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Implementing SSI at farm level: results from the field interventions

Presented by Nicole Lefore (IWMI) on behalf of ILSSI partners: IWMI, ILRI and NCAT

ILSSI Symposium January 31st, 2018

Photo: David Brazier, IWMI

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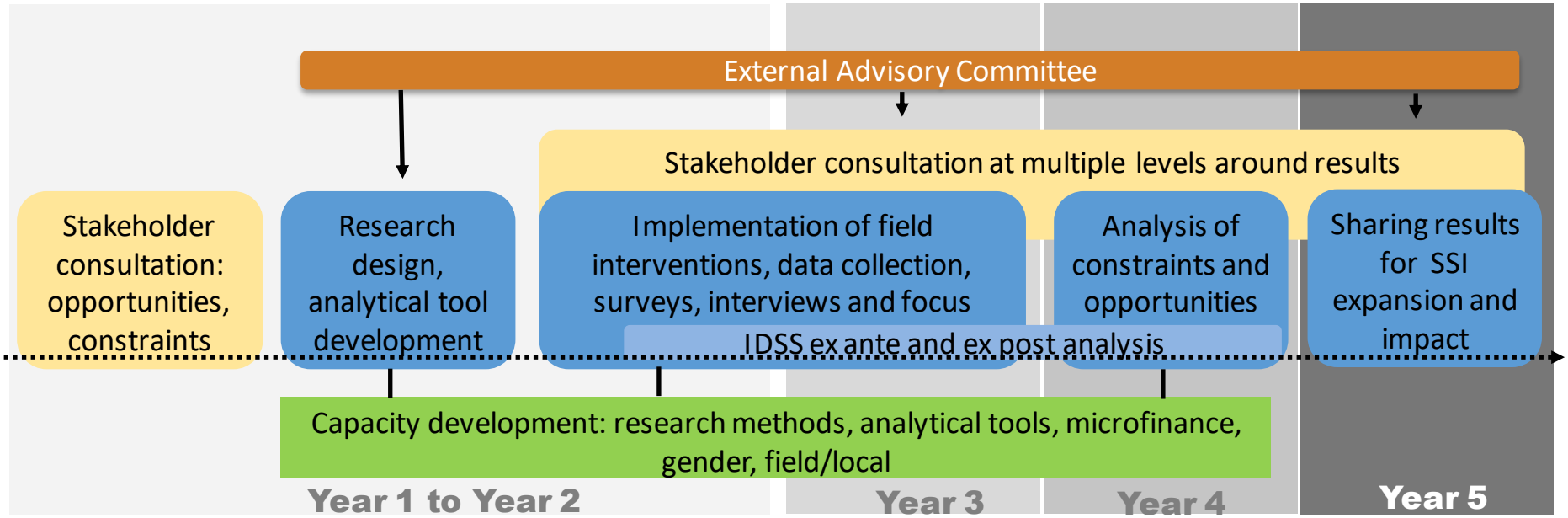
OUTLINE

1. Introduction to ILSSI field interventions
2. Emerging key messages
3. Pathways and considerations for scaling up

DEMAND DRIVEN RESEARCH

Sites, interventions, constraints analysis based on **continual engagement, national partnerships** and **capacity development** at multiple levels.



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ILSSI FIELD INTERVENTIONS

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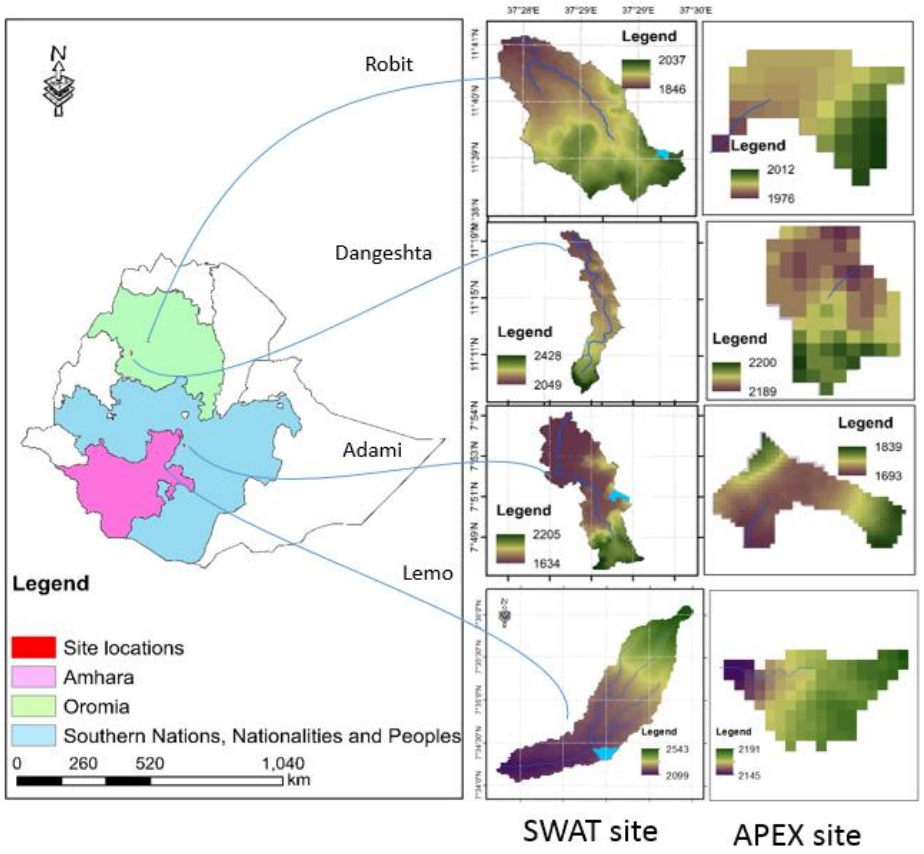
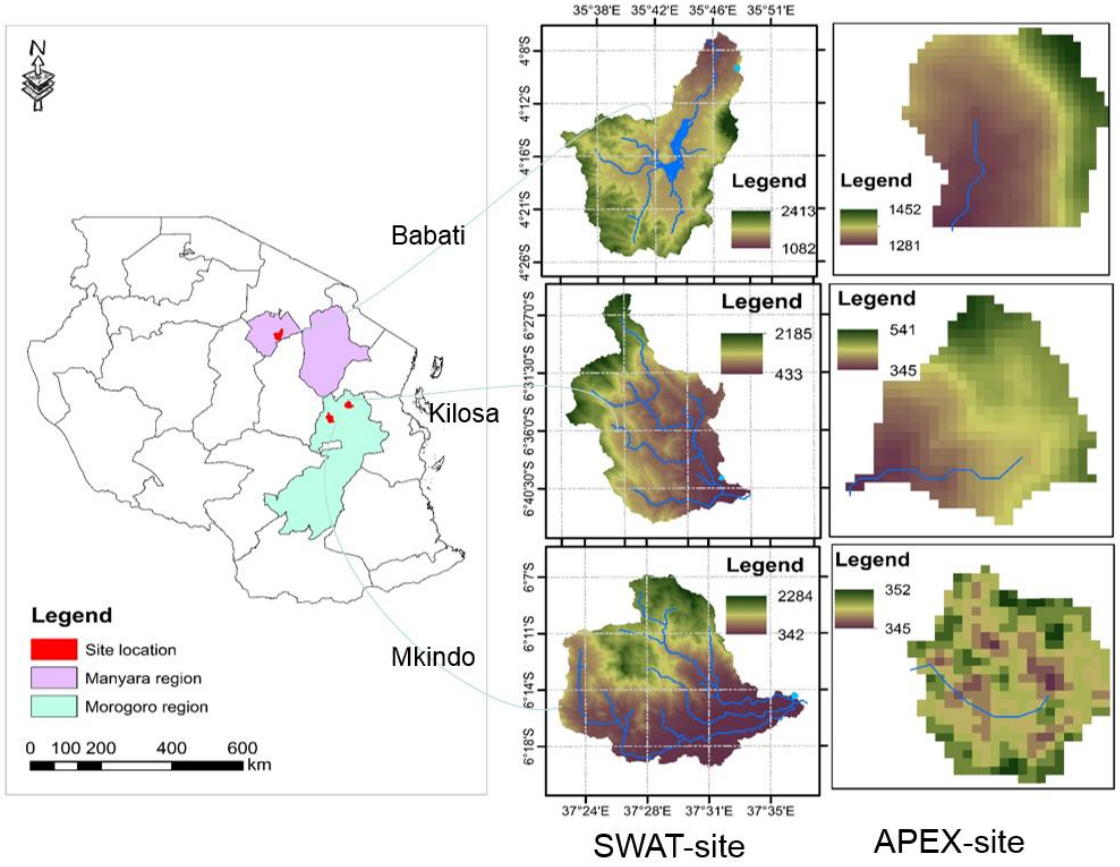
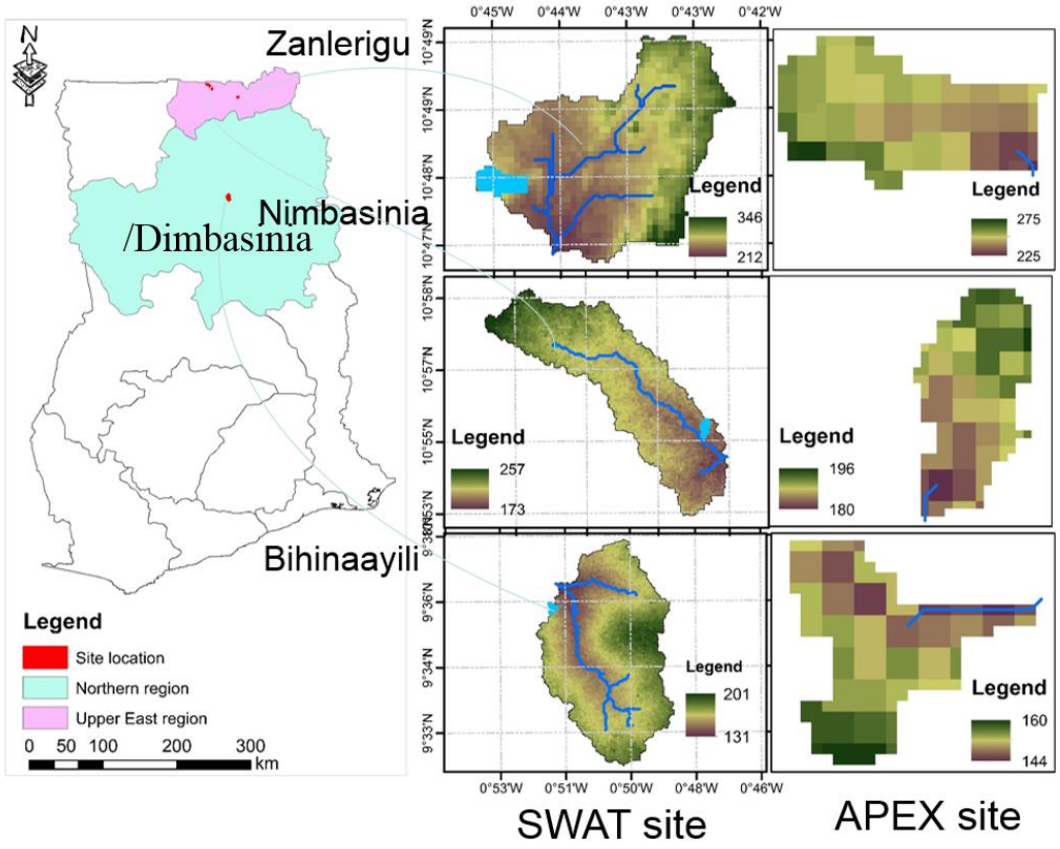
ETHIOPIA SITES



TANZANIA SITES



GHANA SITES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SWAT site
APEX site

EMERGING KEY MESSAGES

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SSI OFFERS PROMISING SOLUTIONS FOR ON- AND OFF-FARM BENEFITS

Emerging messages:

- SSI is **economically feasible**
- **Multiple benefits** of SSI
- SSI technologies need to be **labor saving**
- **On-farm water management** enhances benefits of water lifting
- Targeted **value chains** and **microfinance** offer entry points
- **Risks** at landscape level and opportunities for mitigation

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SSI PROFITABLE, ECONOMICALLY FEASIBLE

Emerging messages:

- Irrigating smallholder farmers are able to **exceed break even and obtain profit**, especially high value, low labor crops
- **Labor is the largest part** of SSI costs
- Repayment period for technologies varied from 6 months to 2+ years

SSI TECHNOLOGIES PROVIDE MULTIPLE BENEFITS AND INCENTIVES TO FARMERS

Emerging message: **Benefits and incentives vary** by SSI technology and context - **enables targeted outcomes**

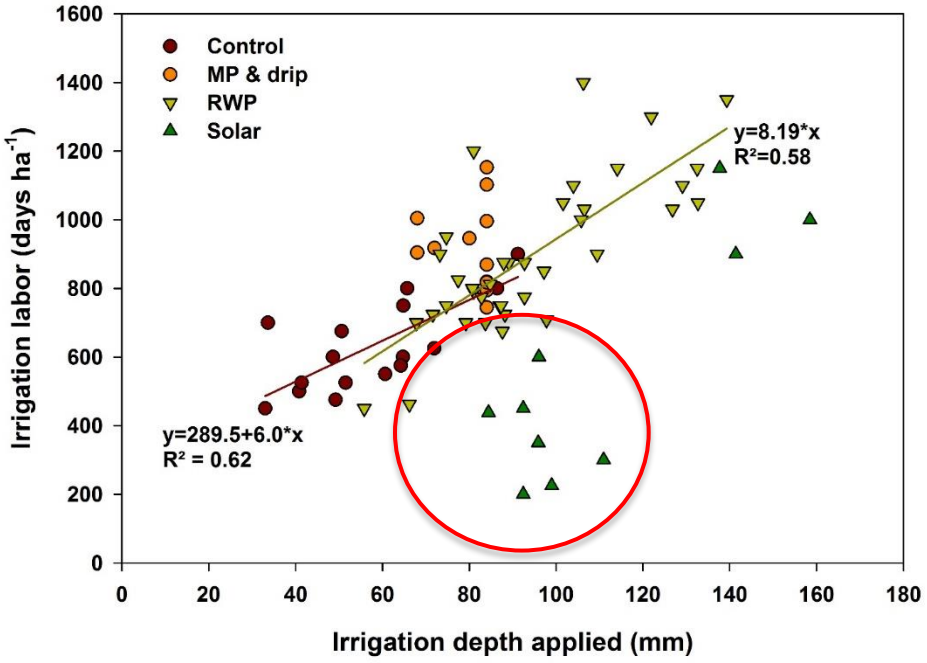
	Labor saving	Yield and/or quality	Water productivity	Profit, Higher income	Multi-purpose uses
Control	0	0	0	0	0
RW	0	0	0	-/0	+
Solar	++	+	0	++	++
Service provision: water suppliers & drip	+/-	++	++	+/-	-

Summary of the opportunities and challenges related to each of the water lifting technologies towards the control (=manual water lift from surface or groundwater).
++, + and – represent a high, medium and low effect.

LABOR SAVING TECHNOLOGIES KEY

Emerging messages:

- **Labor is major cost** – often above capital investment in technology
- Labor requirement **differs by crop and technology**
- Labor saving technologies **more profitable, preferred**
- Availability of household labor influences willingness to borrow

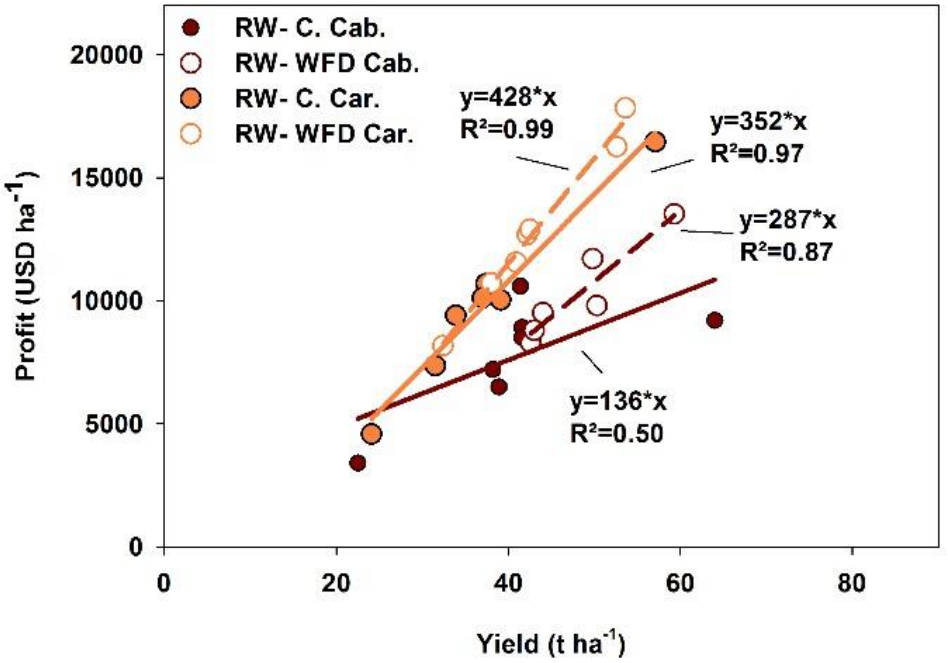


Irrigation depth applied during 2016 and associated number of irrigation labor days to irrigate one hectare

IRRIGATION SCHEDULING TOOLS IMPROVE SSI OUTCOMES

Emerging messages:

- Increase **yields, profit**
- Improve **water and productivity**
- Improve fertilizer use
- Drivers: **Reduce labor, costs**



Yield (t ha^{-1}) and corresponding profit converted to USD ha^{-1} for cabbage and carrot for the rope and washer technology (RW) when irrigation was performed without support of a WFD (control, C.) and with a WFD.

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AGRONOMIC PRACTICES ENHANCE SSI BENEFITS: CONSERVATION AGRICULTURE IN COMMERCIAL GARDENS

Emerging messages:

- **Saving potential** for water, soil, labor
- Improved **yield quantity and quality**
- Constraints: limited mulch supply, pest control, information/extension

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PATHWAYS AND CONSIDERATIONS FOR SCALING UP

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VALUE CHAIN ENTRY POINTS FOR MARKET DEVELOPMENT: IRRIGATED FODDER CASE

Emerging messages:

- Irrigated fodder a **promising cash crop and for on farm use**
- Fodder/forages (+ seed) **demand** increasing; shrinking sources
- Allocating land and water exclusively for expanding forage production

Photo credit: Aberra Adie, ILRI

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MICROFINANCE FACILITATES SCALING UP

Emerging messages:

- Microfinance access **increases likelihood to adopt** SSI technologies
- Returns show **feasibility to repay** credit for technologies
- Supply: Finance providers see irrigated production as **lower risk**
- Pump sharing groups have high conflict, smaller groups more promising

Constraints to scaling:

- Credit often not available
- High cost of credit - Farmers prefer informal or semi-formal

Photo credit: One Acre Fund

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CAPACITY SUPPORTS SCALING UP

Emerging messages:

Opportunities –

- Farmers with more **experience, training improve water productivity**
- Knowledge, experience with irrigation positively **influences willingness to borrow for SSI**

Constraints -

- Institutional capacity low on SSI
- Microfinance capacity very low

Field level trainees on water management, irrigated fodder, CA practices, microfinance:

Female: 375
Male: 907

Producers: 938
Civil servants: 115
Private sector: 36
Civil society: 193

SSI SUSTAINABILITY CONSIDERATIONS

- Farmers **benefit**, have **incentives** to adopt
- **On-farm water management** enhances benefits, mitigate risks
- **Experience, training** improves water management
- Match **technology packages suitable** to context, aim
- **Reduce labor** requirements through tech and tools
- Increase access to **finance products** and **information**
- Expand role of **private sector** supply and services
- Apply tools at multiple levels to **analyze trade-offs, and identify sustainable solutions**
- Strengthen **governance, regulatory mechanisms** to support monitoring and mitigation of risks

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GENDER, NUTRITION and OTHER OPPORTUNITIES

Presented by Claudia Ringler and Elizabeth Bryan

ILSSI Symposium January 31st, 2018

Photo: Claudia Ringler, IFPRI

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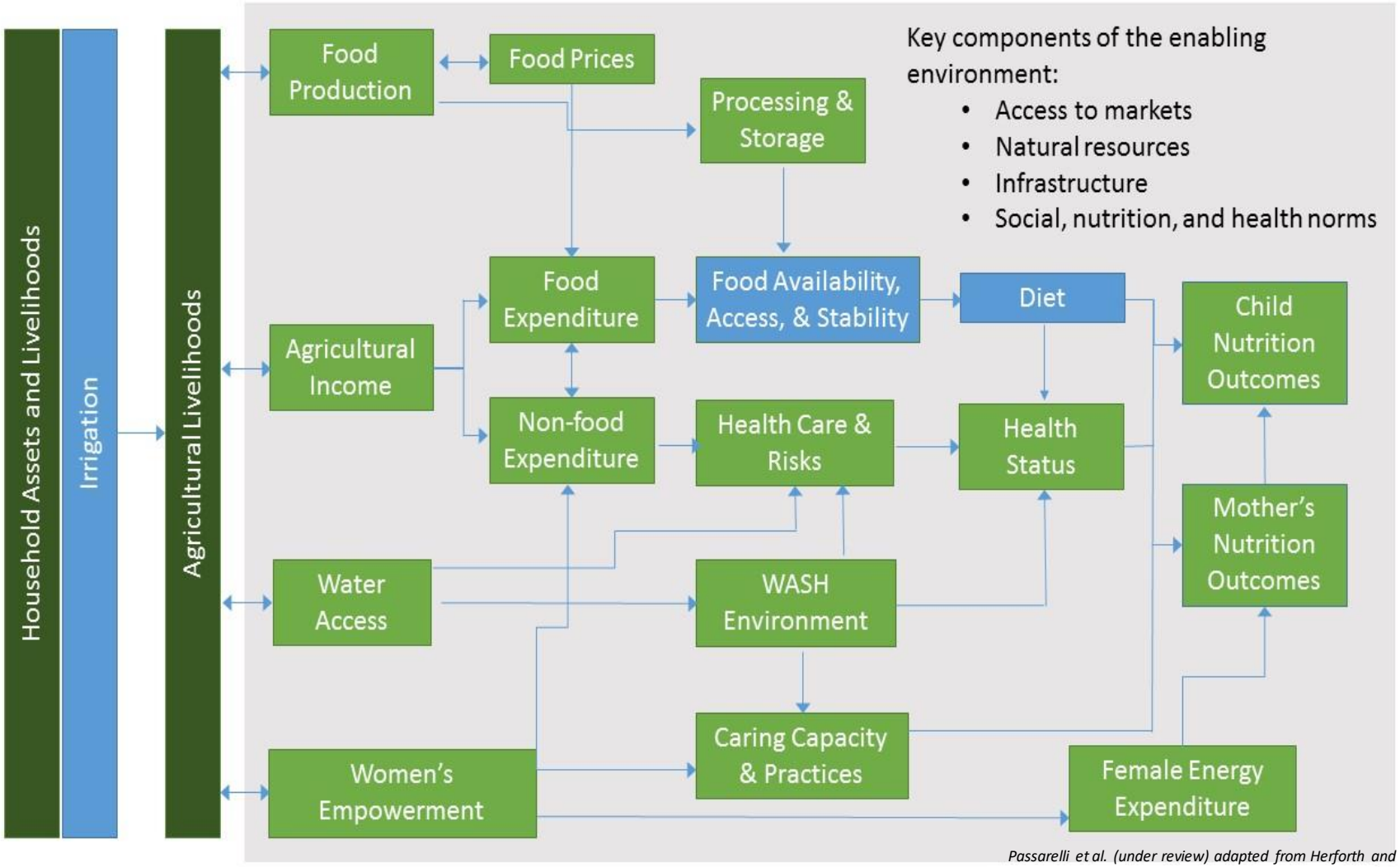
SSI CAN IMPROVE NUTRITION THROUGH SEVERAL ENTRY POINTS



Passarelli et al. (under review) adapted from Herforth and Harris, 2014

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IRRIGATORS ARE BETTER OFF (ETH)

Variable	Ethiopia		
	Without Irrigation	With Irrigation	p-value
Value of crop production in past year, USD	$907	$2,851	0.000
Total land cultivated in rainy season, hectares	1.40	1.37	0.707
Total land cultivated in dry season, hectares	0.06	0.18	0.000
Total land holdings of household, hectares	1.69	2.00	0.003
Distance to market where crops are sold, minutes	0.95	0.81	0.049
HH Food Insecurity Access Scale	5.87	3.93	0.000
TLU's owned	6.13	8.06	0.000
HH produces starch	0.99	0.98	0.438
HH produces pulse	0.57	0.42	0.002
HH produces vegetables	0.17	0.47	0.000
HH produces fruit	0.06	0.30	0.000
N	190	249	

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	Ethiopia		Tanzania		Ghana	
	Non-irrigators n=185	Irrigators n=284	Non-irrigators n=224	Irrigators n=227	Non-irrigators n=264	Irrigators n=568
	Mean					
Household food insecurity access scale, 0-27 [higher means worse]	5.78	4.04	3.92	2.58	7.19	6.40
Female dietary diversity score: number of categories consumed	3.69	3.58	3.71	4.20	3.39	3.98
Household dietary diversity: number of food categories consumed	5.69	6.06	4.88	5.63	7.19	7.52

Differences statistically significant, except diff FDDS in Ethiopia

SIGNIFICANT DIFFERENCE IN ASF CONSUMPTION FOR IRRIGATORS

- Statistically significant differences between irrigators and non-irrigators in the shares of households that consume:
  - Meats, eggs, oils and fats, vegetables, and miscellaneous groups (spices, condiments, tea, coffee, and alcoholic beverages) in Ethiopia
  - Meats, eggs, fish and sea food in Ghana
  - Meats, eggs, fish and sea food, cereals, pulses, fruits, and miscellaneous groups in Tanzania
- Meats, dairy and eggs, fish, and beverages and tobacco are the most income elastic categories in all the three countries compared to other categories (Muhammad et al, 2011), consistent with the income pathway findings

IRRIGATORS MORE LIKELY TO CONSUME HOME-PRODUCED F&V (GHA)

- Irrigators are more likely to source fruits and vegetables from their own-farm than non-irrigators, though markets play a bigger role in both cases.
- Own-production accounts for 37% of vegetables consumption for irrigators, compared to 26% for non-irrigators.
- Own-production accounts for 21% of fruit consumption for irrigators, compared to 11% for non-irrigators.
- Own production of foods consumed: cereals: 76%; R&T: 31%; meats: 69%; eggs: pulses: 38%; milk: 96%

IRRIGATION IMPROVES NUTRITION INDICATORS (TZ/ETH)

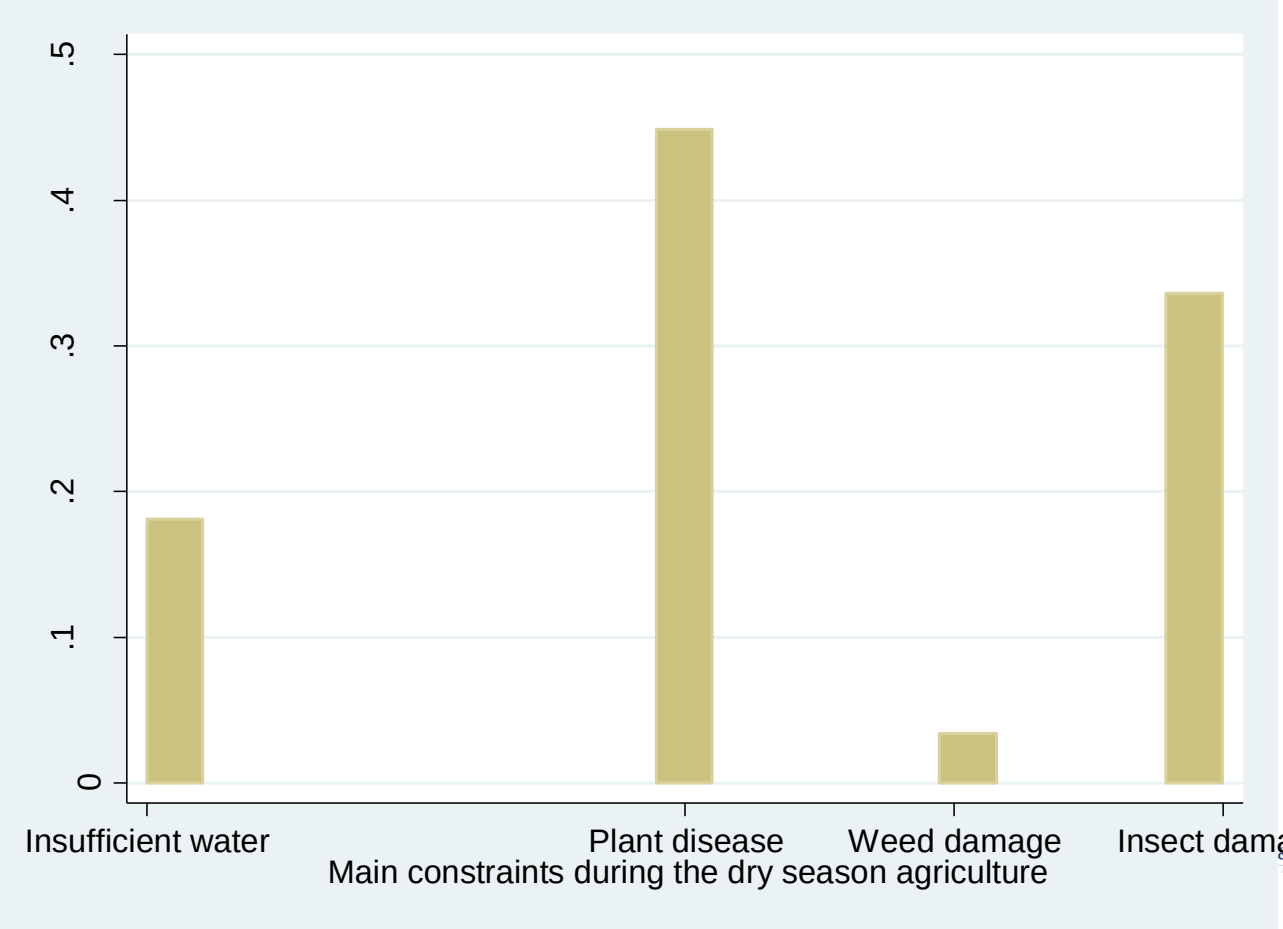
- Irrigation significantly improves household income (from agricultural production) and production diversity
- Increasing household income leads to higher dietary diversity when controlling for the income effect
- Increases in household production diversity do not contribute to increases in dietary diversity
- Irrigation influences nutritional outcomes through income pathway

IRRIGATION CAN BE MADE MORE NUTRITION-SENSITIVE

1. Incorporate food security and nutrition as explicit goals during investment design and focus on reach, benefit and empowering women
2. Integrate training programs and awareness campaigns on nutrition with irrigation development
3. Recognize multiple uses of irrigation water, such as WASH, livestock watering and fish production
4. Encourage kitchen gardens
5. Increase policy synergies between the agriculture, nutrition, health and WASH sectors.

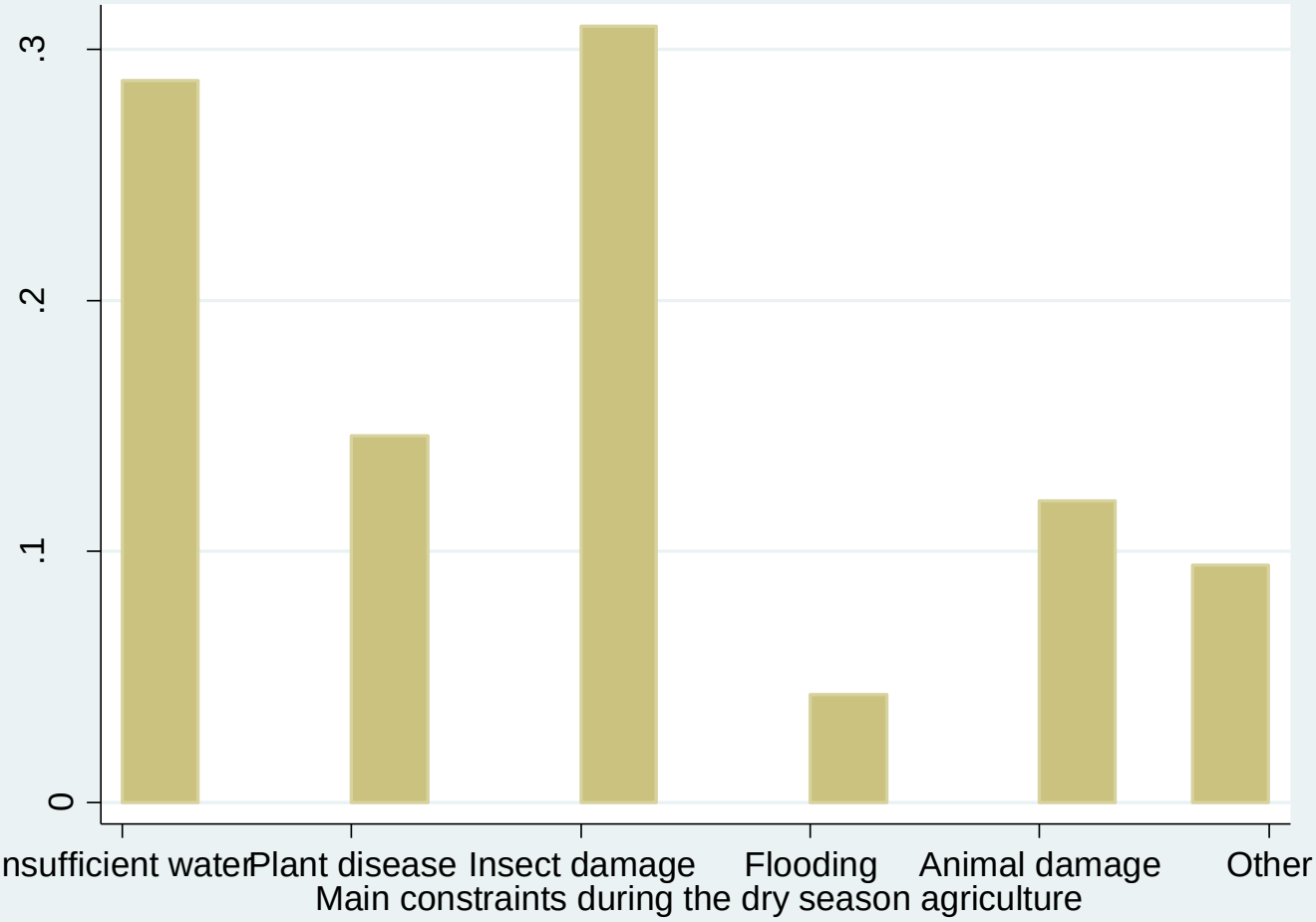
NEED FOR COMPLEMENTARY SERVICES BASED ON CONSTRAINTS-- GHANA

- Plant disease
- Insect damage
- Insufficient water



NEED FOR COMPLEMENTARY SERVICES BASED ON CONSTRAINTS-- TANZANIA

- Insect damage
- Insufficient water
- Plant disease
- Animal damage



NEED FOR COMPLEMENTARY SERVICES BASED ON CONSTRAINTS-- ETHIOPIA

- Irrigators are closer to markets: suggesting the need to further explore market access for produce and inputs as a constraint for adoption of irrigation technologies
- Irrigators are closer to major rivers and access surface water bodies: physical access to water as a constraint
- Irrigated plots are closer to homesteads: need to further explore the labor and managerial requirements of irrigation compared to rainfed agriculture as a potential constraint

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GENDER MATTERS FOR ACHIEVING BENEFITS FROM AGRICULTURAL WATER MANAGEMENT

- Women play different roles in agricultural households and have **different needs and priorities** for water uses and technologies
  - E.g. **"double burden"** for managing both domestic and productive water
- Women face **constraints in adopting, using and benefitting from water technologies**
  - E.g. different **access to/control over** water (and land), information/trainings, credit, and inputs
- Irrigation interventions should consider ways to **reach**, **benefit** and **facilitate women's empowerment**

Photo Source: IWMI, Ethiopia

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Preferences and Priorities: MATCH TECHNOLOGY TRADE-OFFS AND AIM

Opportunities

- Women and men farmers perceive multiple benefits, varied incentives, different priorities
- Women prefer technologies that save labor, multiple purpose, multiple seasons, installed near home, suitable for gardens (especially solar pumps)

Challenge

- Targeting programs to meet diverse goals/benefits

Table 1: Summary of the opportunities and challenges related to each of the water lifting technologies respectively towards the control. ++, + and – represent a high, medium and low effect (modified after Schmitter et al., 2016).

	Labour saving	Yield	Water productivity	Profit	Multi-purpose use
Control	0	0	0	0	0
Rope and washer	0	0	0/+	-/0	+
Solar	++	+	-/0/+	++	++
Motorized pump & drip	-/+	++	++	-/+	-

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Improved On-Farm Water Management: CAN REDUCE WOMEN'S TIME BURDEN

Opportunities

- Irrigation scheduling tools can increase the benefits of SSI and enhance water sharing
- Women perceive these tools as a way to improve labor use

Challenges

- Reducing the constraints women have to access tools
- Increasing women's access to training and information about tools, practices

Photo credit: Petra Schmitter, IWMI

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Irrigated Value Chains: EMERGING OPPORTUNITIES FOR WOMEN

Opportunities

- Under-explored crops can be profitable and benefit women
- Seed production high potential

Challenges

- Women risk losing profitable and preferred crops to men (fodder, leafy greens)

Photo credit: Tadesse Desalegn, IWMI

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Microfinance Can Increase SSI Adoption: WOMEN LACK EQUAL ACCESS

Opportunities

- Group lending with women or women/men farmers

Challenges

- Women have lower access to credit for SSI and financial training
- High female labor in male headed households reduces likelihood of borrowing to purchase technologies

Photo credit: IWMI

Quantitative Analysis: The Women's Empowerment In Agriculture Index for SSI

- Decision-making roles on irrigated crops
- Autonomy in decision-making: types of crops to grow for irrigated vs. non-irrigated
- Productive capital includes irrigation tank/pond and irrigation equipment
- Access to information/extension on irrigation methods
- Time allocation time spent irrigating/working with equipment
- Added response options on irrigation topics for various questions on credit, savings, group membership

TABLE I. THE FIVE DOMAINS OF EMPOWERMENT IN THE WEAI

Domain	Indicator	Weight
Production decision-making	Input in productive decisions	1/10
	Autonomy in production	1/10
Access to productive resources	Ownership of assets	1/15
	Purchase, sale, or transfer of assets	1/15
	Access to and decisions on credit	1/15
Control over use of income	Control over use of income	1/5
Community leadership	Group member	1/10
	Speaking in public	1/10
Time allocation	Workload	1/10
	Leisure	1/10

Source: Alkire et al. (2013).

SSI Is Not Always Associated With Women's Empowerment

COUNTRY	Irrigators WEAI Score	Non-irrigators WEAI Score	Contributors to disempowerment
Ethiopia	0.82	0.85	•Group membership •Leisure time •Speaking in public •Credit access •Control over use of income
Ghana	0.82	0.80	•Credit access •Workload •Group membership •Control over use of income
Tanzania	0.88	0.86	•Group membership •Credit access •Leisure time •Speaking in public •Autonomy in production

Source: IFPRI-ILSSI Survey

Decision-Making on Irrigation in Ethiopia

	Women's Responses: Ethiopia			
	How much input did you have in making decisions about…		How much input did you have in decisions on the use of income generated from…	
	Irrigated food crop farming	Irrigated cash crop farming	Irrigated food crop farming	Irrigated cash crop farming
No input	0%	2%	0%	1%
Input into very few decisions	14%	15%	13%	16%
Input into some decisions	52%	53%	51%	53%
Input into most decisions	23%	16%	23%	15%
Input into all decisions	11%	15%	13%	15%

Source: IFPRI-ILSSI Survey

Decision-Making On Irrigation In Ghana

	Women's Responses: Ghana			
	How much input did you have in making decisions about…		How much input did you have in decisions on the use of income generated from…	
	Irrigated food crop farming	Irrigated cash crop farming	Irrigated food crop farming	Irrigated cash crop farming
No input	1%	1%	2%	1%
Input into very few decisions	13%	13%	13%	14%
Input into some decisions	32%	30%	32%	30%
Input into most decisions	29%	33%	28%	31%
Input into all decisions	24%	23%	23%	24%

Source: IFPRI-ILSSI Survey

Decision-making on Irrigation in Tanzania

	Women's Responses: Tanzania			
	How much input did you have in making decisions about…		How much input did you have in decisions on the use of income generated from…	
	Irrigated food crop farming	Irrigated cash crop farming	Irrigated food crop farming	Irrigated cash crop farming
No input	0%	0%	1%	0%
Input into very few decisions	9%	11%	11%	14%
Input into some decisions	23%	31%	26%	30%
Input into most decisions	30%	24%	29%	23%
Input into all decisions	37%	34%	34%	34%

Source: IFPRI-ILSSI Survey

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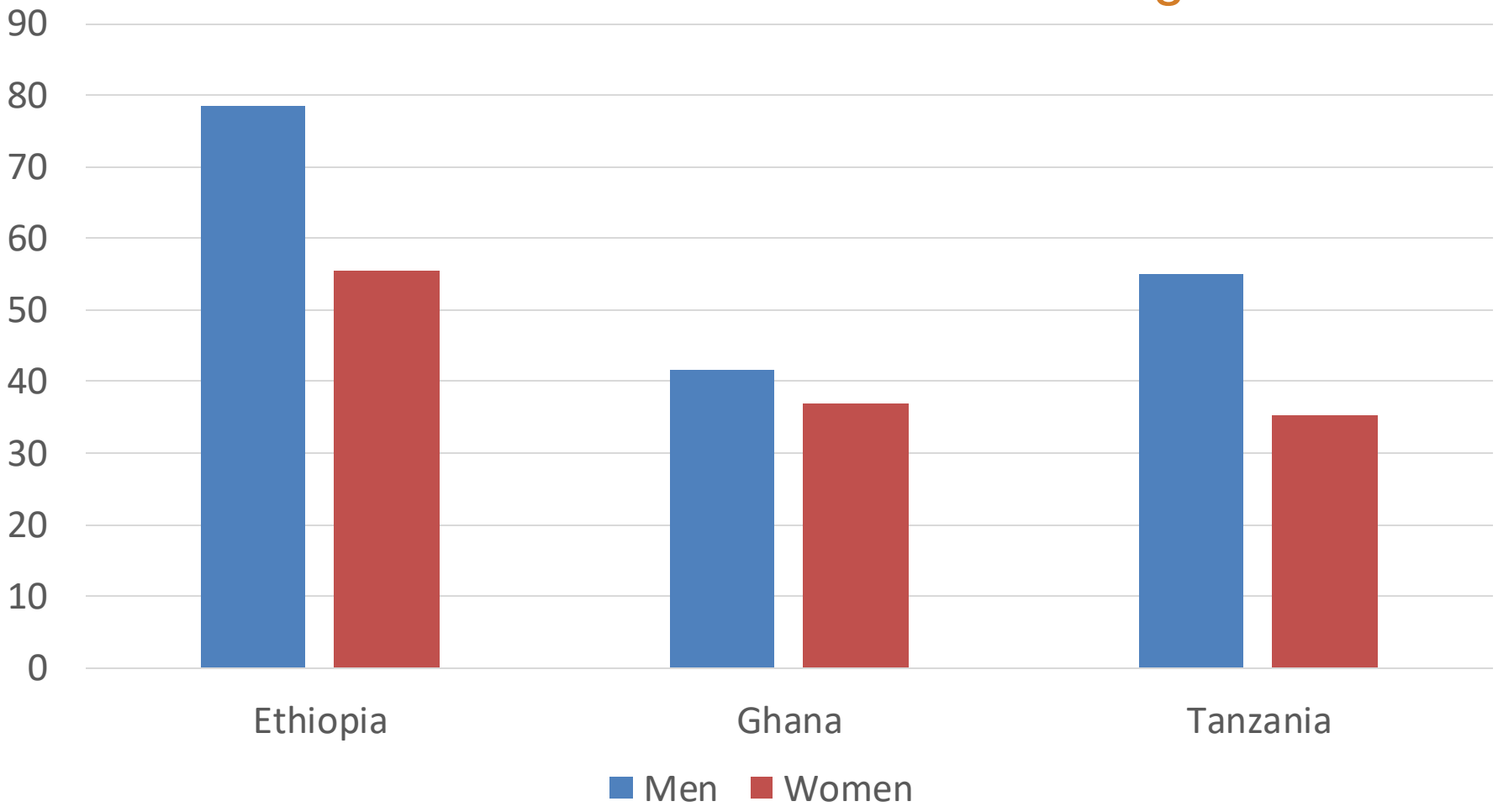
Who Has Access to Information on Irrigation?



Source: IFPRI-ILSSI Survey

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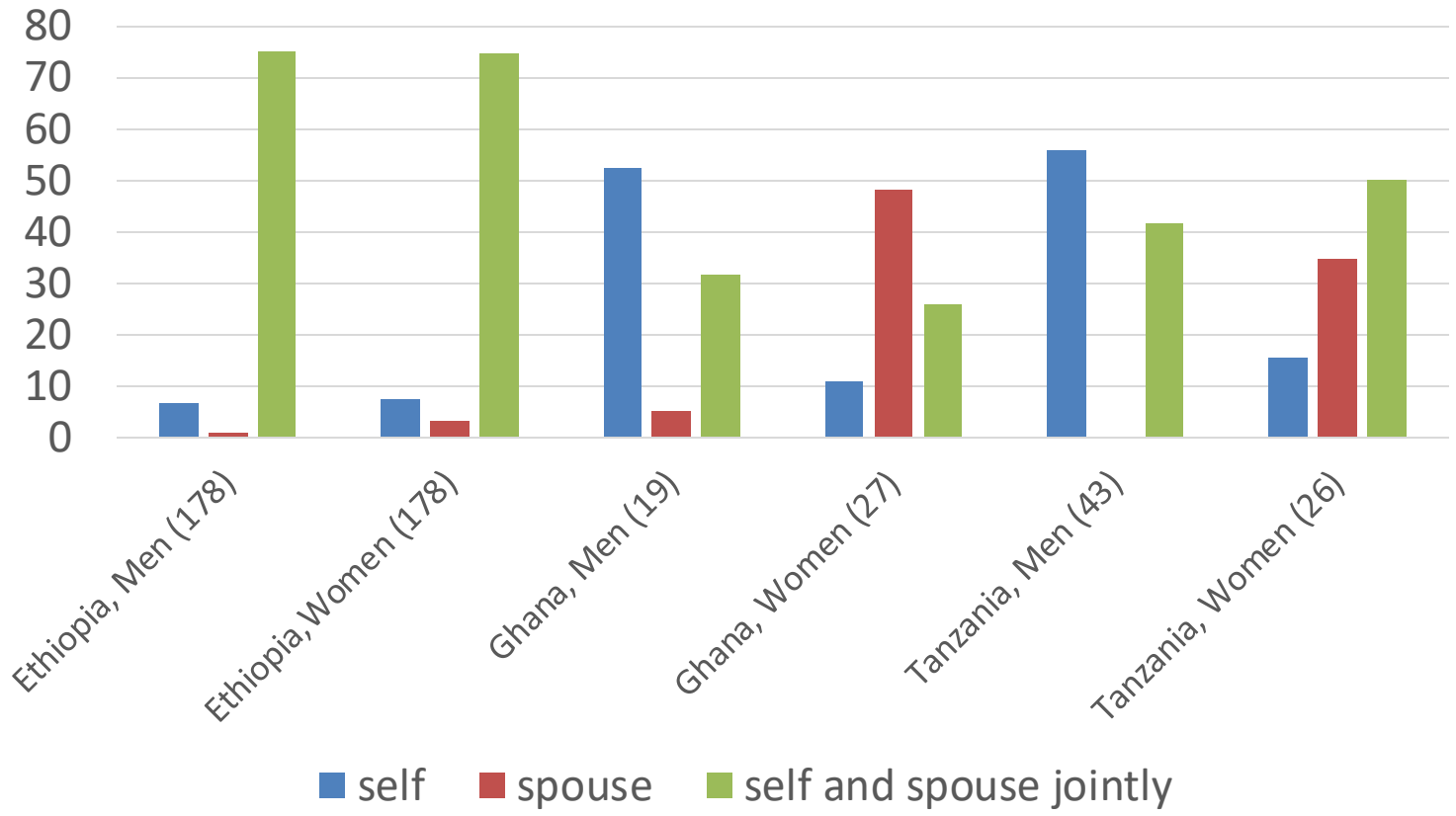
Who Owns Irrigation Equipment?



Source: IFPRI-ILSSI Survey

TO ADDRESS THESE CONSTRAINTS A SERIES OF STEPS CAN BE TAKEN ALONG THE 3 PHASES OF TECHNOLOGY ADOPTION

1. Awareness of the technology
2. Tryout of the technology
3. Continued adoption (use and decision to keep)

Theis et al. 2018.

AWARENESS OF THE TECHNOLOGY

1. Understand how women and men **learn about and access information** through different channels and networks
2. Identify **barriers to women's participation** in groups meant to support technology adoption

Theis et al. 2018.

TRY-OUT OF THE TECHNOLOGY

1. Identify whether men and women have **different preferences** for the design and location of technology
2. Make **credit** accessible to both men and women
3. Household decisionmakers may prefer to draw on **"free" unpaid family labor** rather than adopt SSI to save women's time
4. Support women's access to and control over **land and water resources** needed to irrigate

Theis et al. 2018.

CONTINUED ADOPTION OF THE TECHNOLOGY

1. Targeting technologies to women **does not guarantee their control**
2. Do not assume that **use of the technology confers control** over it
3. Safeguard women's access to and **control over the profits** of irrigated production
4. Ensure that SSI technologies **reduce women's time burden** (and that families value this)

Theis et al. 2018.