

ILRI Workshop on

**Developing Policy for More Effective Management of Water and Livestock Resources for
Community Based Irrigation in Ethiopia**

***Roles, Constraints and Opportunities of Small
Scale Irrigation and Water Harvesting in
Ethiopian Agricultural Development:
Assessment of Existing Situation***

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ILRI Workshop, March 14-16, Addis Ababa, Ethiopia

Outline

- I. Background
- II. Key Problems in Agriculture - Water
- III. Agric. water development status
- IV. Irrigation development
- V. Stakeholders, donor involvement
- VI. Targets of irrigation development
- VII. Constraints and limitations
- VIII. Opportunities for investment
- IX. Research needs
- X. Conclusions and Recommendations

I. Background⁽¹⁾

- ❖ World Food Summit targets as well as those in the MDGs pledge to:
 - ❑ reduce # of chronically hungry by ½ by 2015
 - ❑ promote gender equity & women empowerment
 - ❑ ensure environmental sustainability
- ❖ **The Poverty Vicious Cycle in Ethiopia**
 - Population growth → agriculture and livestock into marginal land → deforestation → land & water degradation → poor productivity, food insecurity → poverty → poor health, malnutrition → inability to invest in maintaining or improving land productivity → further degradation, etc. Aggravated by shocks
 - How to transform this “vicious cycle” in to a “virtuous cycle” is the key question that needs to be addressed.

I. Background⁽²⁾

- ❖ To effectuate investments in agriculture, five types of capitals must be considered
 - ❑ natural capital
 - ❑ financial capital
 - ❑ physical capital
 - ❑ social capital
 - ❑ human capital
- ❖ For successful investments in agric. access to these five capitals needed in reasonable amounts
- ❖ Successful investment associated with increasing one or two of these capitals that is most lacking
 - ☞ e.g. investment in water may increase land productivity by 50%, but when associated soil fertility improvement by up to 300%; multiple use systems → more impact than single, etc

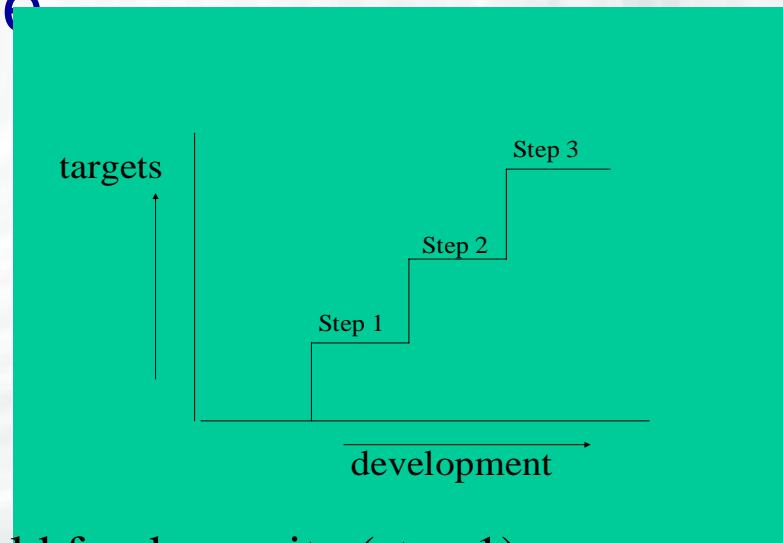
I. Background⁽³⁾

❖ Ethiopian Development Strategy

- ✓ ADLI is a national policy basis for Ethiopia's development
- ✓ Land and human (labor) is considered key factors
- ✓ Water is considered as a third pillar for development
- ✓ Other capitals are scarce in most cases

❖ Achieving goals is a challenge

investments in smallholder agric. sub-sector:
using water and related technologies have
direct impact



Three successive targets for development: household food security (step 1), absence of poverty in communities (2), and national economic growth (3)

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II. Problems in Agriculture - Water

- ❑ Long dry spells (leading to crop failures)
- ❑ Drought (Three major droughts in 30 years)
- ❑ Huge water resources potential but with spatial and temporal variability
- ❑ Unutilized due to lack of infrastructure, lack of investment capital, transboundary nature of the rivers → stagnation to increase production and productivity using water resources
- ❑ Other problems related to supporting institutions, water use rights, management, etc

II. Problems in Agriculture - Water ⁽⁵⁾



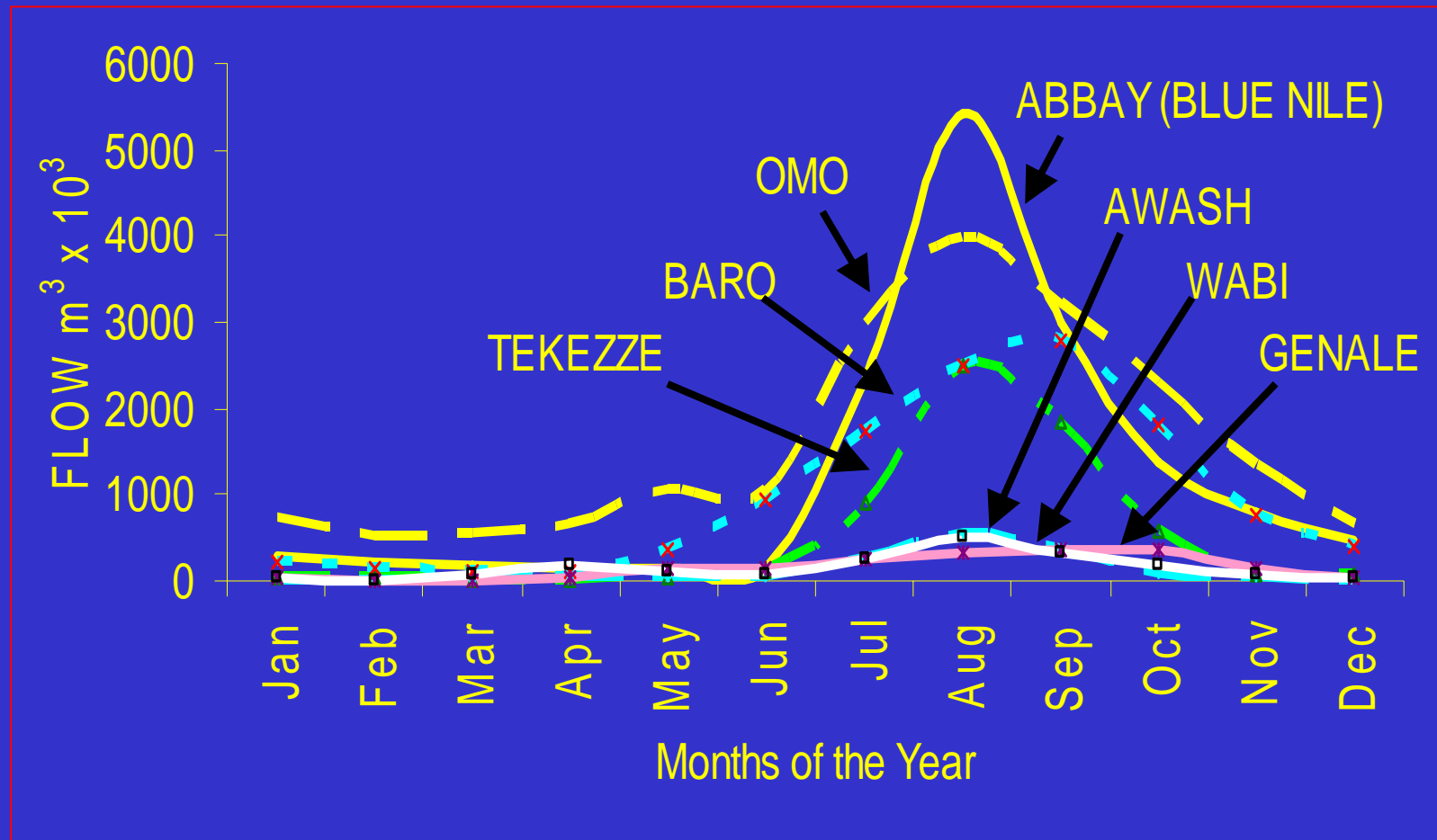
Inadequate rainfall, drought and long dry spells cause crop failure

II. Problems in Agriculture - Water ⁽²⁾

Most rivers are transboundary



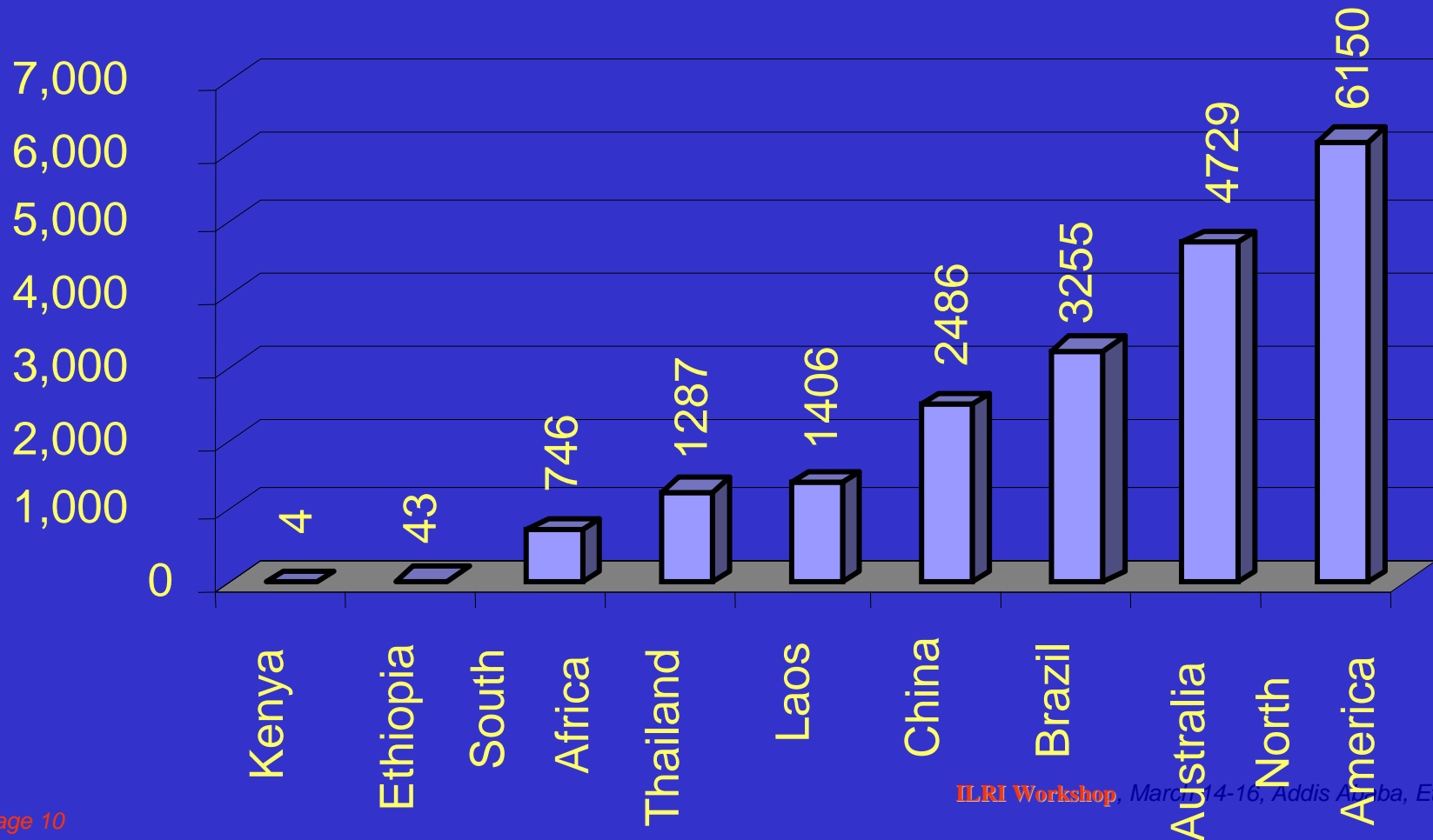
II. Problems in Agriculture - Water⁽³⁾



High rainfall variability and unreliability; significant runoff variability; significant erosion and sediment in the system; no adequate storage

II. Problems in Agriculture - Water ⁽⁴⁾

PER CAPITA STORAGE CAPACITY m³/capita



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II. Problems in Agriculture – Water (7)



The less densely populated lowlands relatively hot, with low rainfall of 200 – 800 mm p.a.; extensive livestock production or pastorals; lack of water

III. Irrigation development status ⁽¹⁾

- ❖ Large, medium and small-scale: 247,500 ha, i.e. 5.8% of potential of 4.25mio ha
- ❖ Over 55% of developed irrigation is traditional
- ❖ Figure largely believed to be underestimated: household level expansion not accounted for

Definitional issues and parameters

<i>Organization</i>	<i>Parameter</i>	<i>Small scale</i>	<i>Medium scale</i>	<i>Large scale</i>
Co-SAERAR (Amhara)	Command Area	≤250ha	250-700ha	>700ha
	Dam Height	<9m		
	Catchment Area	Co-SAERA works for catchment area of <25km ² and for diversion no limit for catchment area		
BoA (Amhara)	Command Area	≤300ha	>300ha	No lower limit
BoA (Oromia)	Command Area	<300ha	300-3000ha	>300ha
SNNPR	Command Area	50-200ha	200-1000ha	>1000ha
MoWR	Command Area	<200ha	200-3000ha	>3000ha

III. Irrigation Development ⁽²⁾

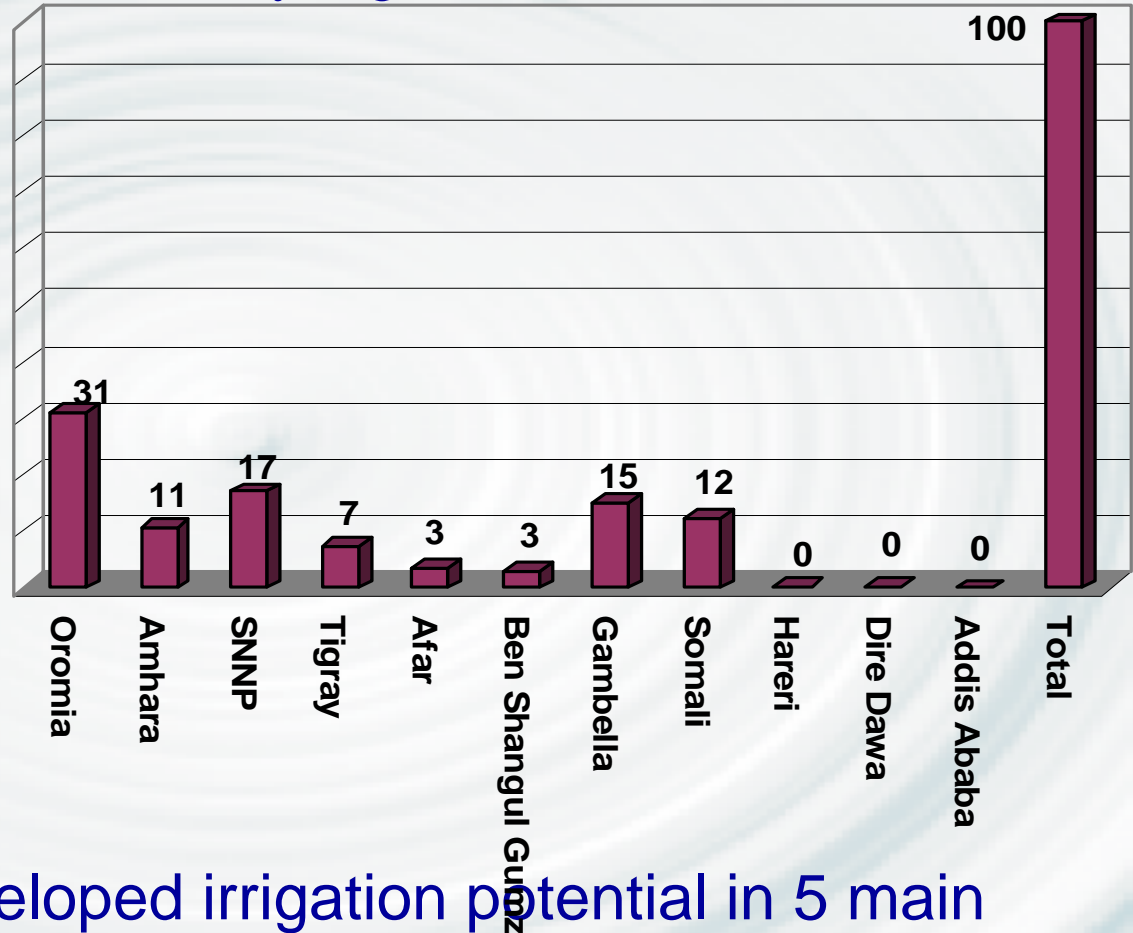
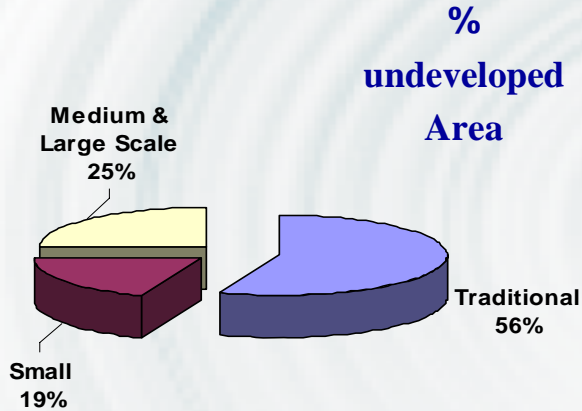
a) by typology & region

Region	Current Irrigation Activities			Total Developed	Irrigable Potential	Un-developed	RANK
	Traditional	Modern Irrigation					
		Small	Medium/ Large				
Oromia	56,807	17,690	31,981	106,478	1,350,000	1,243,522	1
Amhara	64,035	5,752	-	69,787	500,000	430,213	5
SNNP	2,000	11,577	6,076	19,653	700,000	680,347	2
Tigray	2,607	10,000	-	12,607	300,000	287,393	5
Afar	2,440	-	21,000	23,440	163,554	140,114	6
Ben Shangul G.	400	200	-	600	121,177	120,577	7
Gambella	46	70	-	116	600,000	599,884	3
Somali	8,200	1,800	2,000	12,000	500,000	488,000	4
Hareri	812	125	-	937	19,200	18,263	8
Dire Dawa	640	860	-	1,500	2,000	500	9
Addis Ababa	352	-	-	352	526	174	10
	138,339	48,074	61,057	<u>247,470</u>	4,256,457	<u>4,008,987</u>	

III. Irrigation development ⁽³⁾

Proportion of undeveloped irrigation potential by region (%)

Developed Irrigation



Over 86% of undeveloped irrigation potential in 5 main regions showing large investment opportunities

III. Irrigation development (4)

Type of Scheme	Completed Schemes		
	Number	Area (ha)	Beneficiaries
Small Scale Modern	86	4989	NA
Small Scale Traditional	NA	15,000	NA
Water Harvesting ^[3]	41,097	4,109.7	41,097

Irrigation and Water Harvesting Scheme in Tigray Region (as of May 2004) 18 NF, 9 with problem

Type of Schemes	Completed Schemes		
	Number	Area (ha)	Beneficiary
Large/Medium Scale	10	5,638	13,035
Small Scale Modern	49	6,509	23,349
Water Harvesting ^[1]	106,323	HH	106,323
Total	106,333	12,147	142,707

Irrigation and Water Harvesting Scheme in SNNP Region (as of May 2004)

IV. Stakeholders/donor involvement

- ❖ Government: ministries, bureaus, commissions
- ❖ NGOs: national, international
- ❖ Irrigation cooperatives
- ❖ Key donors
 - ☞ e.g. CIDA, USAID, AfDB, JICA, IFAD, etc

IV. Stakeholders/donor involvement

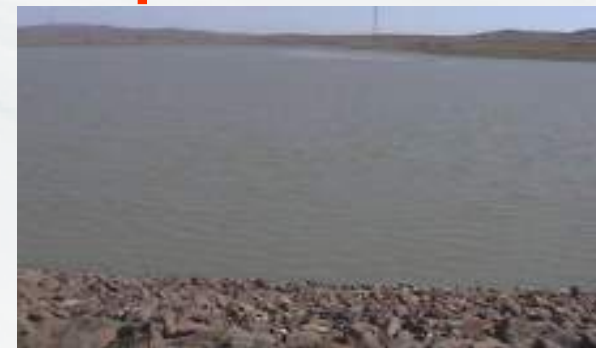
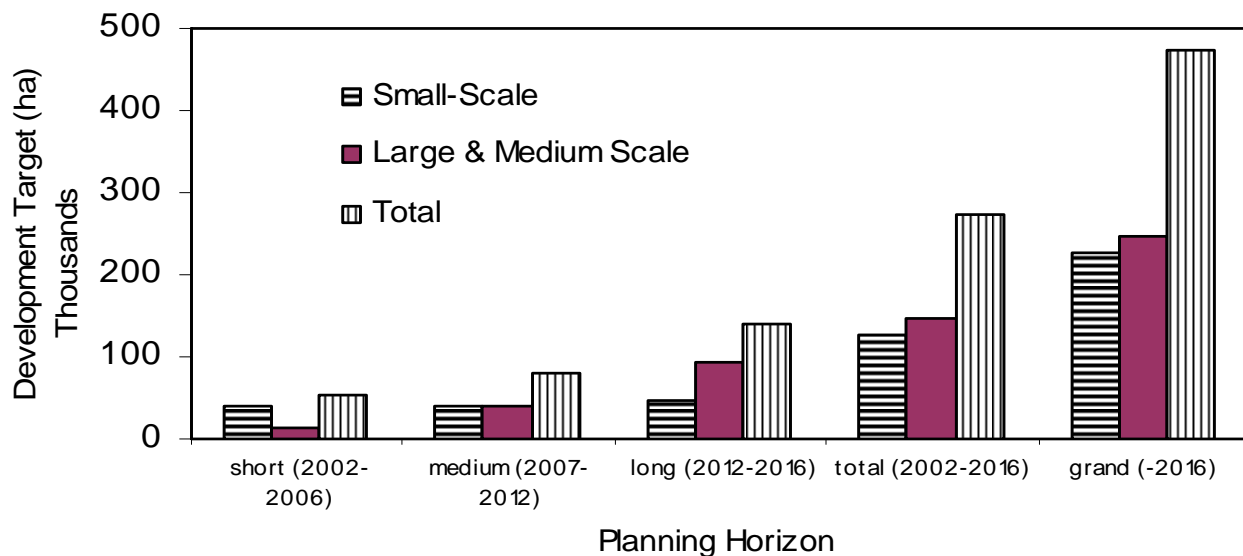
(2)

❖ Current NGO/donor activities

NGOs, Donor or Agency	Small scale Irrigation (SSI)	Micro Irrigation (MI)	Rainwater Harvesting RWH)	REGION (S) OF ACTIVITY
Action Aid	✓			SNNPR
SG 2000	✓		✓	Amhara, Oromia, SNNPR
CIDA	✓	✓	✓	Tigray, Amhara
CRS	✓	✓	✓	Amhara, Oromia, Tigray, SNNPR
AFD	✓			Amhara, Oromia, SNNPR
CARE	✓	✓	✓	Amhara, Oromia, Afar
USAID	✓			Amhara, Tigray
ESRDF	✓	✓		Amhara, Oromia, SNNPR
IFAD	✓	✓		Amhara, Oromia, Tigray, SNNPR
GTZ			✓	Oromia, Amhara
JICA	✓			Oromia
ORDA	✓			Amhara
ADF	✓			Amhara, Oromia, SNNPR
ADB	✓			SNNPR

V. Targets of irrigation development

Targets for Irrigation Development Program



0.45 M ha developed by 2016

about 1.8 times current area (0.247 mio ha) (MoWR: WSDP)



VI. Constraints and limitations (1)



Physical:

☞ soil conditions, topography, rainfall characteristics, physical, infra structure, etc.



Technical:

☞ choice of technology (supply driven, technically focused), little local consultation (indigenous knowledge), access to innovations, etc.



socio-economic:

☞ access to markets, credits, extension (information), institutional support services, support for WUAs, multiple use systems ignored, etc



VI. Constraints and limitations ⁽²⁾

MAIN AREAS OF CONSTRAINTS	SSI	MI	RWH
Baseline studies/data – on potentials of different areas for water development	+++	0	+++
Technology choice – often inappropriate technology, very limited choices, difficult to manage by farmers on their own	+++	+	++
Low yields – not significantly above rainfed system, soils/agronomic problems	+	+	+
Property rights – land use rights, land ownership and water rights not clear, and hence difficult access and conflicts	+++	+++	+++
Too small landholdings – land holdings small; continued land fragmentation hence problems of diversification into high value crops	++	0	+++
Conflicts – conflicts between traditional irrigators and those in modern systems	+	0	+++
Marketing and market access – limited knowledge of target marketing, need for market assessment, market information	+++	+++	+++
Dependency syndrome – some see aid or donation has become a part of rural life; anticipate to aid as <u>one of the various livelihood options</u> ; less effort for successful farming because of fear that they will lose out on aid.	+++	0	+
Institutional arrangements: – gaps, overlaps and conflicts of mandates of regional / federal institutions; beneficiaries not adequately involve (farmers)	+++	+++	+++
Training – lack of adequate training to handle technologies prior to introduction	++	+++	+++
Capital – lack of start-up capital or access to credit to initiate venture	0	+++	0
Research – no research in water mgnt poor linkage between research and extension irrigation.	+++	0	+++

VII. Opportunities for investment

- ❖ High water potential; earmarked in various regions for irrigation development
- ❖ At the moment, high level commitments from govt., donors, NGOs, etc (New Coalition on Food Security in Ethiopia).
- ❖ Opportunities improving knowledge of planners, policy makers on water issues, etc.: dialogue at various levels, training, with local participation, etc.
- ❖ Wide range of technologies now exist worldwide and can be adapted, and up-scaled through applied research

VII. Opportunities for investment

MAIN AREAS OF KNOWLEDGE GAPS	SSI	MI	RWH
<i>Location, design, construction of infrastructures</i> – faulty design outcomes, etc	+++	0	+
<i>Little knowledge in use of modern irrigation technology</i> – knowledge on micro-dams, drip irrigation and motor pump, maintenance of infrastructure, etc.	+++	+++	+++
<i>Water management</i> – little experience in improving water use efficiency	+++	+	++
<i>Land management</i> – knowledge in land management viz erosion, infiltration, <i>in-situ</i> water conservation, soil fertility management	++	+	+++
<i>Input utilization</i> – knowledge on optimum utilization of inputs; diversification of crop, response to market opportunities, etc	+++	+++	+++
<i>Management capacity</i> – knowledge and capacity for maintenance; capacity to organize (WUAs); financial management; resolve conflicts, etc.	+++	+	+++
<i>Information and database</i> – database generation & management: climate data, rainfall, runoff & sedimentation; hydrological data for micro-dams construction	+++	+++	+++
<i>Post-harvest management</i> – on post harvest technologies; post-harvest mgmt.	+++	+++	+++
FUTURE OPPORTUNITIES			
<i>High water potential</i> to be tapped for irrigation water in almost every region.	++	++	+++
Presently, <i>high commitment of the Ethiopia government, donors & NGOs</i> to support irrigation management and development activity	+++	+	+++
Opportunity for implementing in context of <i>multiple use water systems (MUS)</i> , with regions coordinating sub-activities (domestic, irrigation, livestock & hygiene, etc).	++	0	+++
Opportunities for <i>improving knowledge</i> of policy makers, planners, designers, etc.	+++	+++	+++

VIII. Research needs ⁽¹⁾

- ❖ Research to enhance high yields
- ❖ Crop choice is equally as important as going for high yielding and fast maturing varieties



VIII. Research needs ⁽³⁾

- ❖ Investments in hydrological research, water situation assessment and minimization of crop failures due to droughts and long dry spells



VIII. Research needs

(4)

- ❖ Investment in research to enhance adaptation and efficient utilization water management technologies



open pit prepared for catching rainwater



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VIII. Research needs ⁽⁵⁾

- ❖ Socio-economic and marketing research to enhance access to market information, market access to enhance the realization of basic food security needs and modest market-oriented production on a sustainable basis
 - ☞ input supply
 - ☞ output marketing

VIII. Research needs ⁽⁶⁾

- ❖ Hydro-institutional research to enhance
 - ☞ policies for clear definition of land/ water rights; reduce land fragmentation
 - ☞ policies for reduced conflicts between up- and downstream users; traditional irrigators and those on modern schemes

VIII. Research needs ⁽⁷⁾

- ❖ Hydro-institutional research to enhance gender, empowerment and increasing access of women to land, water and decision making (e.g. WUA, etc)



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IX. Conclusion & Recommendation ⁽¹⁾

- ❑ The poverty and food insecurity can be tackled at various stages and sustainable water use in agriculture can provide realistic opportunity for growth
- ❑ Unless water is properly managed for agriculture achieving growth, food security and protecting rural livelihood in Ethiopia is questionable
- ❑ Mixed perception on impact of SSI
- ❑ +ve impact can be enhanced through training, research, application proven technologies
- ❑ Three levels of rural poor are identified and relevant small holder technology choices through applied research can enhance transformation

- Classify and **identify target groups** based on the scope of their assets and livelihoods and provide development assistance that enables them to protect and improve these assets and livelihoods through various combinations of interventions.
- **Increase** the volume of **production** and **enhance productivity** through proper land and water management, which may require strategic and applied research.
- Put in place **land use classification** and delineation, based on suitability that reduces risk of degradation (rainfed agriculture, irrigated agriculture, forest land, grazing land).
- **Improve degraded land** through conservation-based interventions, catchment treatment and afforestation.
- Invest in rural water development as **multiple use water** systems to reduce poverty and improve livelihood through providing water for agriculture, livestock, domestic and sanitation.
- Manage the water properly:
 - Avail water to overcome dry spells & provide supplementary irrigation through RWH (in-situ soil moisture maximization, ponds, shallow wells) and MI (treadle pumps, hand pumps, micro pumps, drip irrigation)
 - Whenever WR availability permits, develop SSI (diversions, storage dams). Entail intensive consultation with beneficiaries, preceded by base line study and accompanied by action research to achieve greater food security impacts

Recommendation

- There is a strong need to enhance access to **institutional support** services such as credit and extension. Availing market information on input and output marketing will only achieve the desired impacts if an effective extension system is in place to guide farmers to understand the issues related to the optimal application inputs, targeted planting dates and product quality to enable them respond well to market incentives.
- **Capacity building** in various aspects of irrigation management Provide the necessary policy framework at all levels to give more attention to poor people (especially women) – enable women to be a major beneficiary of investments.
- **Improve policies** for enhancing private sector investments in irrigated agriculture development, especially manufacture and sales of micro irrigation technologies as well as other input and output market functions.
- **Project planning should be a step-wise exercise** that avoids ‘too ambitious’ projects, with limited resources for adequate baseline studies, stakeholder consultations and effective implementation

Thank You