

Introduction

The Ethiopian Government has considered irrigation agriculture as a primary engine of economic growth in general and to the rural economy in particular. Due to its multi-dimensional benefits, the government plans to increase the current level of irrigation infrastructure three-fold by the end of 2020¹. However, there has been a concern regarding the performance of existing irrigation systems. More emphasis has been given to technical and engineering factors, the social and institutional dimensions of irrigation management have been usually neglected or handled badly^{2,3}.

Objective of the Study

Thus, the current study has two interlinked objectives
(i) to understand the nature and diversity of irrigation technologies and water management systems at different levels and identify the existing gaps in the sector and
(ii) to investigate the determinants of irrigation performance and farmers' satisfaction in using and managing irrigation water.

Method

- Our analysis utilizes a comprehensive and unique household and plot-level survey conducted in ten districts of the country. In addition, focus group discussion and key informant interview was conducted to gather qualitative approach.
- Irrigation is considered as a sociotechnical system. This approach highlights on the social dimensions of irrigation as important as the technical dimensions.
- Nested analytical framework was employed to examine the existing institutional arrangements related to irrigation water development and management.

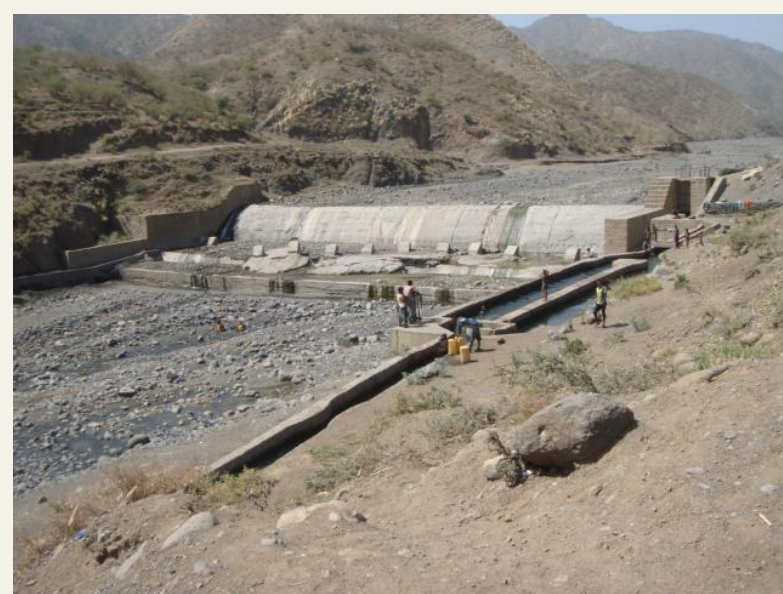


Table 1. Salient features of irrigation schemes included in the study

Region	Zones included	District	Agro-ecological zone	No. of sub-district	Scale of irrigation	No. of hh	Total no. of plots	No. of irrigated plots
Tigray	East Tigray	Atsebi Wemberta	Drought prone highland	2	Small, Micro	51	188	66
	South Tigray	Raya Alamata	Drought prone highland, lowland	4	Small, Micro	49	148	72
Amhara	North Wollo	Raya Kobo	Drought prone highland, lowland	2	Large, Small, Micro	38	166	78
	East Gojjam	Mecha	Drought prone highland, lowland	2	Large, Small, Micro	66	337	170
Oromia	South West Shoa	Illu	Moisture reliable, highland-Cereal	8	Small, Micro	60	364	130
		Wonchi	Moisture reliable, highland-Cereal	2	Medium, Small, Micro	50	275	86
	Arsi	Sire	Humid moisture reliable, lowland	1	Large	12	48	37
	Jeju		Humid moisture reliable, lowland	1	Large	8	30	17
SNNPR	Sidama	Genet Enset	Moisture reliable, highland	2	Small, Micro	103	512	294
	4	7	10	26	464	2166	991	

•Applying ordinal logit model, we analyze factors which affect irrigation performance, taking farmers' satisfaction level in using and managing irrigation water as an indicator. The model has been used widely to analyze ranked responses⁴.

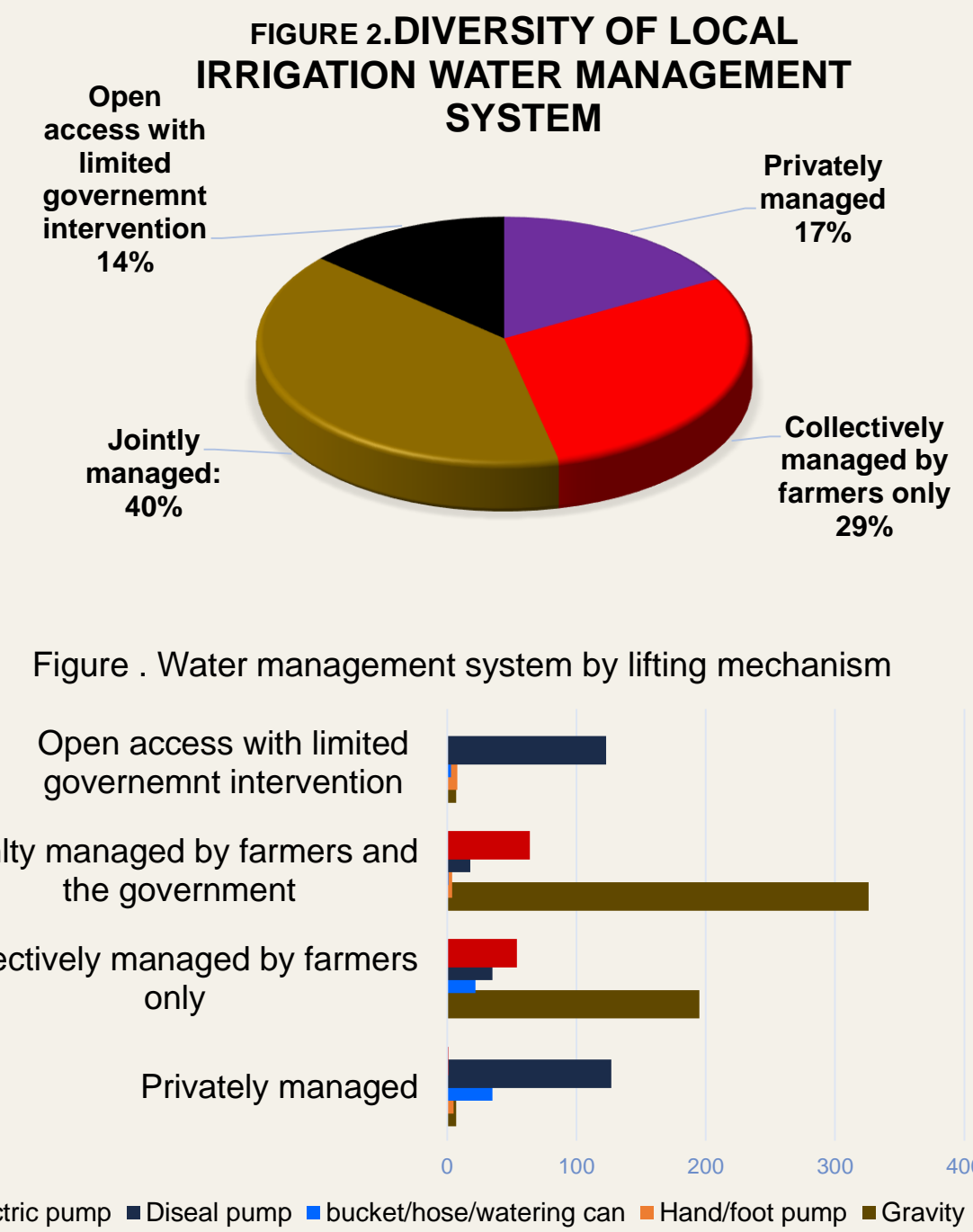
Qualitative Analysis

Our findings show that even if the policies, strategies and the legal instruments are very well specified, and the relevant institutions and organizations have been established at federal, regional and local level;

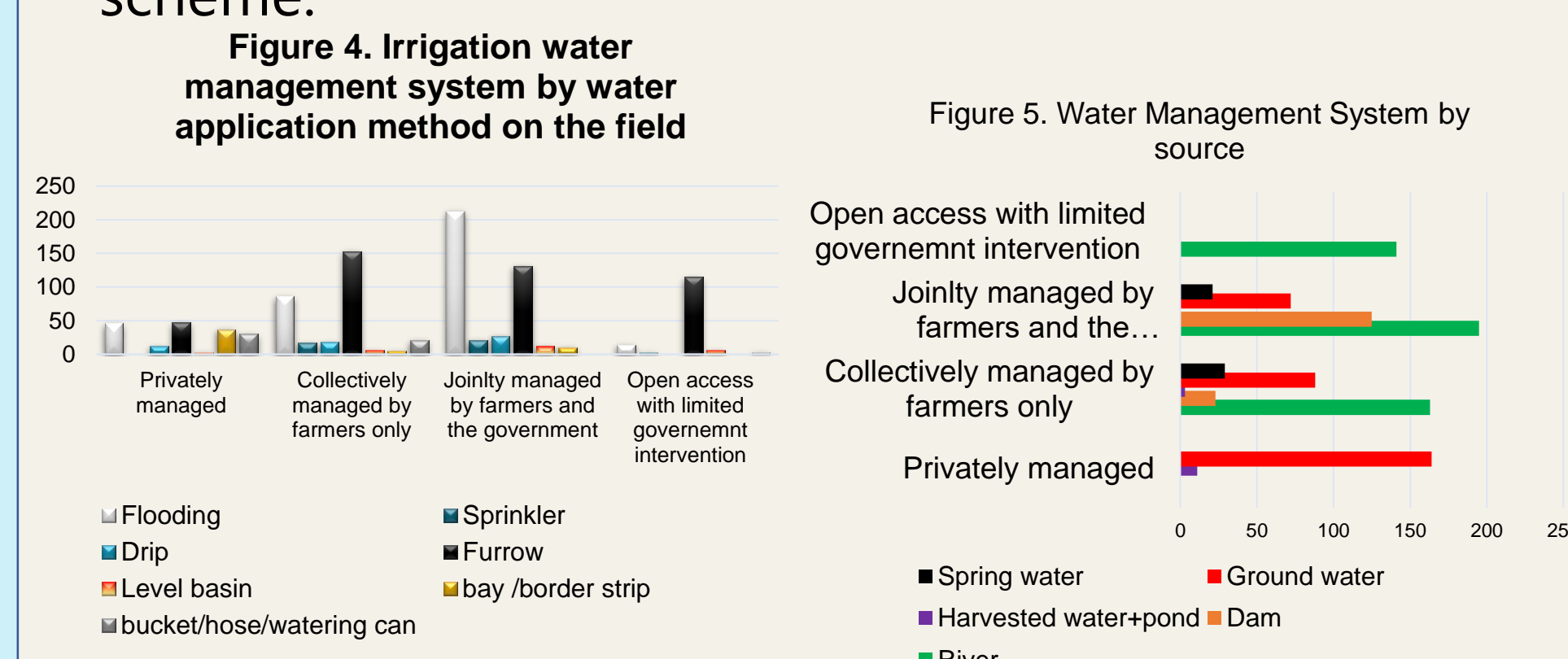
- ✓ there has been weak enforcement capacity among executed organizations at each level;
- ✓ the current information sharing mechanisms in place do not ensure institutional harmony and efficient information and resource flows;
- ✓ horizontal and vertical communications between ministries and bureaus belonging to different sectors is very weak.
- ✓ Thus, organizations of ministries, bureaus and departments attempt to fulfill their responsibilities without an interdisciplinary and integrated approach which is fundamental in the field of water resource management at each level.

Descriptive Analysis

At local level, in spite of the existence of diversified types of water management systems and related institutions, we found that the irrigation water management systems are not well developed in their nature as well as in their function.



- Jointly managed irrigation system- government agency manages the main and secondary canals and farmers manage the tertiary units and beyond.
- Users managed system- the farmers and the WUA have full control and responsibility from inception to the construction and implementation of the scheme.



- Micro-scale private irrigation refers to individualized small-scale technologies for storing, lifting, conveying and applying irrigation water.
- Open access with limited government intervention -those who have farm land adjacent to a river or spring water which there have been hardly any developed irrigation structure, access irrigation without any schedule or turn.



Regression Result

•In addition to household, plot and village level characteristics, water management systems and irrigation technologies significantly affect the performance of irrigation.

Table 2. Ordered logit, the marginal partial effects of various irrigation technologies and management systems on Farmers' satisfaction

Scheme level variables	y = Pr(SATI_LEV EL==very dissatisfied)	y = Pr(SATI_LEV EL==dissatisfied)	y = Pr(SATI_LEV EL==satisfied)	y = Pr(SATI_LEV EL==very satisfied)	Odds ratio
Water Management System, dummy, cf, Jointly managed by farmers and state agency					
Private	-0.042	-0.157**	0.021	0.178**	0.403**
Collectively managed by farmers	-0.044***	-0.173***	0.008	0.209**	0.357***
Open access	-0.057	-0.192**	0.045	0.204**	0.330**
Irrigation water lifting mechanism, dummy, cf, Gravity					
Manual	-0.024***	-0.137	-0.091*	0.252**	2.842***
Diesel pump	-0.023***	-0.119***	-0.042*	0.184**	2.214***
Electric pump	0.0139	0.0604	0.0012	-0.0754	0.6993
Irrigation water source structure, dummy, cf, River					
Dam	0.066***	0.213***	-0.05*	-0.23***	0.29***
Pond	0.0379	0.136	-0.0273	-0.1466	0.4611
Ground water	-0.0096	-0.047	-0.0104	0.067	1.3457
Spring water	0.057**	0.185***	-0.0522	-0.19***	0.345***
Irrigation water application mechanism on the plot, dummy, cf, flooding					
Sprinkler	-0.018**	-0.098*	-0.052	0.168	2.0174
Drip	-0.027***	-0.155***	-0.123**	0.305**	3.547***
Furrow	-0.025***	-0.11***	-0.014*	0.151**	1.99***

Concluding Remarks

- Our findings show that at each level, Institutions, organizations and technology play a fundamental role on the performance of irrigation systems. Therefore, emphasis should be given on:
 - ✓ Capacity building and stakeholders participation at each level,
 - ✓ technical assistance for farmers,
 - ✓ Public-Private Partnership,
 - ✓ Cost recovery of schemes
- The best starting point to enforce the new Proclamation on IWUA, could be to learn from the success of traditional irrigation systems.
 - ✓ Since irrigation water users have long years of experience of using water. It would provide important insights as to how to organize and develop modern irrigation associations.
- Even if enormous priority given to acquiring and using micro level water lifting technologies,
 - ✓ appropriate and accessible repair and maintenance services for farmers is essential.
 - ✓ serious consideration is need for the sustainability use of the natural resource.

Acknowledgements

We gratefully acknowledge the financial support of the German Academic Exchange Service (DAAD), foundation Fiat Panis and The Water-Energy-Food Nexus Project hosted at Center for Development Research (ZEF).

Reference

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