

WAHARA – Introduction

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On behalf of WAHARA project team



- **WAHARA**: Water Harvesting for Rainfed Africa: investing in dryland agriculture for growth and resilience
- **5 year project**: from March 1st 2011 – Feb 29th 2016.
- **EU-funded**: FP7-AFRICA-2010 (Africa Call)

This presentation

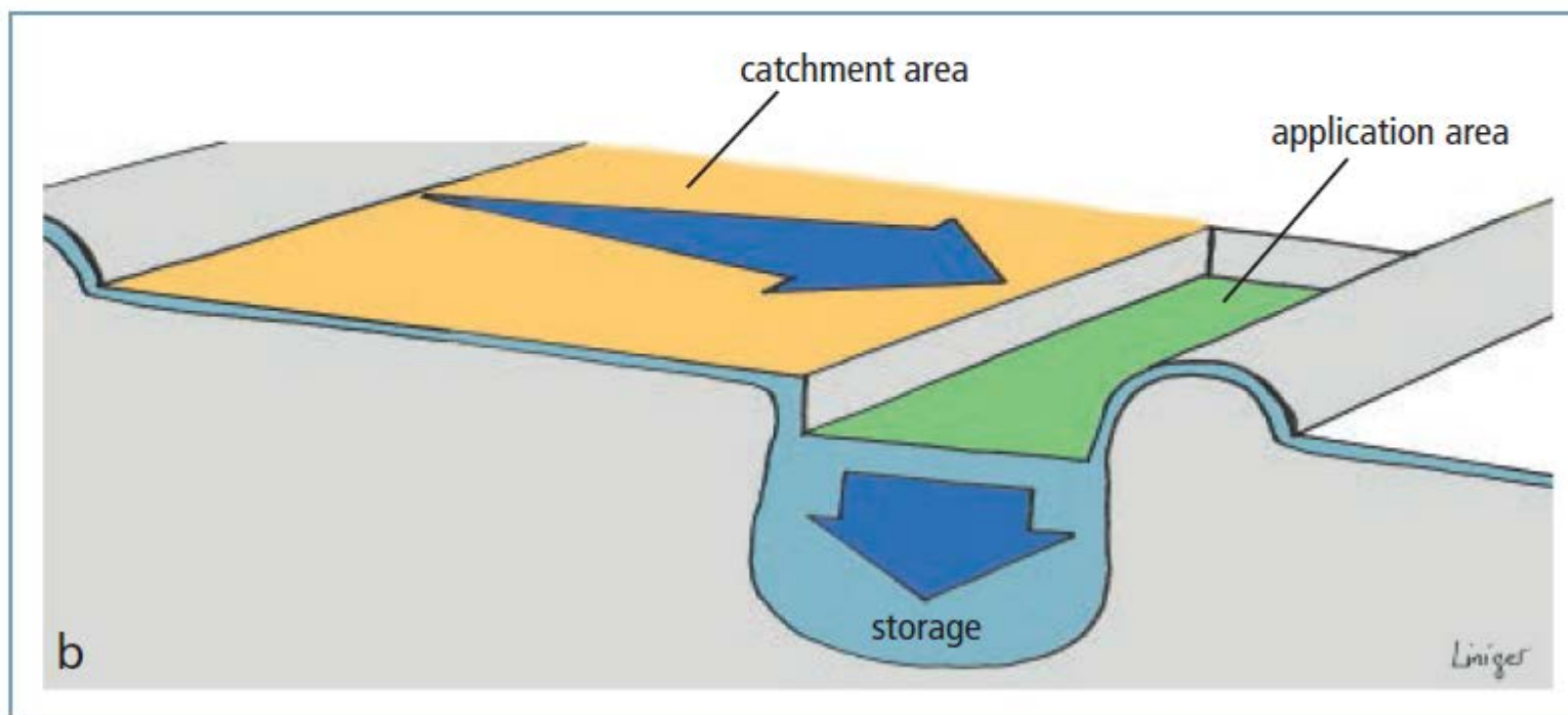
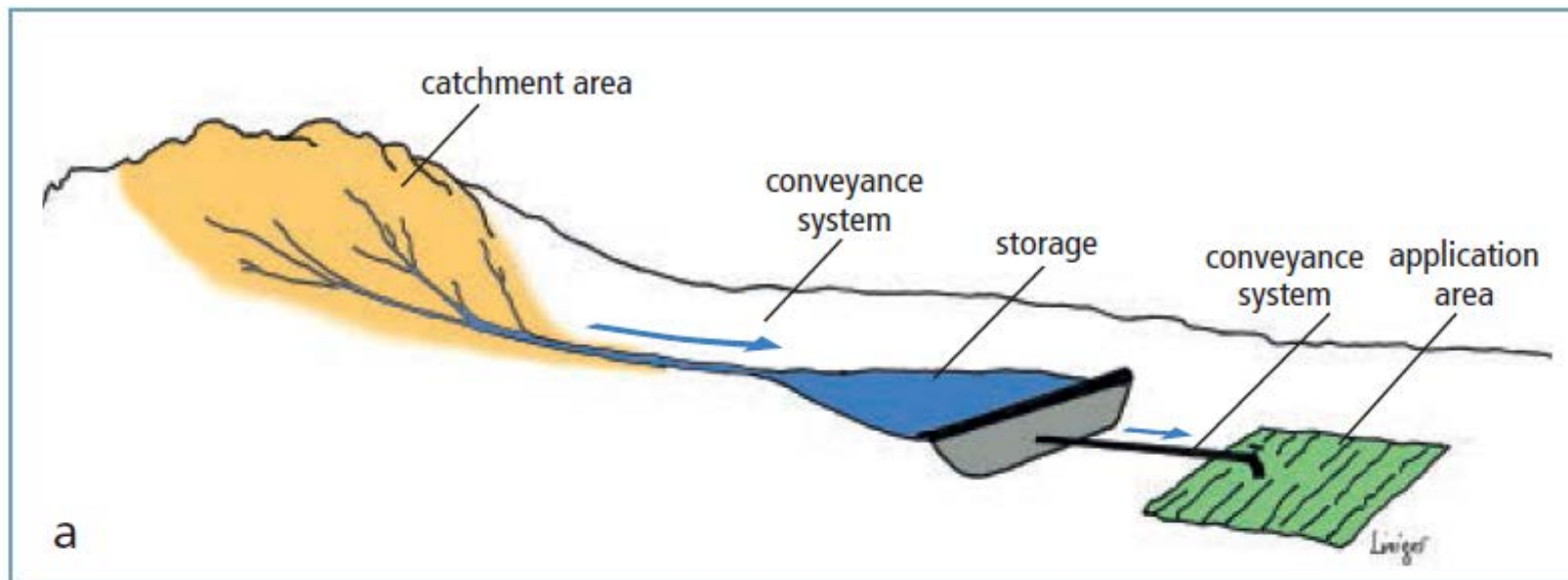
- What is water harvesting?
- What did WAHARA do?



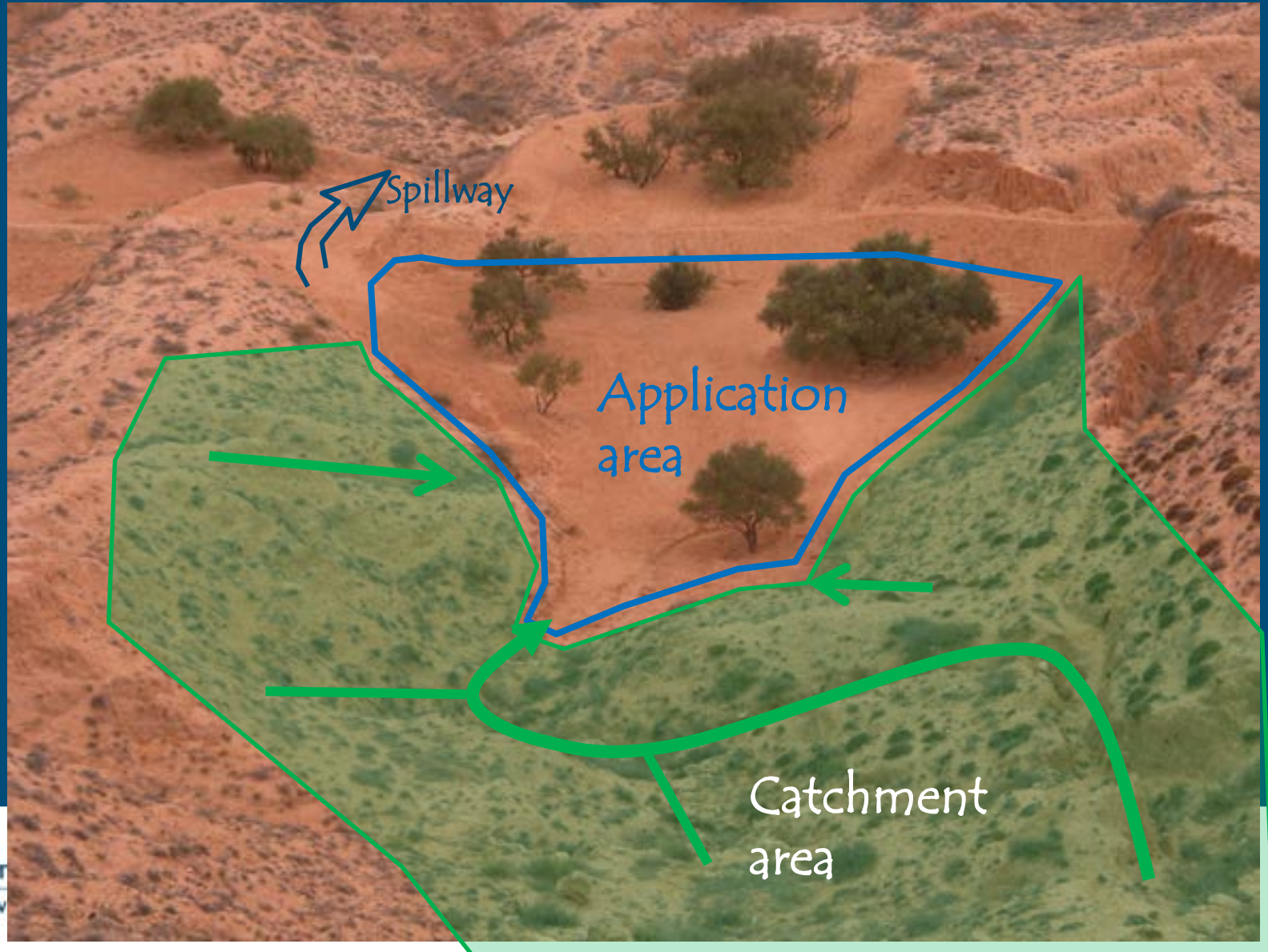
Water Harvesting

In Water Harvesting we collect water and store it for later use.

- We can distinguish 1) area where water is collected, 2) place where it is stored, and 3) area where it is used
- Comparison of rainfall amount with amount of water that plants need tells us how much water is needed
- The more water we need, the larger the area we need to harvest enough water



Principles of Water Harvesting



Water Harvesting from a slope (in Gibraltar)



Water Harvesting

Recharge dam



Terraces and
trenches



Infiltration
pit



Water Harvesting – using roads



Road side ponds to recharge groundwater
and enhance in-situ moisture in soils

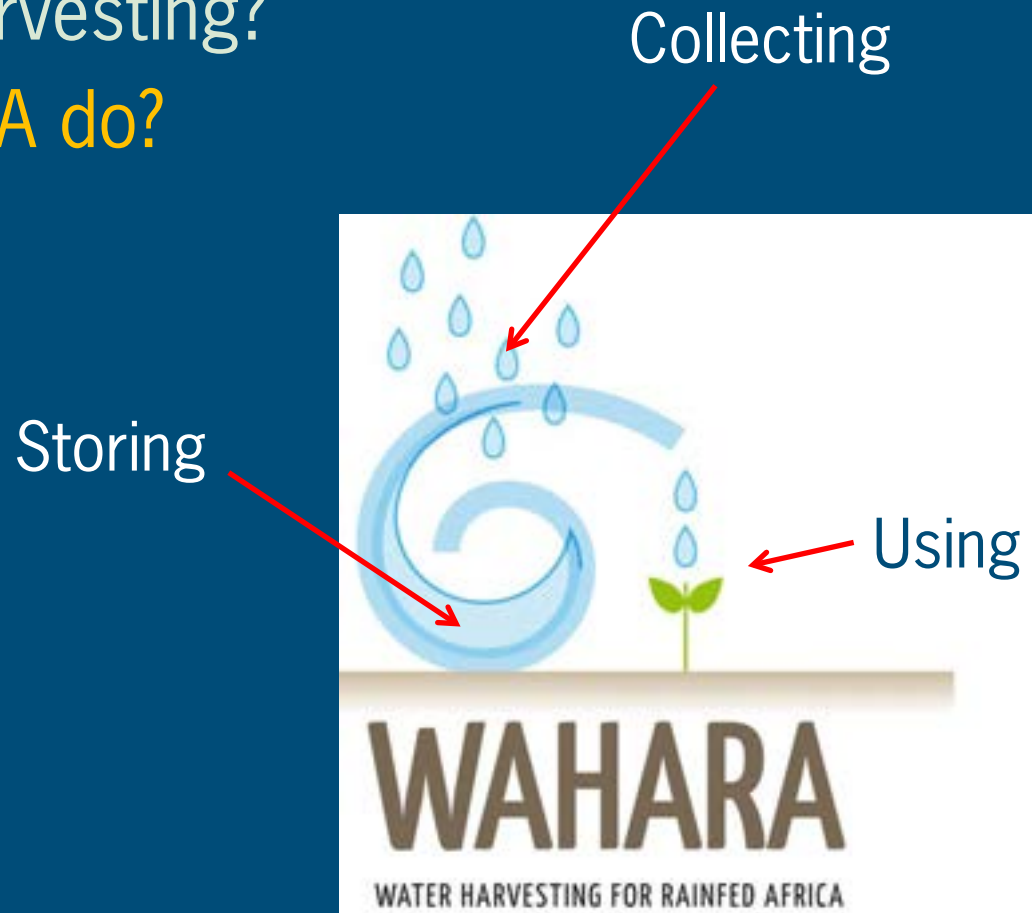
Appropriate WH methods in relation to climate

Ratio of rainwater available to water required by crop	0.2 (dry)	0.5	1.0	1.5	2 (wet)
Dominant type of Agriculture	Extensive grazing	Tree crops and grazing	Cereals	Cereals	Cereals & Horticulture
Water harvesting techniques for cultivation	Long distance water transfers	Jessours & Flood water diversion	Micro catchments	Water retention techniques	Need for water retention in dry years
Water harvesting techniques for livestock management	Transhumance in steeplands: Nomadism in Flatlands	Stock ponds & Rangelands	Stock ponds & Rangelands	Livestock pens	Livestock pens

Tunisia Ethiopia Zambia
Burkina

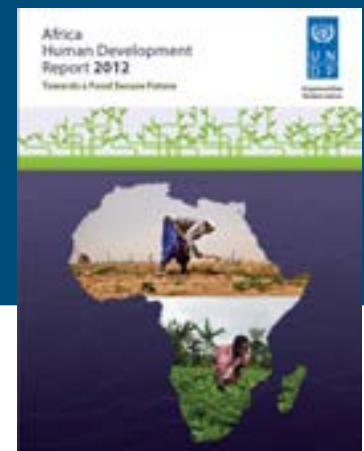
This presentation

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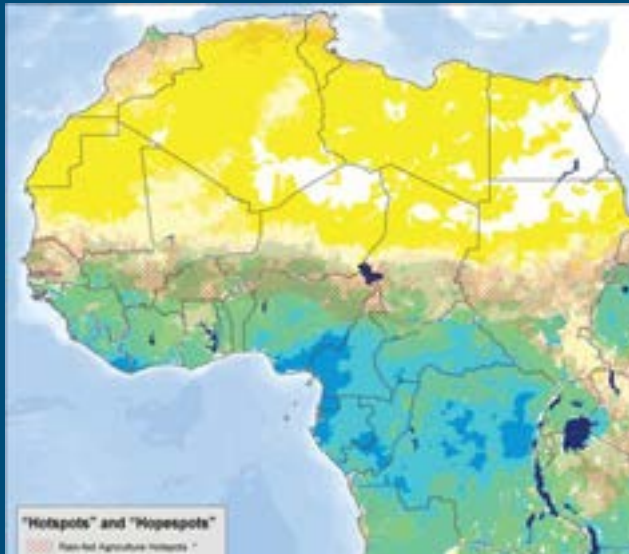


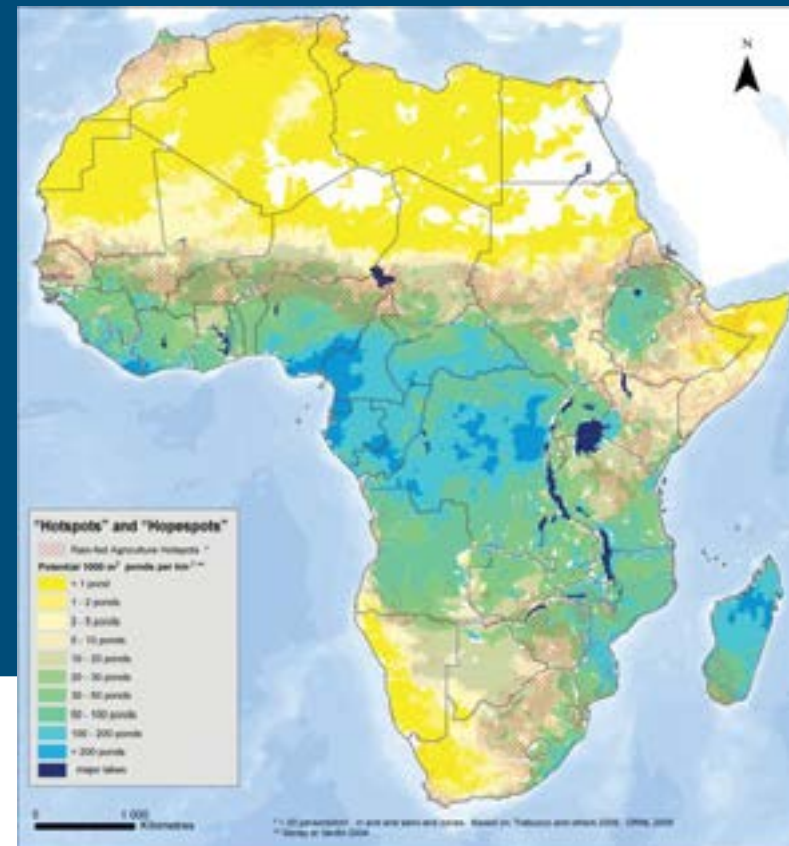
WAHARA – the problem

- Water productivity in Africa is the lowest in the world
- Africa is the only continent where growth of food production has not kept pace with population growth
- 95% of agricultural production in Africa comes from rainfed areas
- Key challenges concerning agriculture:
 - *How will Africa feed its growing population?*
 - *How will African agriculture cope with climate change?*
 - *How to improve water security of rural Africans?*



Introduction - solutions

- Socio-economic benefits of safe water and adequate sanitation (improved health, livelihood security and poverty reduction) have been estimated at US\$3-4 per \$ invested, with the highest returns in Africa
 - WH presents highly adapted, flexible, easy to understand and implement, low-cost solutions to the productivity, climate adaptation and water security challenges
 - These approaches hold great potential to boost economic development and sustain livelihoods in rainfed Africa
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- A map of the African continent with a color-coded overlay. The northern and central regions are predominantly yellow, while the southern and coastal regions are green and blue. A legend in the bottom right corner, titled "Hotspots and Hopespots", indicates that the yellow areas represent "Rainfed Agriculture Hotspots" and the green/blue areas represent "Rainfed Agriculture Hopespots".



Introduction – emphasis WAHARA

- Develop innovative **appropriate WH technologies** for different geographical regions of rainfed Africa
 - WHT should have synergies with existing rainfed farming systems
 - On-site and downstream impacts should be considered
 - WHT should contribute to sustainable improvement of livelihoods
 - Facilitate stakeholder learning and action about WH technologies in different (biophysical and socioeconomic) conditions

Introduction – project areas

The project aims to develop solutions applicable **beyond local study sites** and indeed **across the continent**. In order to reach this objective, study sites are selected that are **representative** for rainfed Africa:

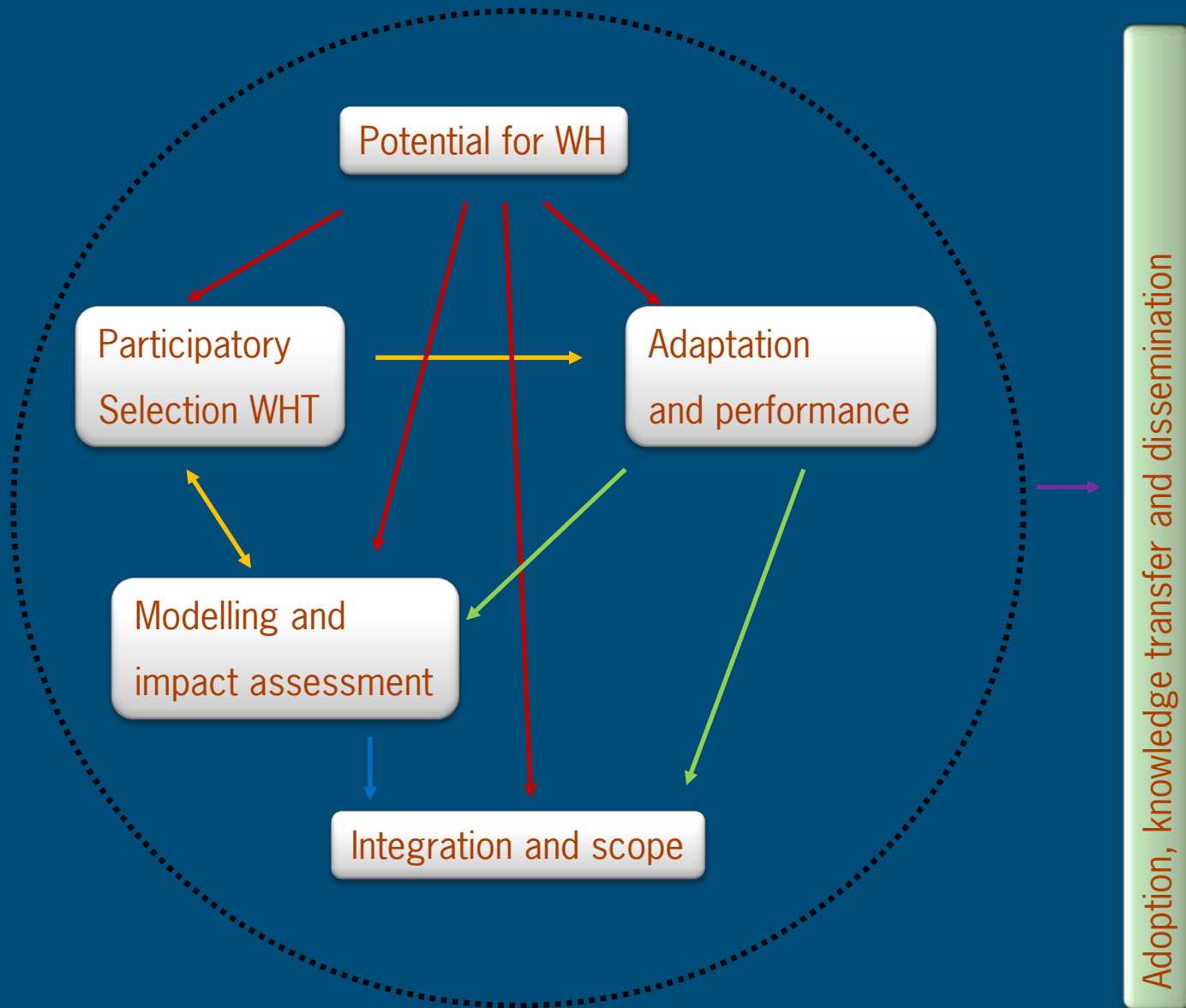
Tunisia in the North,
Burkina Faso in the West,
Zambia in the South and
Ethiopia in the East.



WAHARA - partners

- Led by Alterra (Netherlands)
- Wageningen University (Netherlands)
- Golden Valley Agricultural Research Trust (Zambia)
- Mekelle University (Ethiopia)
- Institut de l'Environnement et de Recherches Agricoles (Burkina Faso)
- Institut des Régions Arides (Tunisia)
- Leeds University (UK)
- Agrotechnology Consult Africa (Zambia/Netherlands)
- MetaMeta (Netherlands)

- Bio-physical and socio-economic context, stakeholder information, potential for WH
- Selected technologies
- Bio-physical and socio-economic sustainability of technologies
- Model results for current conditions and scenarios of climate change, population growth, urbanisation, policies
- Results of the whole project, including: Critical bio-physical and socio-economic conditions for WH, scope of WH, guidelines for application (& adaptation) of WH



Potential for Water Harvesting

- Context sites – both biophysical and socio-economic
- Stakeholder analysis, stakeholder workshop
- Farm household agro-socio-economic survey
- Continental inventory of WH technologies (literature review)
- Overall result: assess the local potential for WH



WAHARA study sites

	Burkina	Ethiopia	Zambia	Tunisia
Area (km2)	NE – 5000	East – 2400	South – 2300	SE – 1200
Rainfall (mm)	400-800	550-800	700-800	150-220
Bioclimate	Sahelo Sudan	Semi arid	Tropical conti	Arid
Population	140000	236000	73000	25000
Farming systems	Mixed	Mixed	Agroforestry, arable farming, dairy	Mixed
WH	Zai, ados, half moon, bund, cropping methods	Armo, diversion, spate, bunds, ponds, terraces, dams, eyebrow basins, deep trenches, cropping methods	Dams, cisterns, storage structures, quarries, cropping methods	Jessour, tabia, recharge structures, cisterns
Crops	Sorghum, millet, ..	Barely, maize, brocolli	Maize, cotton, groundnuts,	Olive, cereals
Water resources	Rain, dam, aquifer	Rain, springs, water storage,	Rain, wells, streams,	Rain, aquifer
Water use	Rainfed, irrigation, drinking	Rainfed agriculture, irrigation,	rainfed, drinking, livestock	Drinking, agriculture, industry,

Potential for Water Harvesting

- Africa is very rich in various WHT, using various methods (rainfall, floods etc) and various scales
- Ethiopia and Zambia study sites are located in more humid climates → more soil conservation technologies, whereas 'true' water harvesting practices are more frequently encountered in the drier Tunisia and Burkina Faso study sites.
- High levels of the local know-how of the stakeholders (especially farmers, engineers, etc.)
- Willingness stakeholders to be fully involved in the different steps of the implementation of the project

Participatory selection of technologies

- Make a compilation of WH technologies using standard WOCAT format (World Overview of Conservation Approaches and Technologies (www.wocat.net))
- Select technologies in second stakeholder workshop, making sure that at least 1 innovative one is selected.



WHT selection



- Sources of WHT:
 - Locally used (including those described with WOCAT)
 - From other WAHARA study sites
 - From existing WOCAT database
 - Others, not in WOCAT → challenge to provide enough information on these to convince stakeholders to try this
- In context WAHARA, last 3 categories are considered innovative
- Scientists made a pre-selection of innovative WHT → for this pre-selection information was provided to stakeholders
- Workshops held in 4 sites; standardised methodology to select 3-4 WHT, 1 of which innovative

WHT selection

Burkina Faso

1. Zai
2. Stone lines
3. Magoye Ripper
4. Talya tray

Ethiopia

1. Percolation/sediment storage ponds with hand dug wells
2. Check dams
3. Series of Hillside Cistern with bench terraces
4. Soil improvement methods (Mulching, Compost, etc)

Tunisia

1. Jessour
2. Gabion check dam
3. Tabia
4. Cistern
5. Recharge well

Zambia

1. Zai pits
2. Magoye ripper
3. Ox-drawn strip tillage
4. Ox-drawn zero tillage with the GART planter

WHT selection

Magoye ripper



**Mulching and
soil improvements**



Gabion check dam



GART planter



Adaptation and performance

- Adapted the selected technologies to make them suitable for local conditions (adaptation should always be considered).
- Developed protocols for performance monitoring (agreed on methods to use)
- Implemented adapted technologies
- Participatory monitoring for 2-3 years
- Evaluate WHT looking at environmental, social, economic factors



Further WAHARA work

- Modelling WHT to see what the effect of WHT would be when applied to a larger area, or when there are changes in climate, population etc
 - Integration of the results from the 4 sites to obtain general lessons about WH in Africa
 - Disseminate project results
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- Later this morning, monitoring, modelling and integration will be presented to finalise the overview of WAHARA
 - First we will have study site presentations to give you a better impression of the study sites

Thanks for your attention!

www.wahara.eu

www.wocat.net

www.thewaterchannel.tv

www.bebuffered.com

