Suitability of Water Harvesting in the Upper Blue Nile Basin, Ethiopia

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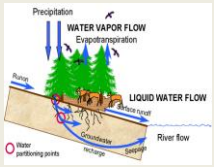
Introduction

The challenge for agriculture in sub-Saharan Africa is the variability in rainfall, characterized by high intensity storms, and high frequency of dry spells and droughts. Water harvesting systems can turn these inherent challenges into opportunities.

1. Bridge dry spells and increase productivity

2. In-situ water harvesting systems can maintain and improve the soil fertility

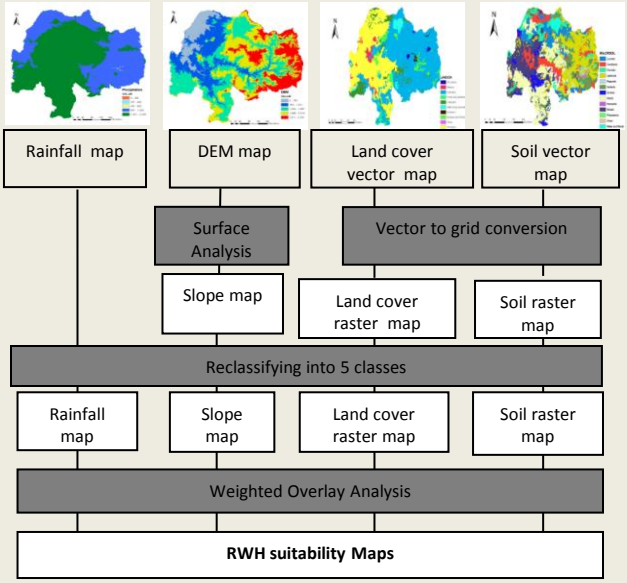


3. Affects the rainfall partitioning

4. Large scale implementation can enhance green water

What potential do water harvesting systems have to enhance water related resilience in rainfed farming systems at catchment scale context? The first step to answer this question is to analyze the suitability of water harvesting systems in different agro-ecological landscapes.

Method



5. Flow chart for the weighted overlay water harvesting systems suitability identification

The suitability analysis was done using the following equation:

$$S = \sum w_i * x_i ; \quad \text{where } S \text{ the final suitability score, } w_i \text{ is the weight of factor } i, \text{ and } x_i \text{ is the criterion score of factor } i$$

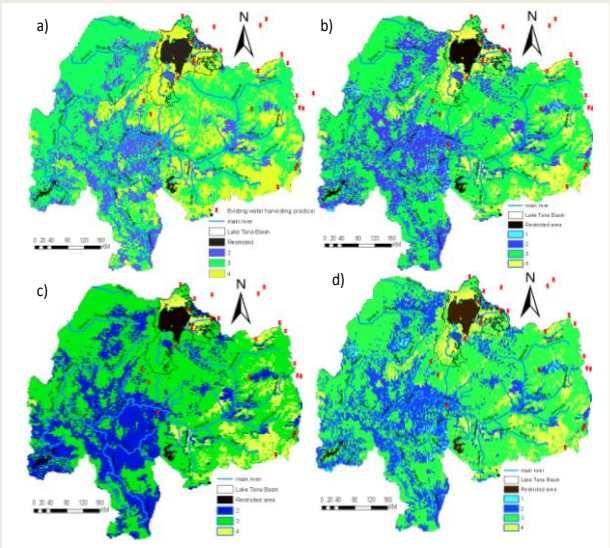
1. Suitability classes of different constraint factors used to identify suitable areas for water harvesting schemes using MCE weighted overlay technique

Suitability values	1	2	3	4	5
Rainfall(mm)	<200	>1200	200-400	800-1200	400-800
slope	>20%	12-20%	8-12%	2-8%	<2%
Land cover	Bushland, forest, woodland, grassland swamp, shurbland	N.A.	N.A.	plantations irrigated land	cultivated land
Soil	N.A.	Leptosols	Arenosols, Regosols	Vertisols Acrisols, Alisols	Luvisols, Cambisols Fluvisols, Nitisols

2. Relative percent influence factors

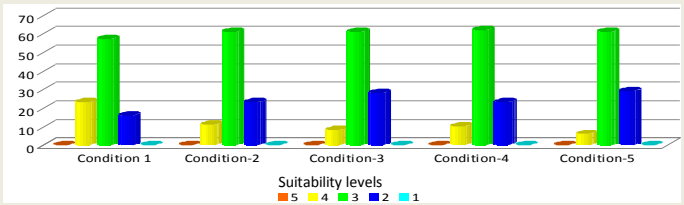
	Percent Influence				
Parameter	Condition-1	Condition-2	Condition-3	Condition-4	Condition-5
Rainfall	25	30	35	25	35
Slope	25	30	25	35	30
Land Cover	25	20	20	20	20
Soil	25	20	20	20	15

Results



6. Suitability level of the Upper Blue Nile for water harvesting under a) condition-1 b) condition-2 c) condition-3, and d) condition-4

3. Area of the total basin (%) covering different suitability levels for water harvesting, for different weight combinations of influencing variables (condition 1-5).



Conclusions

- The Upper Blue Nile Basin has a large potential for water harvesting implementation
- Results are highly sensitive to rainfall amounts
- Investing in water harvesting on open woodland land use types would possibly improve the water availability for livestock which has a nexus effect on water productivity
- There is opportunity of transforming woodland into agricultural land and gain a lot of benefit from water harvesting systems