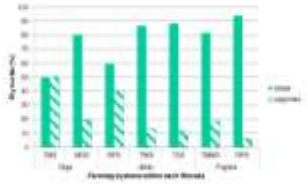
Estimated monthly natural pasture digestibility using monthly rainfall

The problem



Estimated monthly natural pasture crude protein

The problem



TMS= Teff-millet system; MSS=Maize-sorghum system; BPS= Barley-potato; TWS=Teff-wheat system; TSS=Teff-sorghum system; TMMS= Teff-maize/millet system; RPS= Rice-pulses system

Proportion of grass-legumes composition on dry matter bases in study sites: probably the only sources of supplementary feeding

The problem

Woredas	Practicing improved forage		Reasons for not practicing improved fodder production			
	Yes	No	Lack of seed	Seeds expensive	Short age-land	Lack-awareness
Diga	10.4	89.6	43.0	1.7	10.1	46.4
Jeldu	11.0	89.0	79.5	3.7	8.2	13.5
Fogera	9.7	90.3	12.5	1.7	90.9	35.8

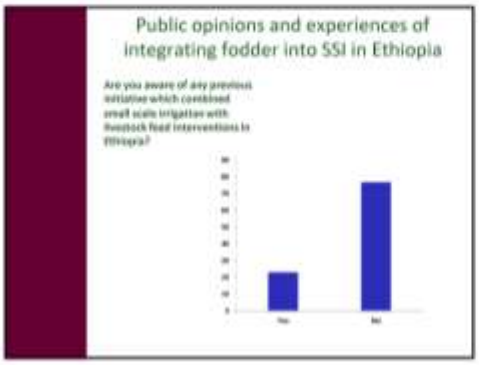
Farmers participation in improved forage production practices and major limitations

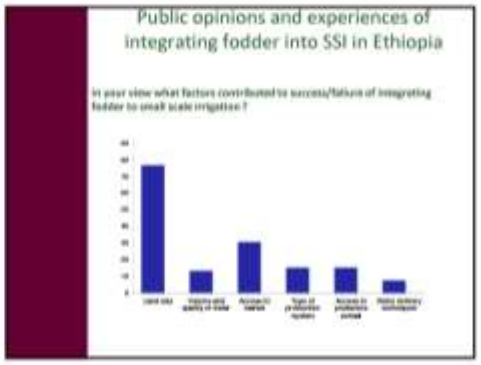
Summary: The problem

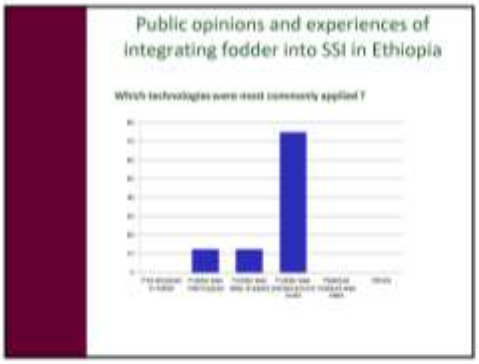
- Low availability , seasonal variation in feed quality and quantity are major problems to target market
- Because of poor quality significant part of the feed goes to maintenance-thus less productivity
- Huge demand supply gaps put pressure on natural resources
- Poor quality is also major causes of low resources use efficiencies and higher contribution to CC

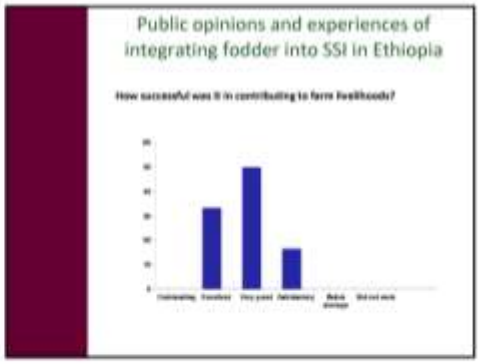
Why integration of fodder into SSI

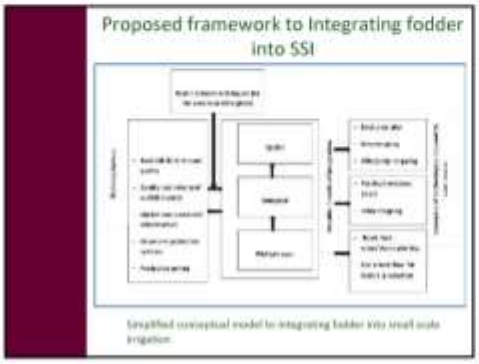
- Opportunities created because of the livestock revolution need to be captured… otherwise the big investment areas will take the opportunities
- The gap between farmers practice and potential weight gain of sheep under improved condition is high (>60% for sheep in central highland). Capturing these needs sufficient and quality feed resources.
- Creates job opportunities for landless farmers when there is sufficient market linkage

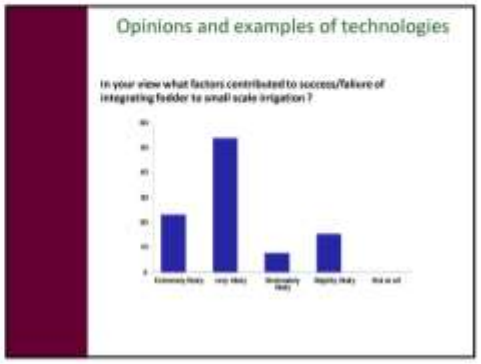

Public opinions and experiences of integrating fodder into SSI in Ethiopia
Are you aware of any previous initiative which combined small scale irrigation with livestock feed interventions in Ethiopia?


Public opinions and experiences of integrating fodder into SSI in Ethiopia
In your view what factors contributed to success/failure of integrating fodder to small scale irrigation ?


Public opinions and experiences of integrating fodder into SSI in Ethiopia
Which technologies were most commonly applied ?


Public opinions and experiences of integrating fodder into SSI in Ethiopia
How successful was it in contributing to farm livelihoods?


Proposed framework to Integrating fodder into SSI
Simplified conceptual model to integrating fodder into small scale irrigation


Opinions and examples of technologies
In your view what factors contributed to success/failure of integrating fodder to small scale irrigation ?


Thanks for your attention
ILRI