

Groundwater for Irrigation

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Presented by

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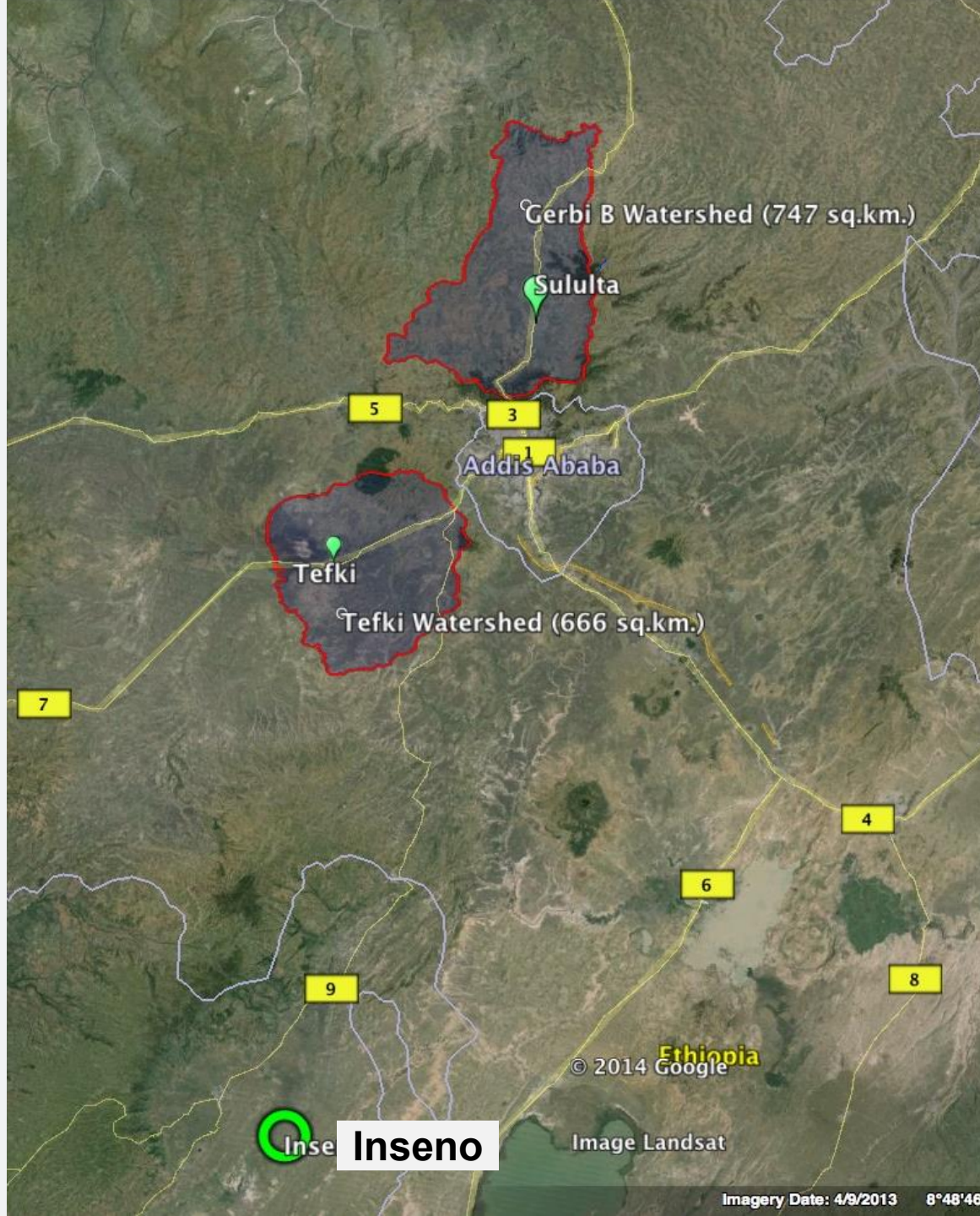




Project Objectives – Provide an Awareness of:

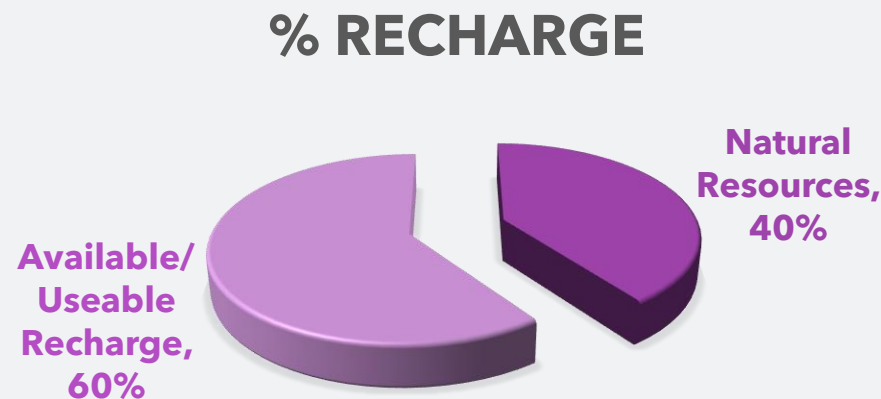
- + Opportunities and limitations for small-scale irrigation using shallow groundwater.
- + Need for planning and management on a watershed basis.
- + Introduction of a spreadsheet tool to assess sustainable quantities of shallow groundwater available for small-scale irrigation.

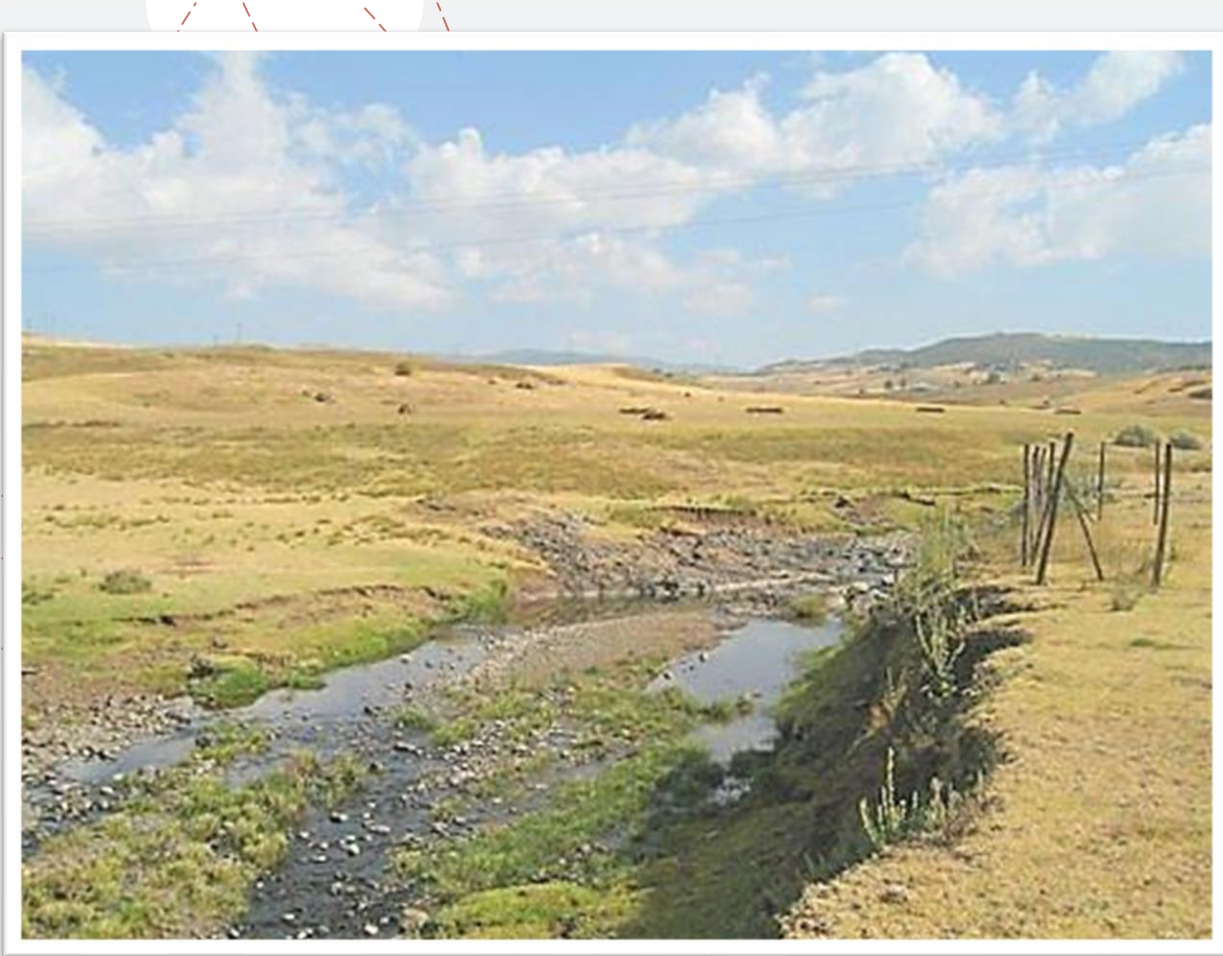
Pilot Watershed Locations



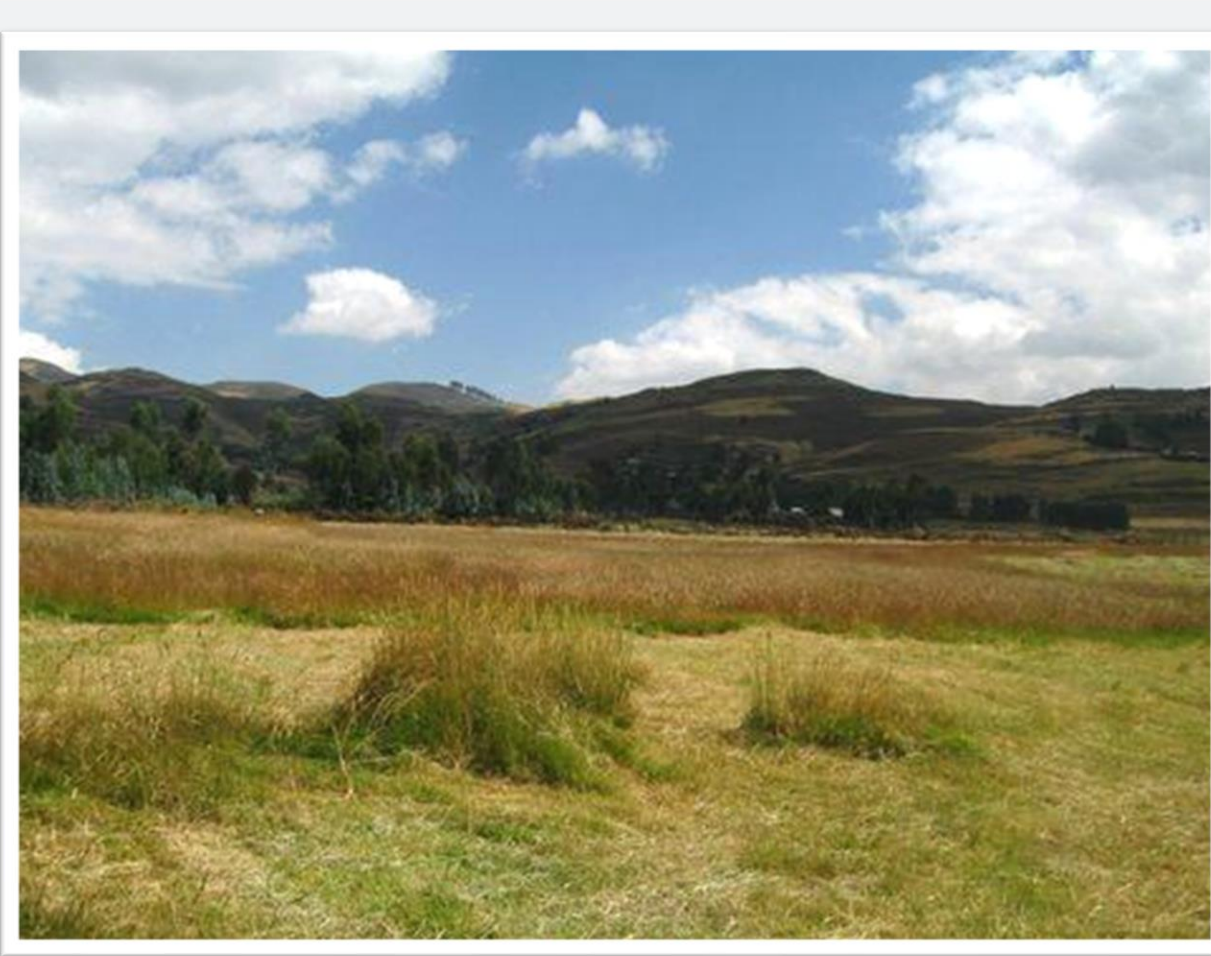
Natural Resource Flows

- + Need to reserve a percentage of groundwater recharge for ecological water needs, e.g.:
 - + Stream base flow.
 - + Riverine vegetation.
 - + Wetlands preservation.
 - + Agriculture (e.g.: Hay crops in Gerbi B Basin).





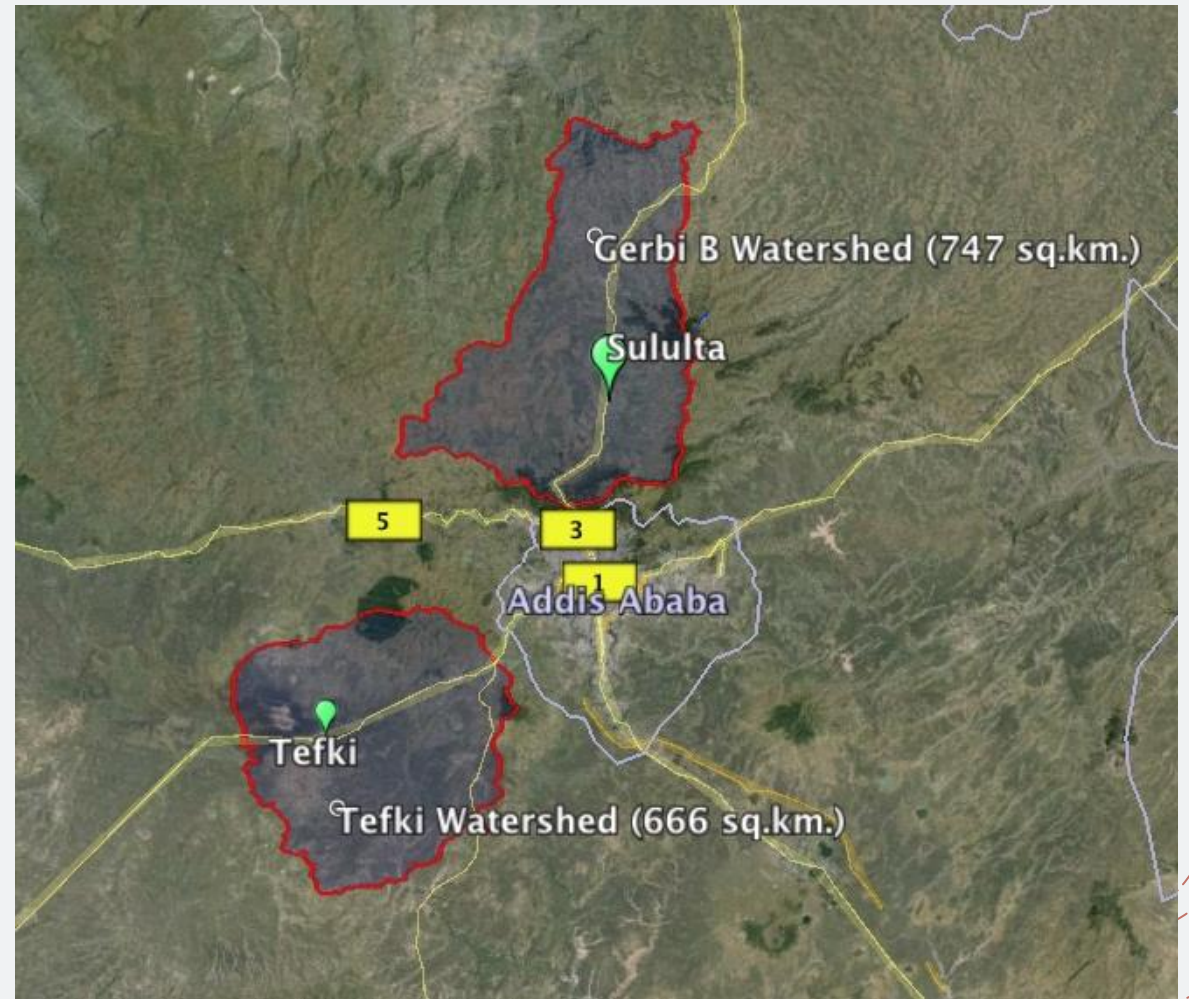
+ Stream Base Flow –
Dry Weather Flow

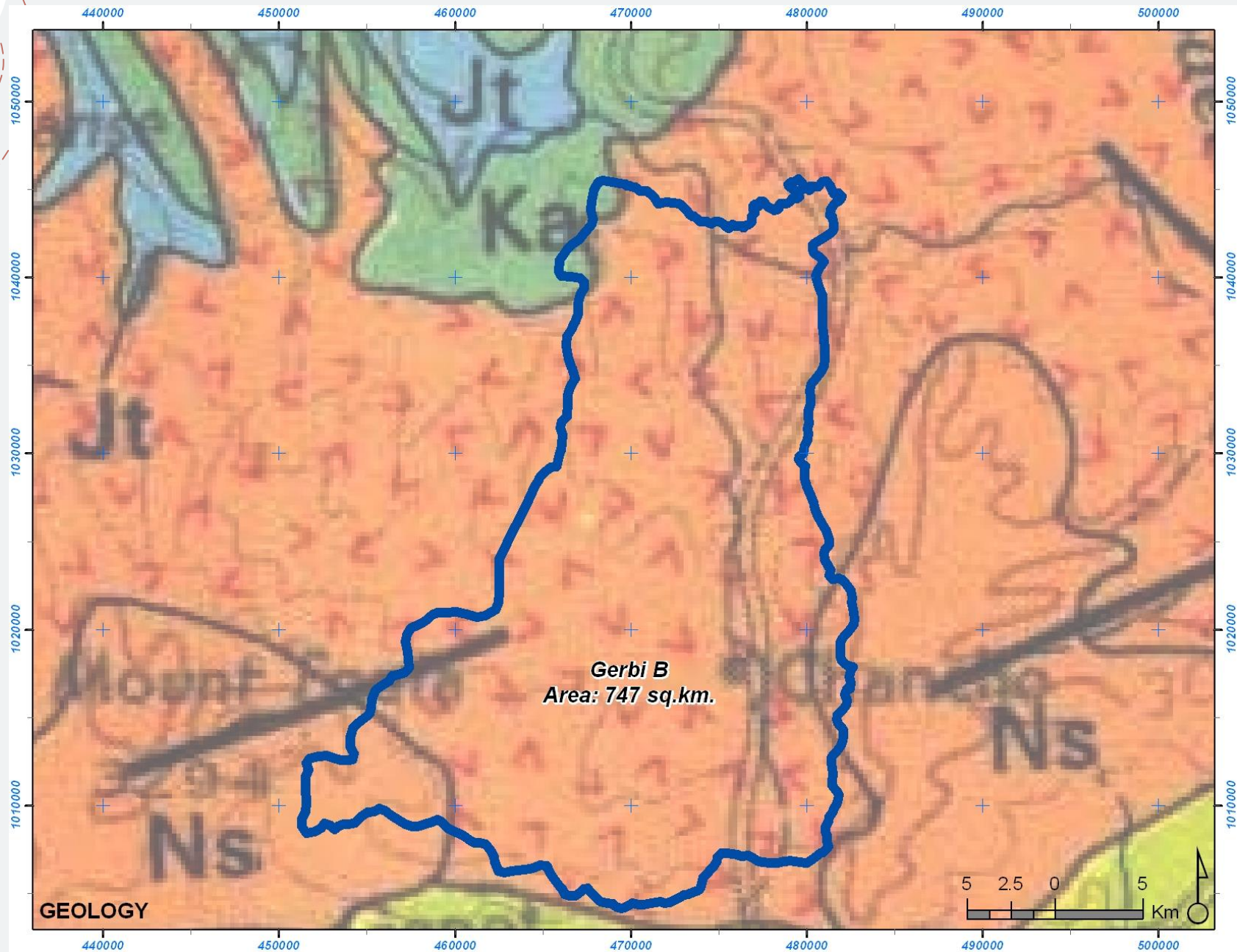


+ Hay Crop in Seasonal
Wetland Areas of Gerbi Basin

Primary Steps in the Analysis

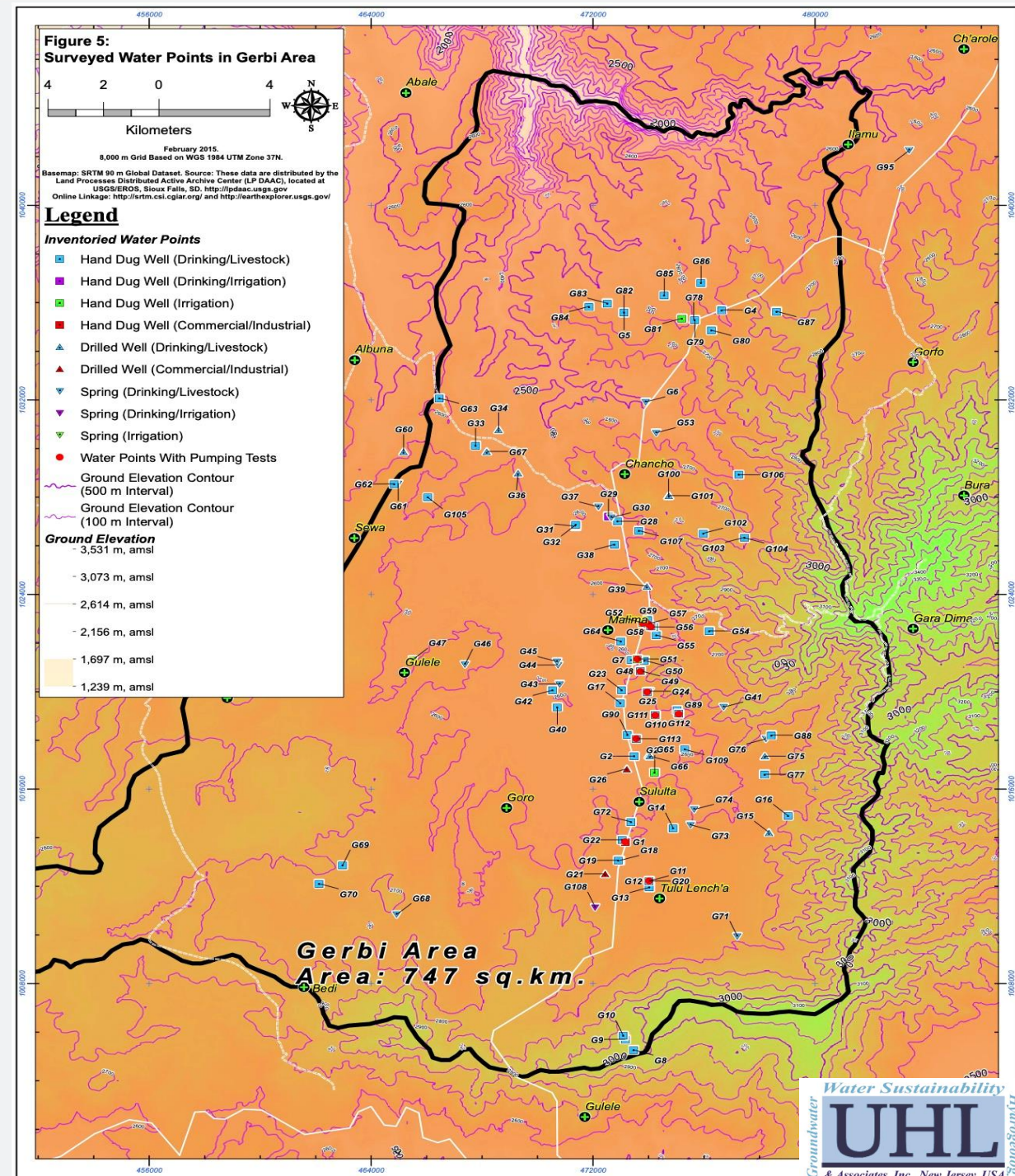
- + Base Maps Development.
- + Field Data Collection Program.
- + Spreadsheet Development.





Field Survey Overview in Gerbi Basin

- + Well Inventory (70+ Wells -hand dug, drilled, springs).
- + Water Quality Indicators – TDS, pH, Conductivity
- + Pumping Tests – 10 short term pumping tests.
- + Social Aspects.



Spreadsheet Approach Groundwater Resource Availability in the Gerbi Basin



GROUNDWATER FOR IRRIGATION

Irrigable Land Potential (ILaP) Calculator

Watershed: Gerbi Area

	INPUTS		
Area	747	km ²	
	Normal	Drought	
Precipitation	1,300	820	mm/Yr.
% of Precipitation Estimated for Groundwater Recharge	12%		
	Normal	Drought	
Groundwater Recharge [A]	117	74	MCM/Yr.
% Reserved for Ecological Use	40%		
	Normal	Drought	
Groundwater Recharge for Ecological Reserve [B]	47	30	MCM/Yr.
	Normal	Drought	
Available Groundwater for Use [C] = [A] - [B]	70	44	MCM/Yr.

Irrigable Land Potential (ILaP) Calculator

Estimating Existing Groundwater Use						
1. Household Use	Population =	150,000		0.82	MCM/Yr.	
	Demand =	15	LPP/day			
2. Livestock Use		2.30	MCM/Yr.	2.30	MCM/Yr.	
3. Commercial and Industrial Use		1.50	MCM/Yr.	1.50	MCM/Yr.	
4. Irrigation Use	Area =	100	Hectares	6.31	MCM/Yr.	
	Demand =	2	LPS/ha.			
Estimated Groundwater Use [D]				11	MCM/Yr.	
				Normal	Drought	
Net Available Groundwater [E] = [C] - [D]				59	33	MCM/Yr.

Irrigable Land Potential (ILaP) Calculator

Estimating Future Groundwater Demand for Irrigation			
No of Days in Growing Season =	120	days	
Future Reduction in Water Use =	0%		
Adjusted Future Water Demand =	2	LPS/ha.	
Estimated Groundwater Demand per Hectare per Growing Season [F]		21,000	m ³ /ha.
		Normal	Drought
Irrigable Land Potential (ILaP) [G] = [E]/[F]		2,810	1,571 ha

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GROUNDWATER FOR IRRIGATION

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Parting Thoughts

- + Do the numbers – groundwater provides great opportunities but has limits.
- + Once overdevelopment begins, it is hard to turn back the clock – examples – US (high plains, California, southwest); India; Jordan; Yemen; China.....
- + Water quality evaluation is critical for irrigation use (sodium and salinity hazards).
- + Growth can and will be rapid in SSA given the economic benefits and food demands.
- + Need to Manage locally.



Thank You!

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