

## Innovation Lab for Small Scale Irrigation (ILSSI): Ghana

### Opportunities for small scale irrigators

Increasing food production through the use of irrigation in the dry season can improve livelihoods through various impact pathways: income generation, employment, nutrition, women's empowerment and enhanced resilience under climate change. Entrepreneurs and farmers are already leading the development of 'emerging systems' with groundwater irrigation systems (with manual or motorized pumping technologies), river or stream pumping, lowland/inland valley rice water capture systems, and private small reservoirs and dugouts.



*Farmer installing a drip kit designed by the University for Development Studies, Ghana. (Photo : Dr. Sylvester Ayambila, UDS)*

The Innovation Lab for Small Scale Irrigation (ILSSI) is identifying entry points for creating more opportunities for farmers and other actors in the irrigation space. Researchers, together with farmers and extension, are piloting ways to improve water lifting, conveyance and field distribution. Researchers are also examining mechanisms to improve access to small scale irrigation technologies for both men and women. The project assesses scaling the technologies and practices within the context of market and environmental sustainability.

### Challenges

Transitioning from subsistence, rainfed systems to commercial, supplemental irrigation requires upscaling of best-bet technologies and introducing efficient water management. Small-scale irrigation technologies must be profitable for farmers and investors. Technologies must also fit the context of the farm, the biophysical environment, and the market. At the same time, there may be market and environmental boundaries to up-scaling and expanding food production through small-scale irrigation.

### Contributing to solutions

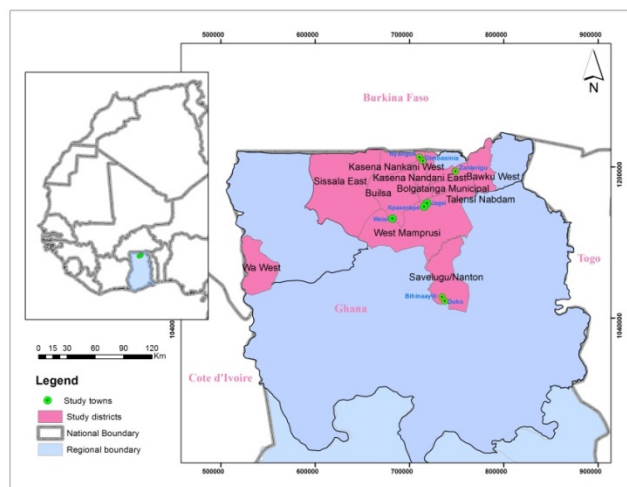
- Piloting small-scale irrigation technologies across various water sources (shallow ground and surface water, rooftop rainwater), water extraction technologies (motorized pumps), and appropriate water application (various drip systems, furrow), and irrigation scheduling tools.
- Exploring options for irrigated fodder for livestock production.
- Generating primary biophysical & socio-economic data to analyse opportunities and constraints for scaling.
- Conducting analysis on irrigation interventions from farm to watershed scale using the Integrated Decision Support System (IDSS) of models SWAT, APEX and FARMSIM.
- Identifying potential pathways between irrigation and improved nutrition and between irrigation and gender.
- Examining opportunities and constraints related to upscaling for different types of investors.
- Identifying potential business models to access small-scale irrigation for men, women and youth.

## Project partners working toward impact

The project team is working in collaboration with partners across three countries. In Ghana, the interventions are implemented, data collected and capacity developed in partnership with The University of Development Studies (UDS) and the Animal Research Institute (ARI). The Water Research Institute (WRI) has provided support for IDSS training and lab facilities. iDE are an implementing partner for one set of field interventions.

## Field level interventions and analysis: Piloting small scale irrigation with farmers

In Ghana, ILSSI has three pilot locations with around 60 female and male farmers. In all sites, ILSSI works with UDS, local Ministry of Food and Agriculture (MoFA) specialists, and farmers to pilot technologies and practices that hold potential for scaling up small scale irrigation. Farmers and local data collectors record data in on daily and seasonal practices in field books. In addition, ILSSI has installed measurement instruments in the watersheds to collect primary data. ILSSI also tests water quality to monitor and analyse different water sources considered for multiple uses. Information is supplemented by qualitative interviews and focus groups, as well as market price monitoring and base- and end line household surveys.



## Site specific interventions

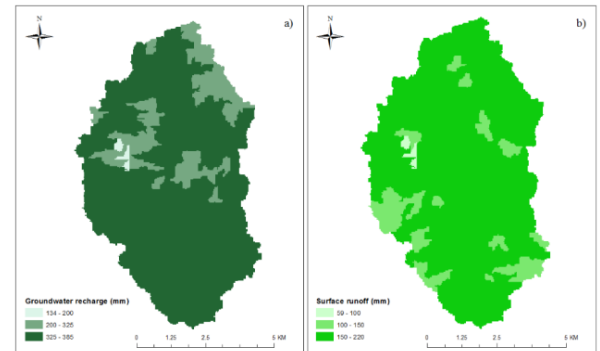
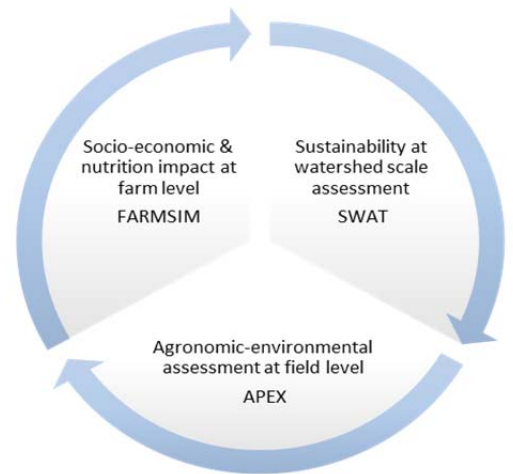
Region	District	Village	Coordinates	Water source	Intervention(s) - technologies
Northern	Savelugu	<b>Bihinaayili</b>	9 36'12.1N, 0 51'22.9 W	surface/streams	Pump, tank and hose
Upper East	Nabdam	<b>Zanlerigu</b>	10°48'11.94"N, 0°43'24.12"W	shallow ground	Pump, tank and hose
Upper East	Kassena Nankana East	<b>Dimbasinia</b>	10°54'23.57"N, 1° 2'8.31"W	shallow ground; surface	Pump, tank and drip kits
Northern	Savelugu	<b>Yemu</b>			Drip kits with conservation agriculture (iDE)

Initial analysis shows that vegetable production with small scale irrigation with pumps is profitable, but the level of profitability varies. Notably, vegetable prices are higher earlier in the irrigation season, so farmers can adjust production schedules to gain from higher prices. In addition, labor usually constitutes the primary cost for irrigators, and intense input of household labor is often not an option. Vegetables with lower labor requirements appear to offer higher profit, even though some of these

crops are neglected by irrigators. The project also shares data from other Feed the Future projects in the Savannah Accelerated Development Authority zone to ensure more robust and relevant modelling, as indicated in the map.

### Modelling scenarios with IDSS

In addition to the primary data collection described above, secondary data are obtained from national and international resources. The project uses a suite of models, SWAT, FARMSIM and APEX as an Integrated Decision Support System. Together with stakeholders and partners, the project is developing scenarios to identify opportunities and constraints at landscape and market levels for upscaling high potential irrigation technologies and practices. Ex-ante scenarios have been developed in early 2016 to test the framework of the models. Initial scenarios with primary and recently collected data are expected by late 2017 following engagement with key stakeholders to ensure alignment with national goals. To date 6 female and 65 male scholars have been trained on the use of IDSS



Sample SWAT model of Bihinaayili watershed



### Gender and nutrition analysis

A baseline survey collected data across several hundred farmers in both ILSSI and control sites in northern Ghana, with an endline survey planned for late 2017. The survey covers issues related to household and farm level production, economics, microfinance and technology access, as well as an intrahousehold module that addresses nutrition and gender.

To complement the survey work, qualitative research on intra-household decision-making was completed in 2016. This research shows that women perceive gains from participation in small scale irrigation for their household and personal well-being. Some gendered, household and community ‘rules’ influence decision-making on technologies and income, but this is a dynamic process. Women and men value joint decision-making and are adapting roles related to agriculture with the emergence of small scale irrigation.

Female farmer harvesting lettuce. (Photo : Felix Antonio, Information Services Department)

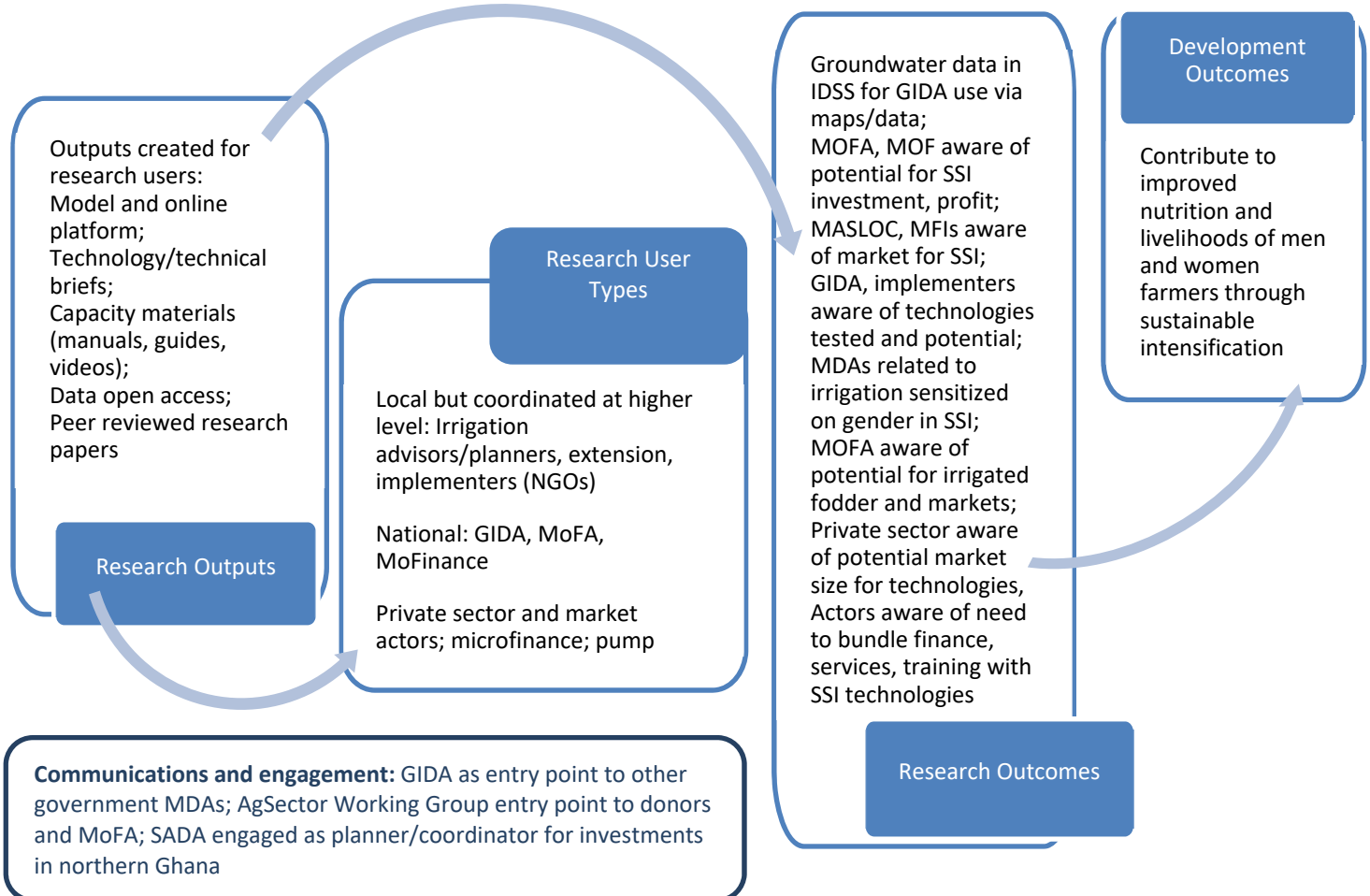
## Pathways to impact: Stakeholder engagement and capacity development

ILSSI early on engaged stakeholders to identify priority issues in small scale irrigation to support identification of pilot field interventions. ILSSI also engaged with key stakeholders and partners to ensure that model scenarios align with national goals and priorities. In 2016, in a second stakeholder workshop, participants ranked constraints for further analysis by IDSS. Along the project impact pathways, ILSSI research results are being shared with national partners and private sector actors, and more broadly across Africa. Partners are expected to use the knowledge generated from the project for scaling solutions and improving policy and practices for sustainable intensified production.

### Ranked List of Constraints for Analysis

1. Access to markets
2. Access to water lifting technology
3. Climate change
4. Access to water
5. Land tenure issues
6. Disease and pest
7. Higher labor cost for women
8. Capacity development
9. Inadequate access to inputs and labor

## GHANA: IMPACT PATHWAY FOR 2017-18



## Capacity development

Capacity development is essential for long-term impact of the project. The project engages scientists and students at UDS, as well as the WRI, to strengthen research skills and develop international journal articles and conference papers. Technical specialists, planners, students and scholars participate in training on the IDSS suite of models. The first IDSS training was held in February 2016 at WRI. The project also strengthens the capacity of farmers, extension and private sector suppliers and service providers. UDS and IWMI have trained local MoFA officers and also suppliers and service providers, such as plumbers, at the intervention sites. Pre- and post-season Farmer Forums are held to plan and then reflect on learning from field interventions. In February 2017, a farmer learning visit enabled farmers from different ILSSI sites to share experiences.



Farmers and service providers learning about the use and maintenance of motor pumps for irrigation. (Photo : Dr. Sylvester Ayambila, UDS)

## National stakeholder events

Event	Date	Location	Output
ILSSI Inception meeting	2015	Tamale	Awareness about project; Refined research design <a href="http://ilssi.tamu.edu/media/1048/stakeholder-workshop-proceedings-april-20141.pdf">http://ilssi.tamu.edu/media/1048/stakeholder-workshop-proceedings-april-20141.pdf</a>
Savannah Accelerated Development Authority event on “Enhancing research into policy and practice”	2016	Tamale	Awareness about project and expected outputs <a href="https://waterjournalistsafrika.com/2016/03/29/ghana-experts-root-for-research-on-water-land-and-ecosystems/">https://waterjournalistsafrika.com/2016/03/29/ghana-experts-root-for-research-on-water-land-and-ecosystems/</a>
Gender and policy workshop	2016	Accra	Technical brief <a href="http://ilssi.tamu.edu/media/1186/ftf-ilssi-project-note-1-gender-equality-in-irrigation.pdf">http://ilssi.tamu.edu/media/1186/ftf-ilssi-project-note-1-gender-equality-in-irrigation.pdf</a> Additional materials from the gender-irrigation capacity building event: <a href="http://ilssi.tamu.edu/workshops/ghana/gender-workshop/presentations-and-videos/">http://ilssi.tamu.edu/workshops/ghana/gender-workshop/presentations-and-videos/</a>
Constraints and opportunities workshop	2016	Accra	Ranked list of constraints for IDSS analysis <a href="http://ilssi.tamu.edu/media/1282/ilssi-project-stakeholder-workshop-report_ghana_final.pdf">http://ilssi.tamu.edu/media/1282/ilssi-project-stakeholder-workshop-report_ghana_final.pdf</a>

## List of knowledge products for Ghana to date

- Evidence for upscaling of dry season irrigation technologies: Market opportunities, IWMI (joint with Africa RISING)
- Decision analysis tool for SSI and drip, IWMI
- Analysis of Water Quality of Selected Irrigation Water Sources in Northern Ghana, IWMI
- Agro-climatic and hydrological characterization of selected watersheds of northern Ghana, IWMI (joint with Africa RISING)
- Gender-related small scale irrigation constraints, Ghana: Results of focus group discussions, IWMI and UDS
- Brief on gender equality in irrigation based on three gender-irrigation trainings
- Small-Scale Irrigation Applications for Smallholder Farmers in Ghana Ex Ante Analysis of Options
- Ex Ante Analysis of Small-Scale Irrigation Interventions in Bihinaayili
- Ex Ante Analysis of Small-Scale Irrigation Interventions in Zanlerigu
- Ex Ante Analysis of Small-Scale Irrigation Interventions in Dimbasinia
- Report on Ghana IDSS workshop
- Stakeholder consultation report Ghana
- ILSSI Stakeholder workshop report Ghana

**Further information:** This handout has been developed by the Feed the Future Innovation Lab for Small Scale Irrigation (ILSSI; [ilssi.tamu.edu](http://ilssi.tamu.edu)). For more information on this project in Ethiopia, contact: **Dr. Neville Clarke, Innovation Lab Director**, ([Neville.Clarke@ag.tamu.edu](mailto:Neville.Clarke@ag.tamu.edu)) and **Mr. Matt Stellbauer, project manager** (e-mail: [Matt.Stellbauer@ag.tamu.edu](mailto:Matt.Stellbauer@ag.tamu.edu))

[www.feedthefuture.gov](http://www.feedthefuture.gov)