



Groundwater governance: Findings from experiential games in Ethiopia

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INNOVATION LAB FOR
Small Scale Irrigation



Objective and Research questions

- To improve our understanding of the potential of behavioral experiments (games) as an experiential learning tool to improve common-pool resource management in Ethiopia

- Research questions
 - To what extent can the intervention change individual mental models to address sustainable governance challenges?
 - To what extent does the intervention stimulate conversations among community members about the need and ways to improve governance?
 - To what extent do awareness-raising and community discussions lead to actions at both individual resource user level and community level?
 - What differences may be observed between men's and women's learning and group dynamics?

Groundwater game

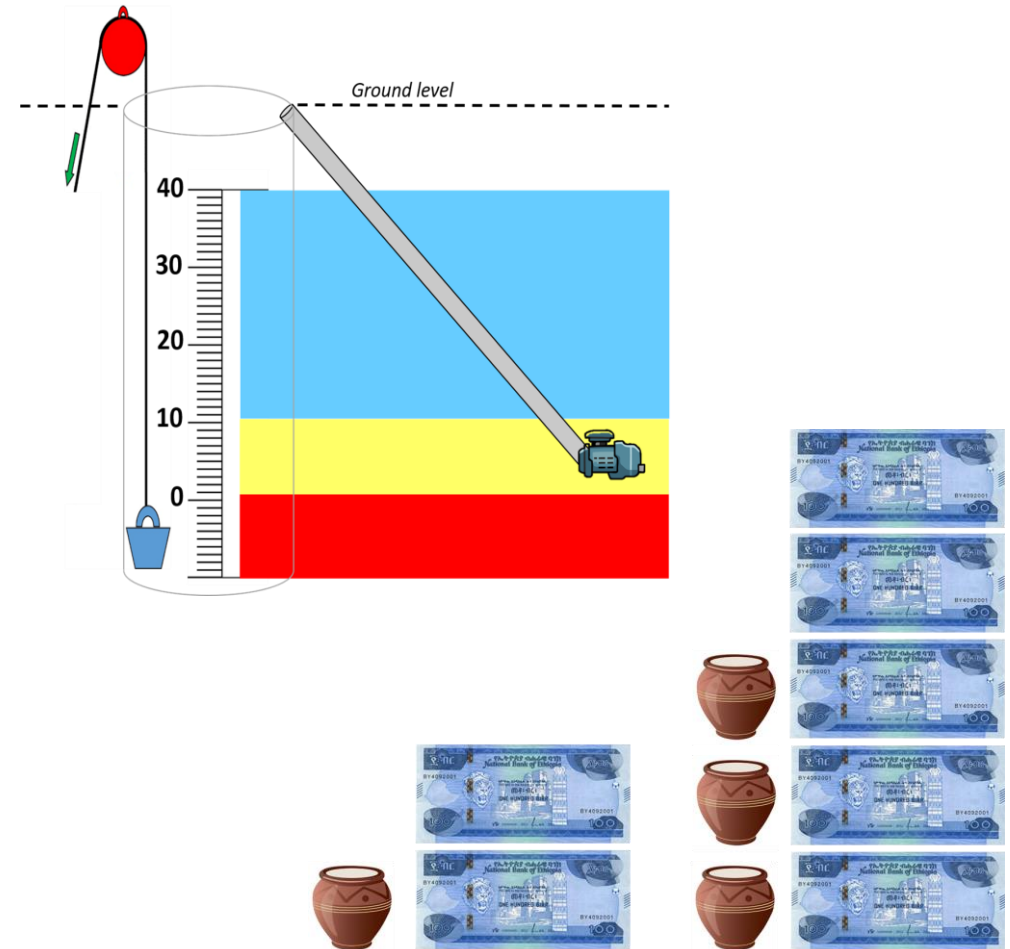
Adapted from a game developed/piloted in India (Meinzen-Dick et al. 2018)

■ Games

- Groups of 5 men or 5 women
- Choose crop A or B with different water use & returns (locally relevant crop types)
- See effect on water table
- Multiple years (rounds), 3 games (treatments)
 - Without communication
 - With communication
 - With communication and group election of rules
- Before- and after-game survey

■ Community debriefing

- How this relates to own experiences and challenges in farming
- Lessons and insights the participants gained from the experience
- Possible solutions



Existing water rules in communities (FGD)

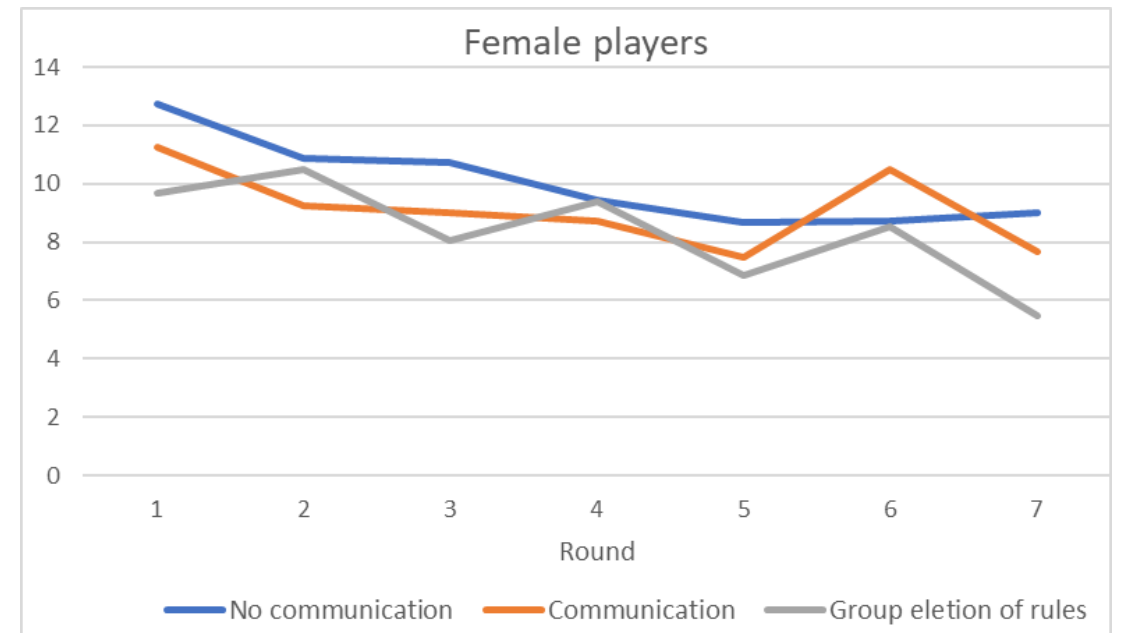
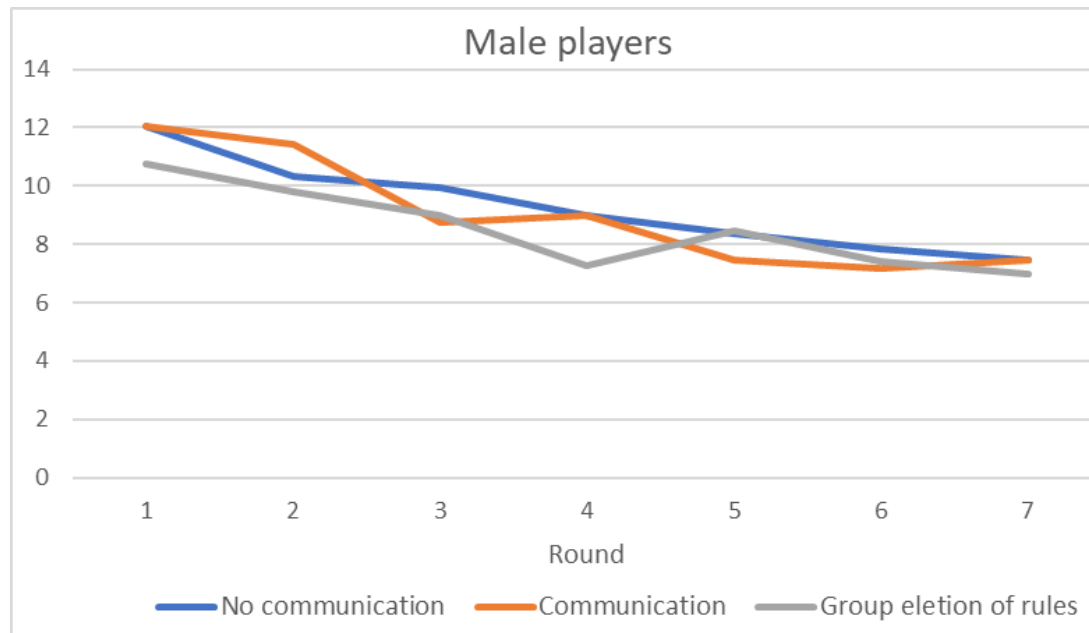
Baseline:

- Surface water rules are more common in communities compared to groundwater rules
 - Most common: redirecting river canals/ building a dam is prohibited
- Few communities had a rule related to groundwater
 - Most common: digging more than one well on one's land not allowed
- Few communities believed that there should be rules governing water, particularly groundwater

Endline:

- No significant differences in existing rules
- Most communities believe that there should be rules governing water, particularly groundwater

Total amount of water consumed for irrigation by all players in each round (Game)



Group election of rules (Game 3)

- All groups enforced crop choice rules in game 3
- Most elected leaders to monitor player choices and water levels, and sometimes to change the rule
 - More women groups tended to elect a leader
- Most imposed sanctions
 - Mostly monetary sanctions (variable; 10 – 1500 birr)
~average 300
 - Social isolation; cultivation / water bans
 - Progressive sanctions
- Female groups recorded more violations to group elected rules, but imposed less fines on violators
- All groups played the game / assessed the situation as if in real life

	Leader	No leader	Total
Female	12	3	15
Male	8	7	15
Total	20	10	30

*“We need sincerity and openness... When we cultivate these crops by rotation we will have two benefits; one save our water, and for the market the product may not be over-supplied.”**

Male player, Geoogeti 2

*Game 3 group discussion

Mental model: Before and after game

Our current groundwater use will affect the sustainability of the resource

	Before		After	
	Freq.	%	Freq.	%
Strongly agree	8	5.3	22	14.7
Agree	64	42.7	90	60.0
Disagree	66	44.0	37	24.7
Strongly disagree	9	6.0	1	0.7
Not applicable	3	2.0		

No need for rules restricting type of crops to be irrigated

	Before		After	
	Freq.	%	Freq.	%
Strongly agree	41	27.3	16	10.7
Agree	55	36.7	31	20.7
Disagree	44	29.3	65	43.3
Strongly disagree	8	5.3	38	25.3
Not applicable	2	1.3		

Need collective action to establish and maintain community water structures

	Before		After	
	Freq.	%	Freq.	%
Strongly agree	68	45.3	65	43.3
Agree	79	52.7	79	52.7
Disagree	3	2	1	0.7
Strongly disagree			5	3.3

Mental model: Before and after game

No need for rules to regulate surface water use

	Before		After	
	Freq.	%	Freq.	%
Strongly agree	21	14.0	15	10.0
Agree	37	24.7	12	8.0
Disagree	52	34.7	70	46.7
Strongly disagree	26	17.3	41	27.3
Not applicable	14	9.3	12	8

No need for rule to limit wells or ground water use

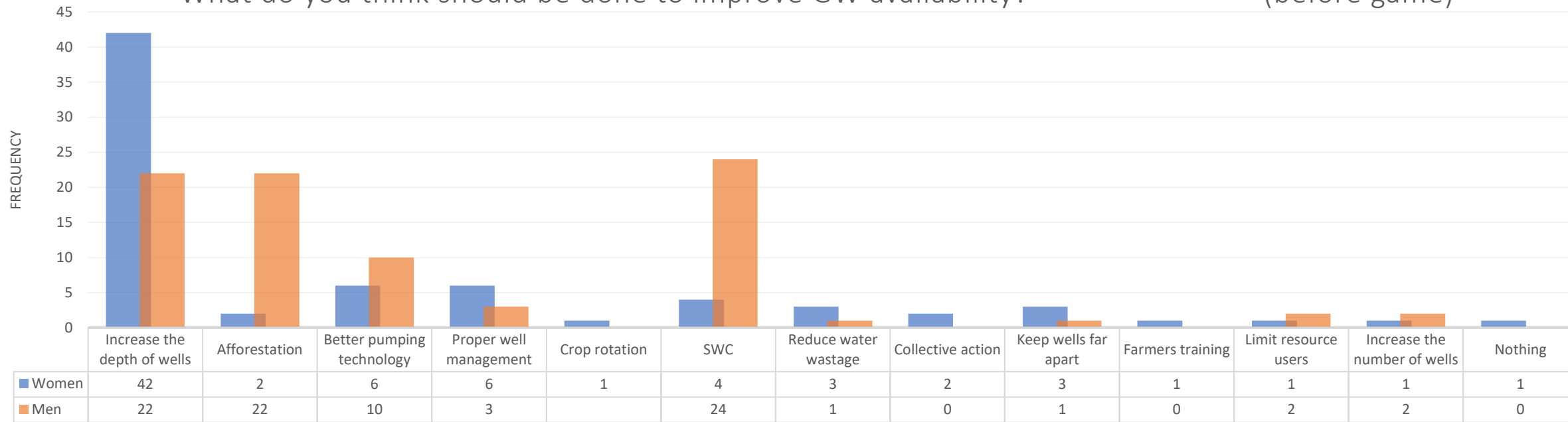
	Before		After	
	Freq.	%	Freq.	%
Strongly agree	36	24.0	18	12.0
Agree	47	31.3	34	22.7
Disagree	53	35.3	65	43.3
Strongly disagree	12	8.0	32	21.3
Not applicable	2	1.3	1	0.7

Community members should act collectively to manage groundwater

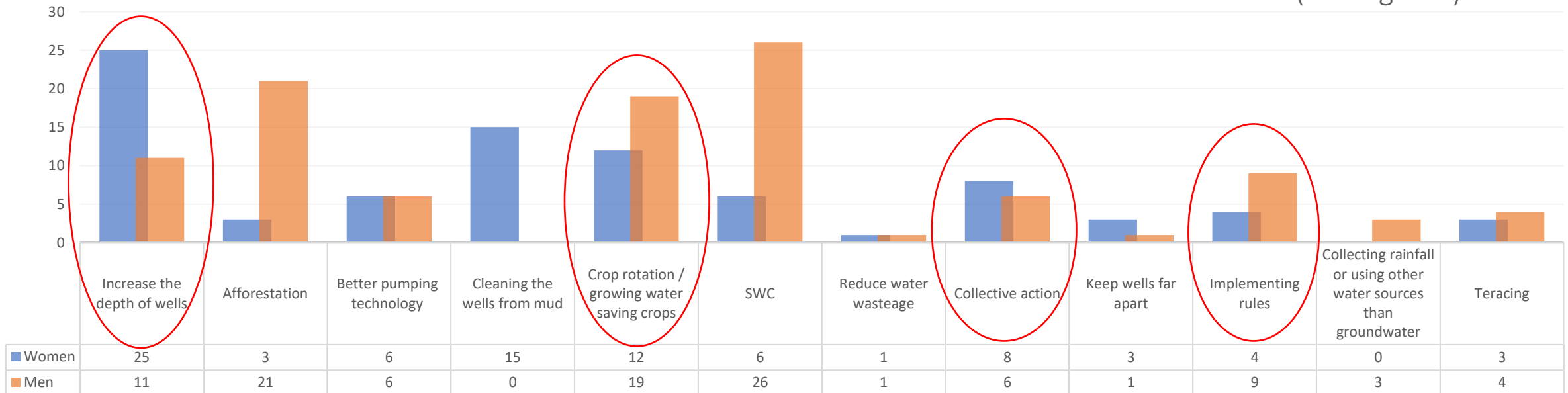
	Before		After	
	Freq.	%	Freq.	%
Strongly agree	32	21.3	40	26.7
Agree	96	64.0	106	70.7
Disagree	21	14.0	3	2.0
Strongly disagree	1	0.7	1	0.7

What do you think should be done to improve GW availability?

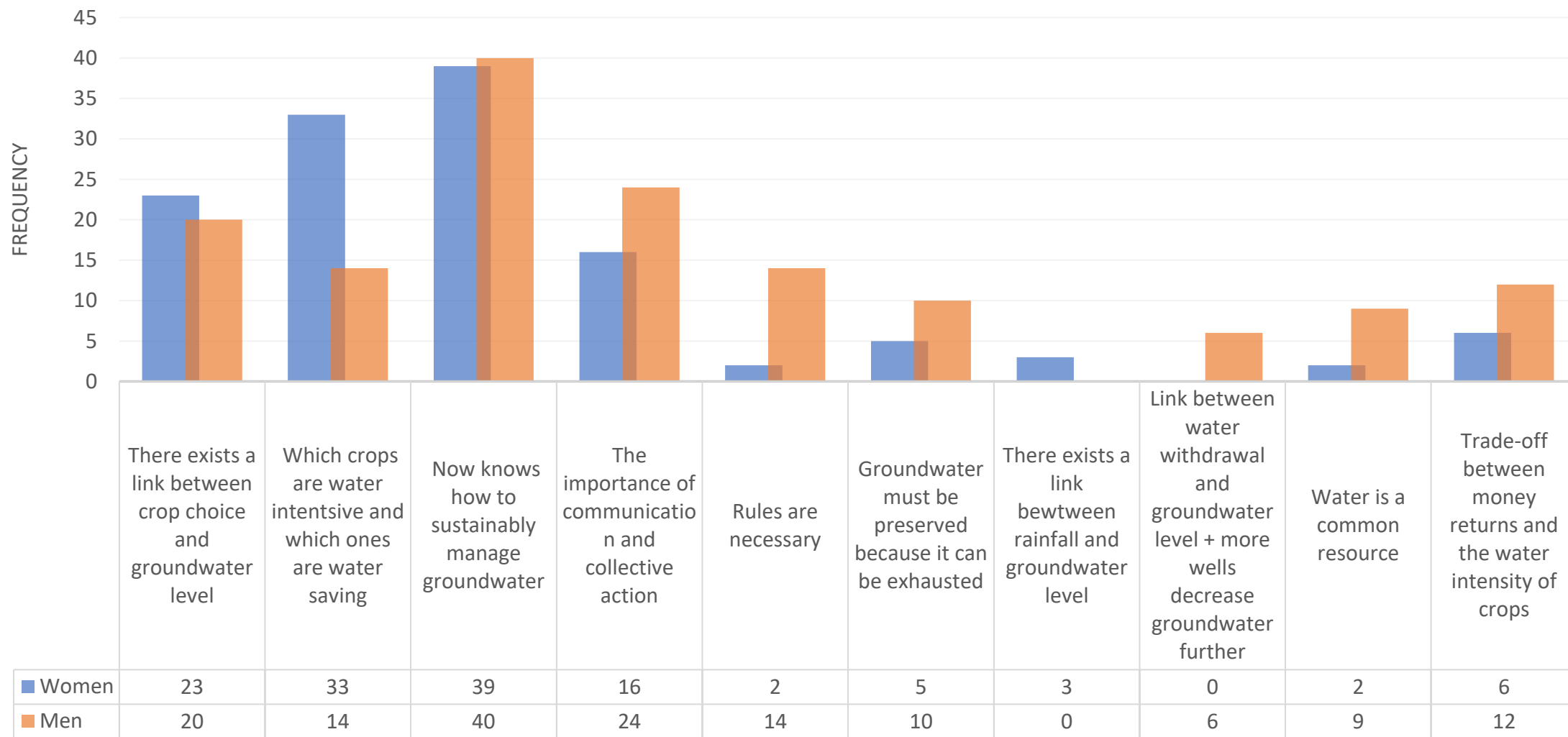
(before game)



(after game)



Post game player reflections: Lessons learned



Endline – in progress

- FGDs show that new learning on GW being a shared aquifer sustains.
- Many reported necessity of establishing rules (contrast from baseline)
 - No community level action yet
 - No urgency
 - Not yet the dry season
 - Need expert support/ help to expand access to GW irrigation (simultaneous)
- Rules related to fairness in access to GW seen to be most important
 - Less references than rules related to governance of resource sustainability in general.

Findings and key lessons

- **Social learning**
 - Indication of immediate and sustained learning effects
 - Viewed as a good learning event
 - Better appreciation and understanding of groundwater as common pool resource
 - More intervention and time needed for community-level collective action
- **Post-game community debriefing discussion is crucial for community-wide learning and spillover effects**
- **Monitor GW changes needed to see longer-term effects on resource sustainability**
- **Important to team-up with extension officers to support community members in determining local water-saving vs water intensive crops**
 - Literal vs illustrative learning implications



Men's and women's group playing the game, March 2021
Photo credit: Fekadu Gelaw



Community debriefing meeting, March 2021
Photo credit: Fekadu Gelaw