Water Harvesting – Practices and Recent Innovations

Leadership Course in Flood based Farming Systems and Water Harvesting

Maimbo Malesu and Alex R. Odour

Outline of presentation

1. General Context on RWH
2. WH - Technological options
3. Capacity building
4. Awareness creation
5. Developments in Policy
6. Conclusions
7. Way forward

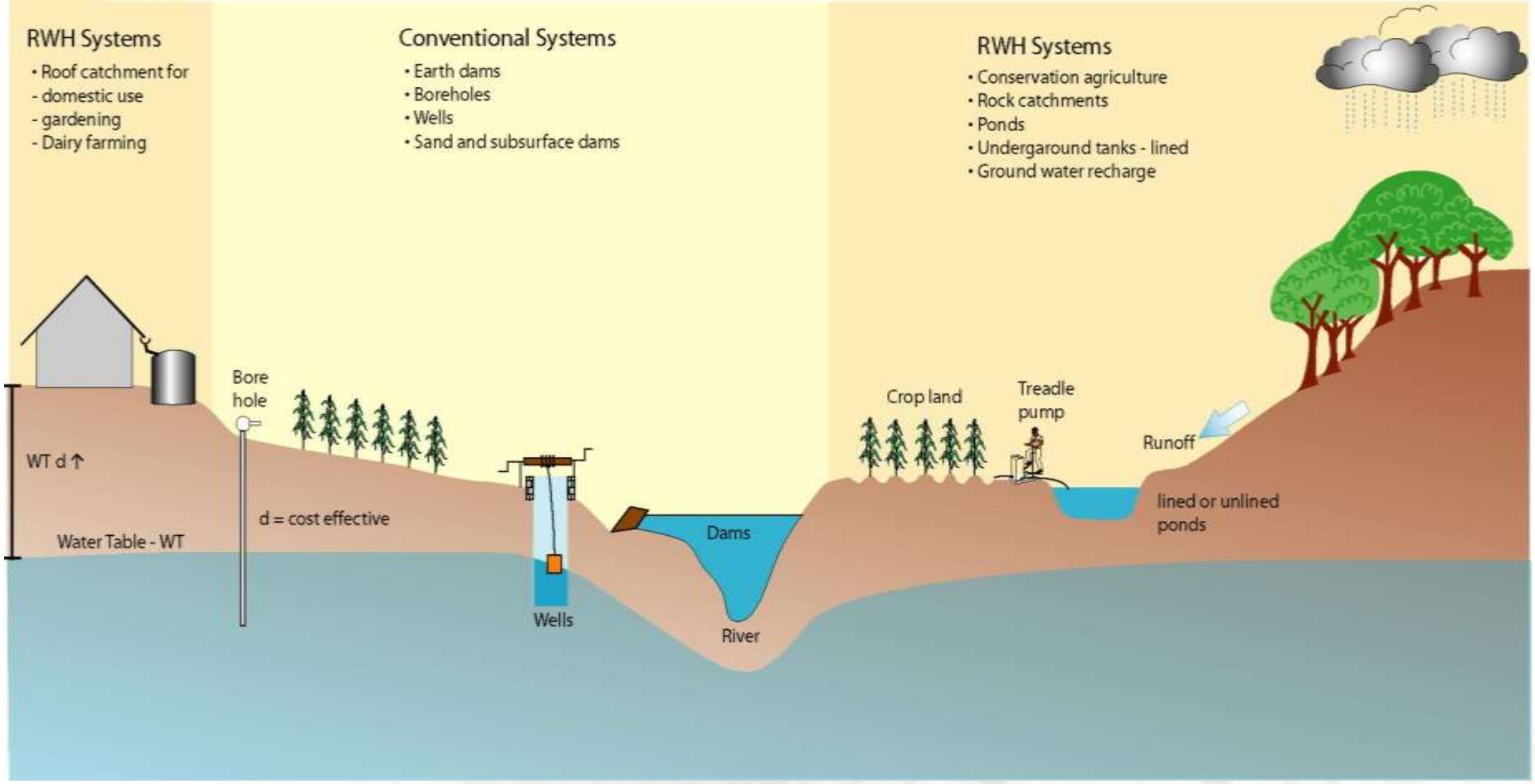
Problems

1. **Poor access to and availability of water in the region due to inadequate water harvesting infrastructure**

1. Extremely low agricultural production – **less than one tonne per hectare** due to intra-seasonal dry spells and drought;

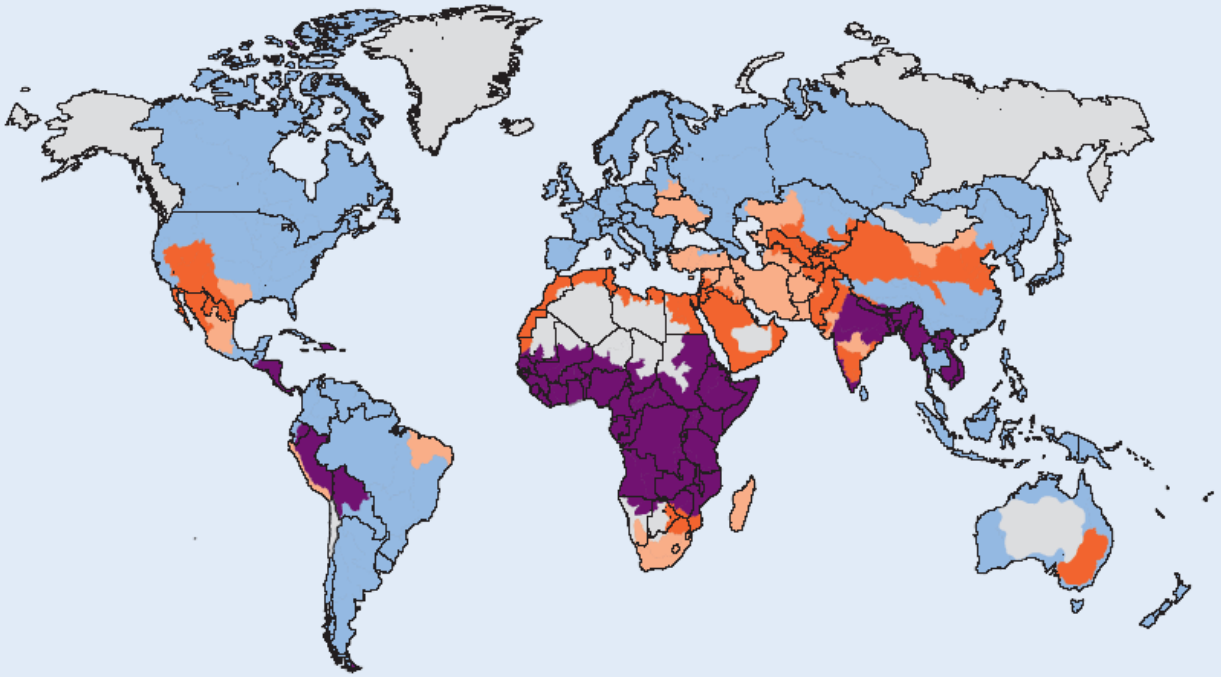
1. Poor management of rainwater – **flooding??**, erosion, ecosystems pollution among others.

The Policy Dilemma



map **2** | **Areas of physical and economic water scarcity**

Little or no water scarcity
Approaching physical water scarcity
Not estimated
Physical water scarcity
Economic water scarcity



Definitions and indicators

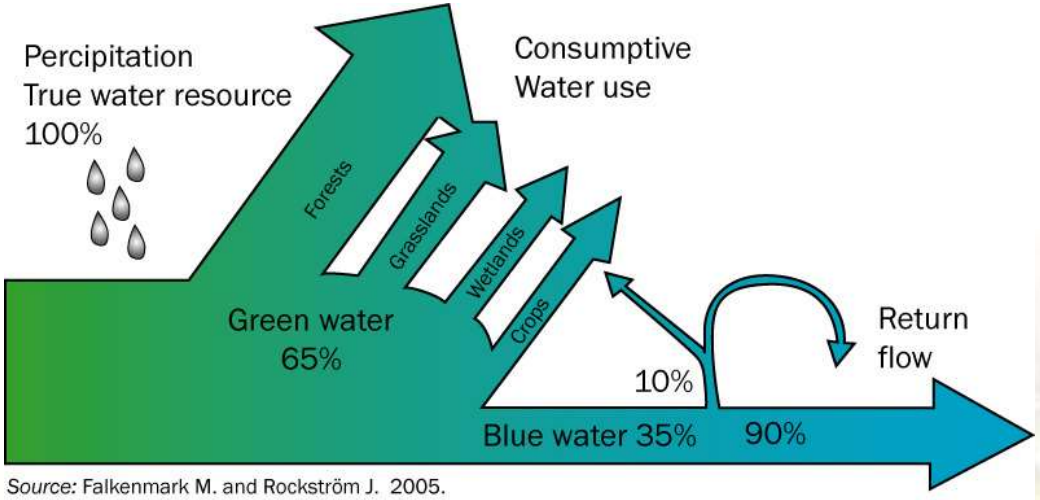
- *Little or no water scarcity.* Abundant water resources relative to use, with less than 25% of water from rivers withdrawn for human purposes.
- *Physical water scarcity (water resources development is approaching or has exceeded sustainable limits).* More than 75% of river flows are withdrawn for agriculture, industry, and domestic purposes (accounting for recycling of return flows). This definition—relating water availability to water demand—implies that dry areas are not necessarily water scarce.
- *Approaching physical water scarcity.* More than 60% of river flows are withdrawn. These basins will experience physical water scarcity in the near future.
- *Economic water scarcity (human, institutional, and financial capital limit access to water even though water in nature is available locally to meet human demands).* Water resources are abundant relative to water use, with less than 25% of water from rivers withdrawn for human purposes, but malnutrition exists.

Source: International Water Management Institute analysis done for the Comprehensive Assessment of Water Management in Agriculture using the Watersim model; chapter 2.

IWMI, 2007

Understanding the rainwater partitions – Kenya Case Study

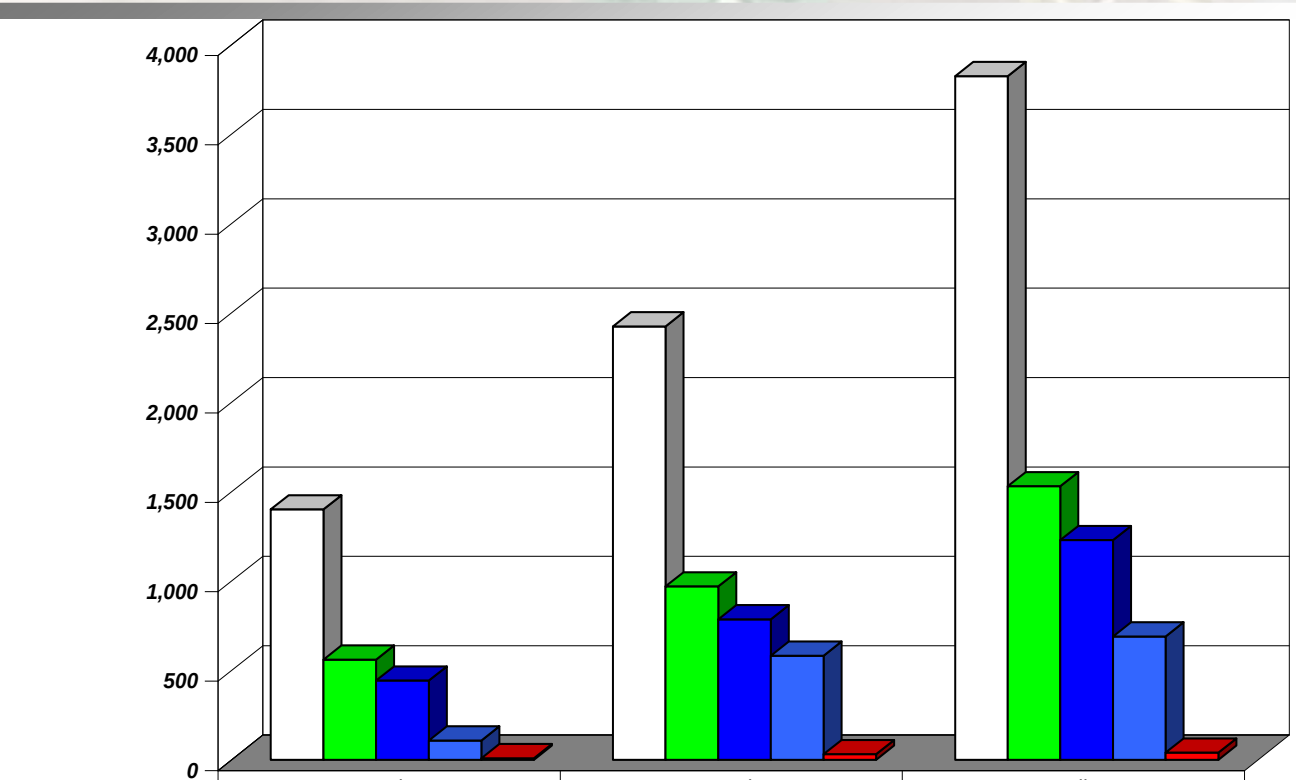
Class	Crops (km^2)	Forest (km^2)	Grasslands (km^2)	Wetlands (km^2)	Total (km^2)
Ewaso-Samburu System	5,650	3,850	54,790	3,347	69,127
Mt Kenya & Abardere System	11,750	2,769	796	201	15,564
Mau and Western System	29,848	6,796	14,233	658	51,600
Coastal forest and Marine	9,626	16,758	23,520	2,811	52,873
Amboseli & Chyulu System	5,983	4,513	14,133	1,774	26,412
Total	62,857	34,686	107,472	8,791	**215,576**
% Landcover within the five Ecosystems	29.16%	16.09%	49.85%	4.08%	**99.18%**
% Landcover within Kenya	**11.03%**	**6.09%**	**18.85%**	**1.54%**	**37.51%**



Source: Falkenmark M. and Rockström J. 2005.

Within the focal ecosystems, grassland occupy the largest portion at about 19%, followed by crops at 11% and forest at 6%.

Low Utilization of Rainwater - Zanzibar

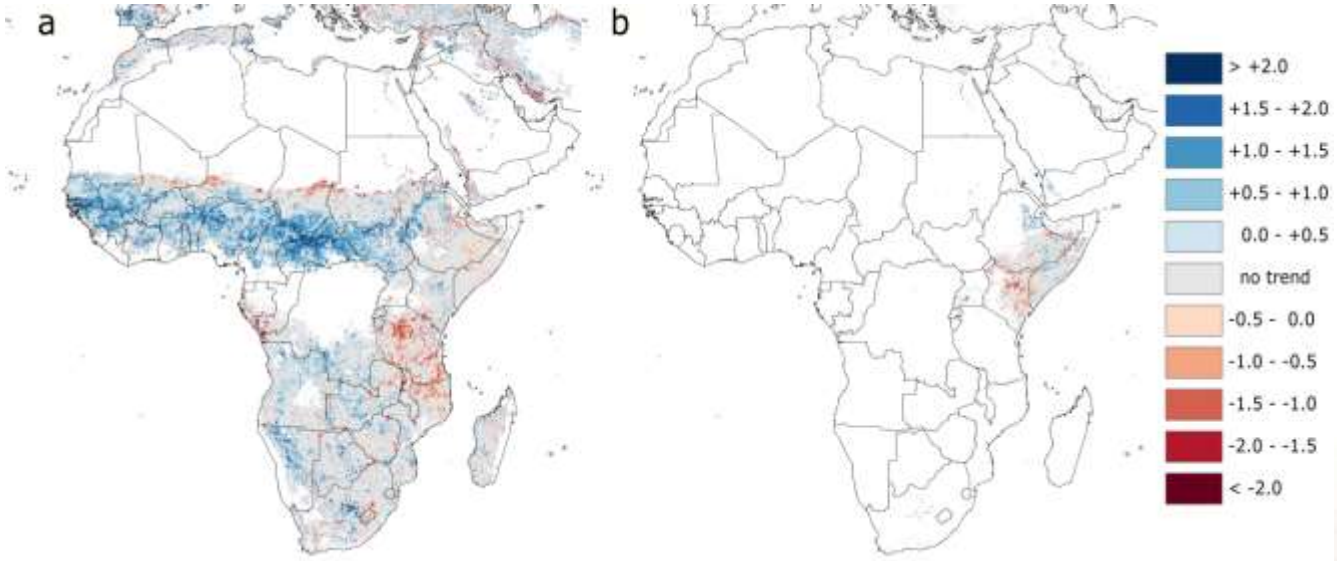


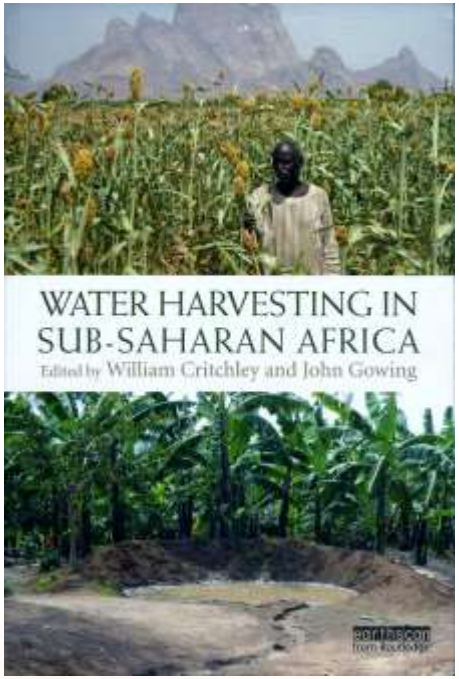
	Pemba	Unguja	Zanzibar
Total Rainwater	1,400	2,424	3,824
Evapotranspiration	560	970	1,530
Runoff	443	785	1,229
Groundwater	108	582	690
Current Use	8	32	40

Malesu et al, 2007

Targeting climate smart agriculture based on LGP from 30 year satellite data

- Length growing period (LGP)
  - 30-45 days increase in West Africa
  - 30-45 days reduction East Africa
- Buffering interventions
  - Rain water harvesting
  - Agroforestry





Change in LGP (days/year) based on 30 year NOAA AVHRR imagery

Vrieling, De Leeuw and Said, 2013, Remote Sensing

SearNet Mission and Vision

The mission is to **Network** among its member Associations within the Region for the **Promotion** of Rainwater Harvesting and Utilization

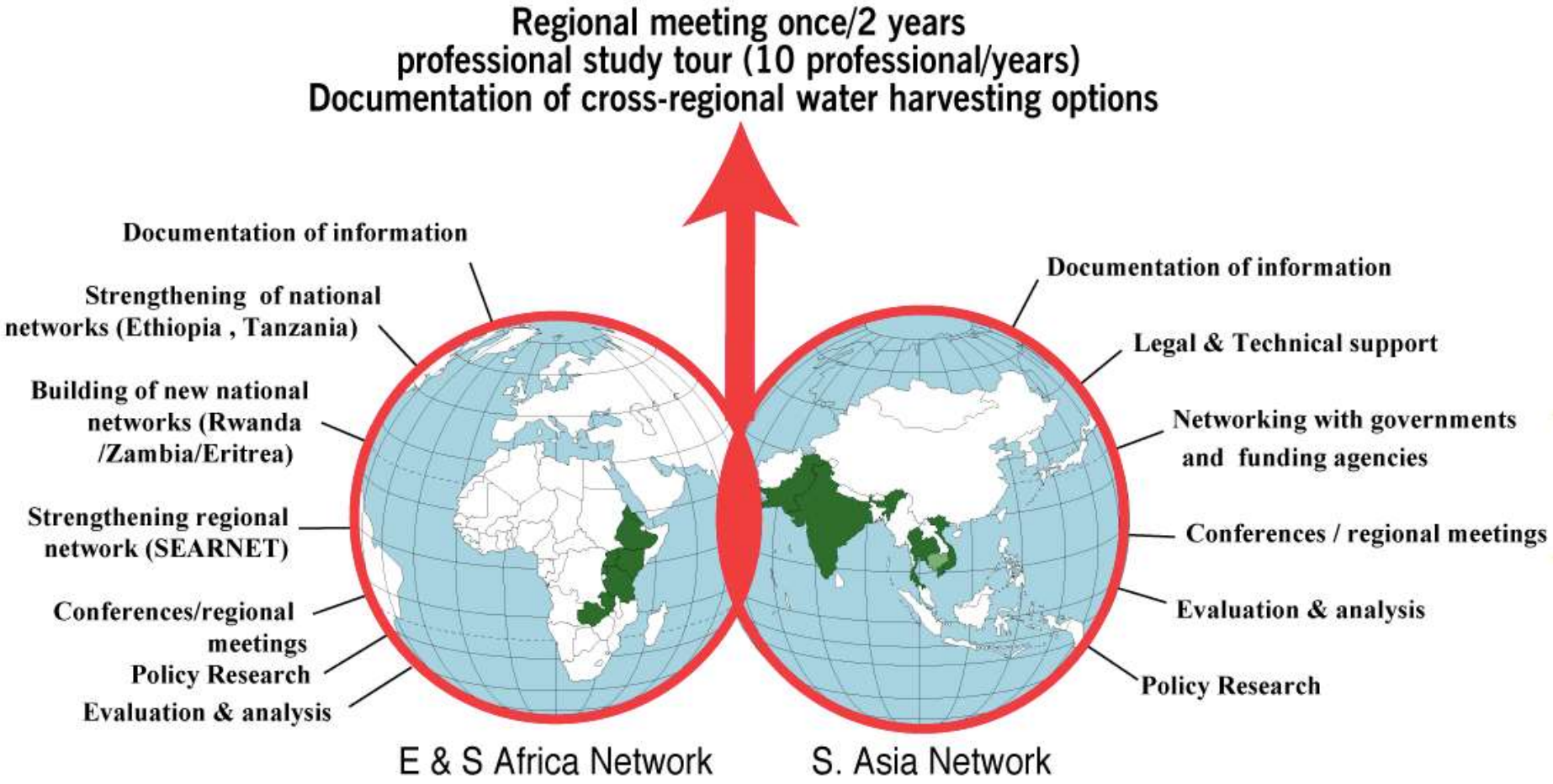
The vision is to **improve the livelihoods** of people of the region through the contribution of sustainable management, **utilization of rainwater** and encouraging community based rainwater harvesting.

Membership

Legally registered National Rainwater Associations of Botswana, Ethiopia, Kenya, Malawi, Rwanda, Somalia, Tanzania, Uganda, Zambia, and Zimbabwe

Associates: Burkina Faso, Burundi, Ghana Mozambique, Namibia, South Africa, Swaziland,

REGIONAL NETWORK STRUCTURE



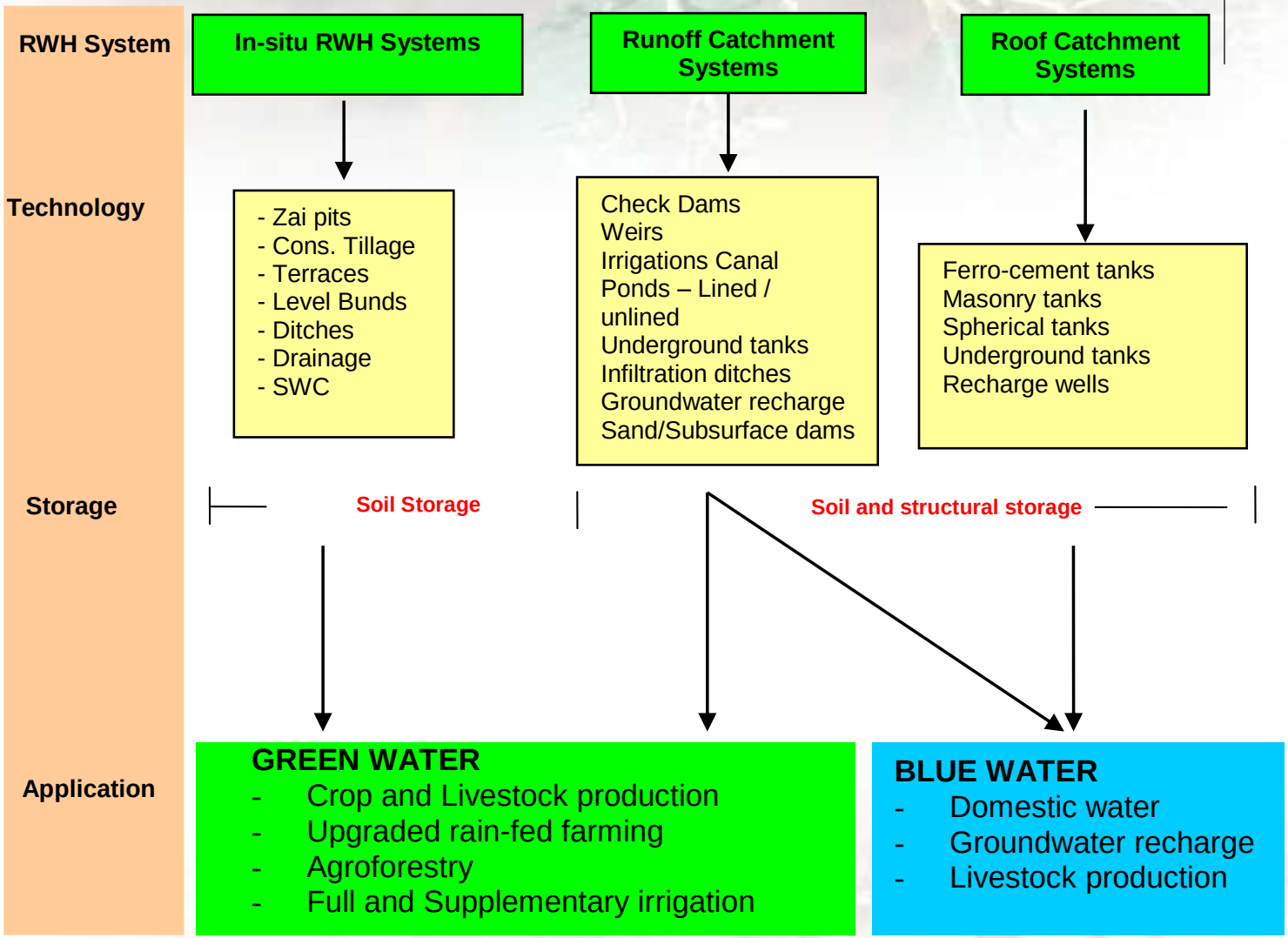
Indicators of Change

- Green and Blue water harvesting systems adopted in government programme and projects of target countries

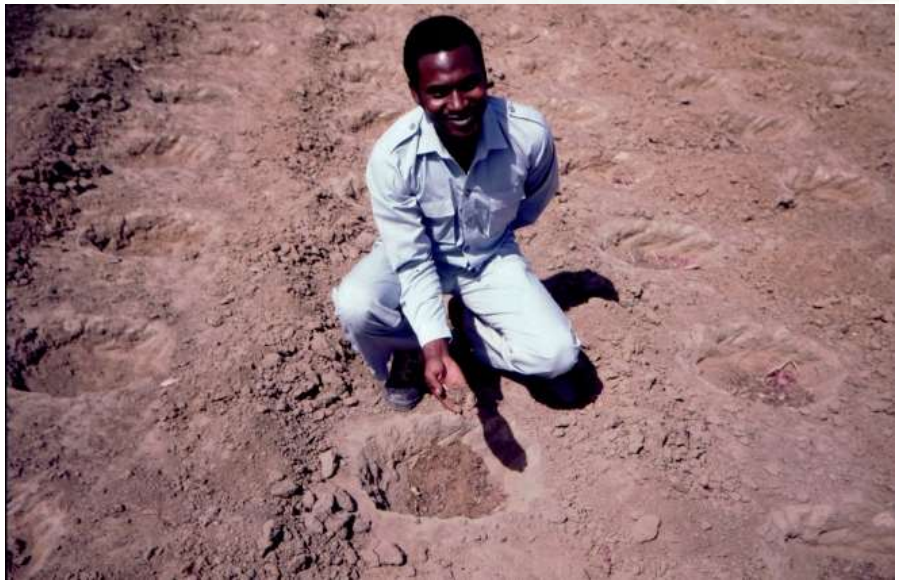
- Research and development partner organizations adopt improved methods for reaching key clients

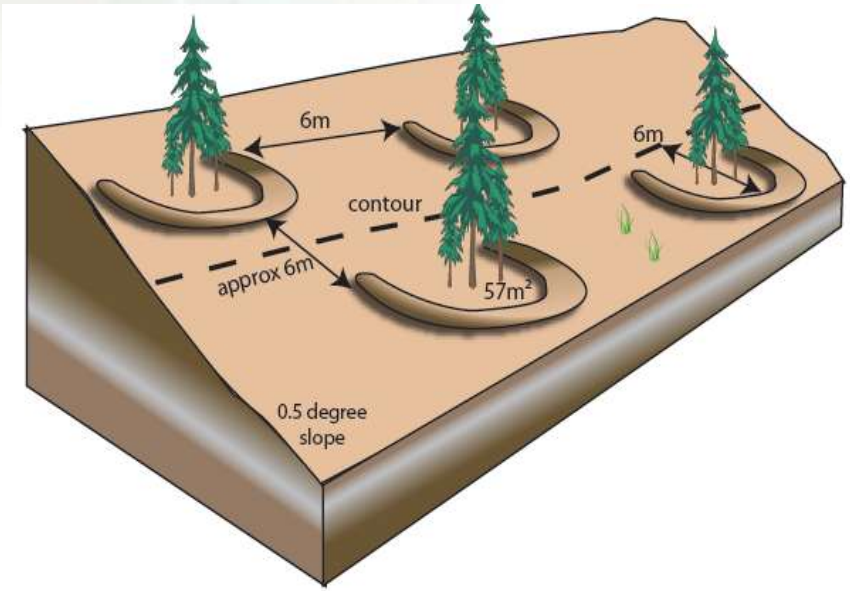
- Level of investment by the governments, donors and other investors

Technological Options



In-situ RWH / Micro catchment





Zai-pits

(Photo W. Critchely)

Earthen Bunds

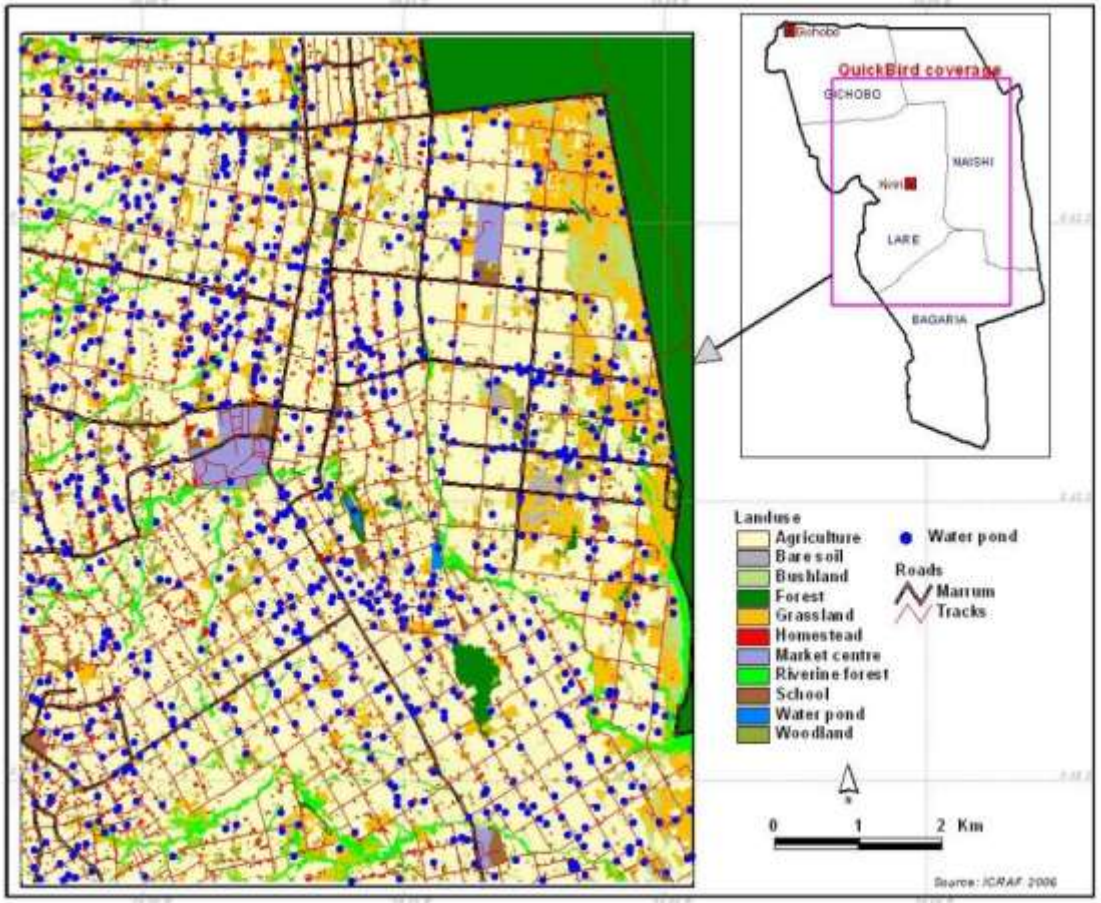
Conservation Agriculture with Trees

Water Harvesting – Practices and recent innovations

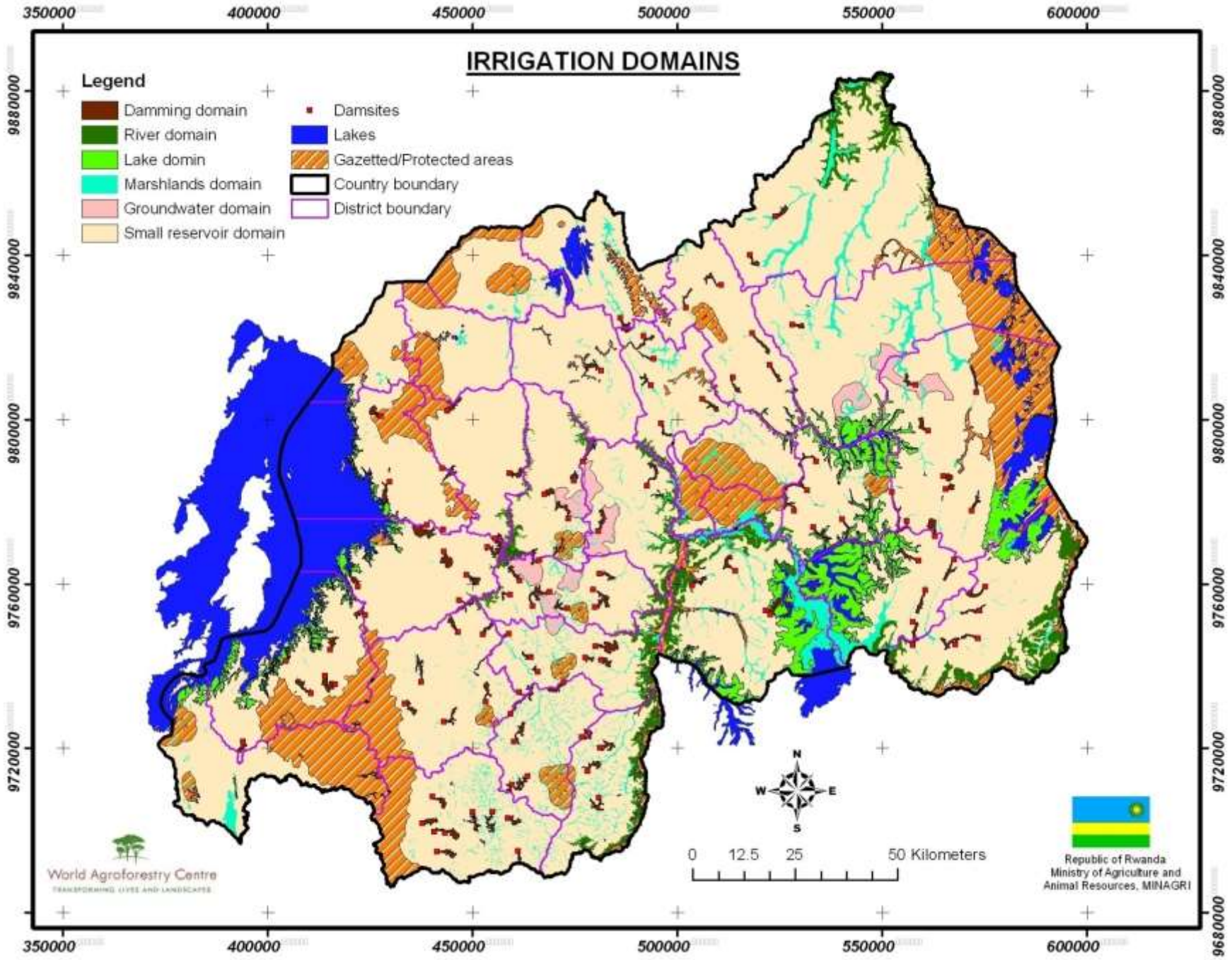
WORLD AGROFORESTRY CENTRE

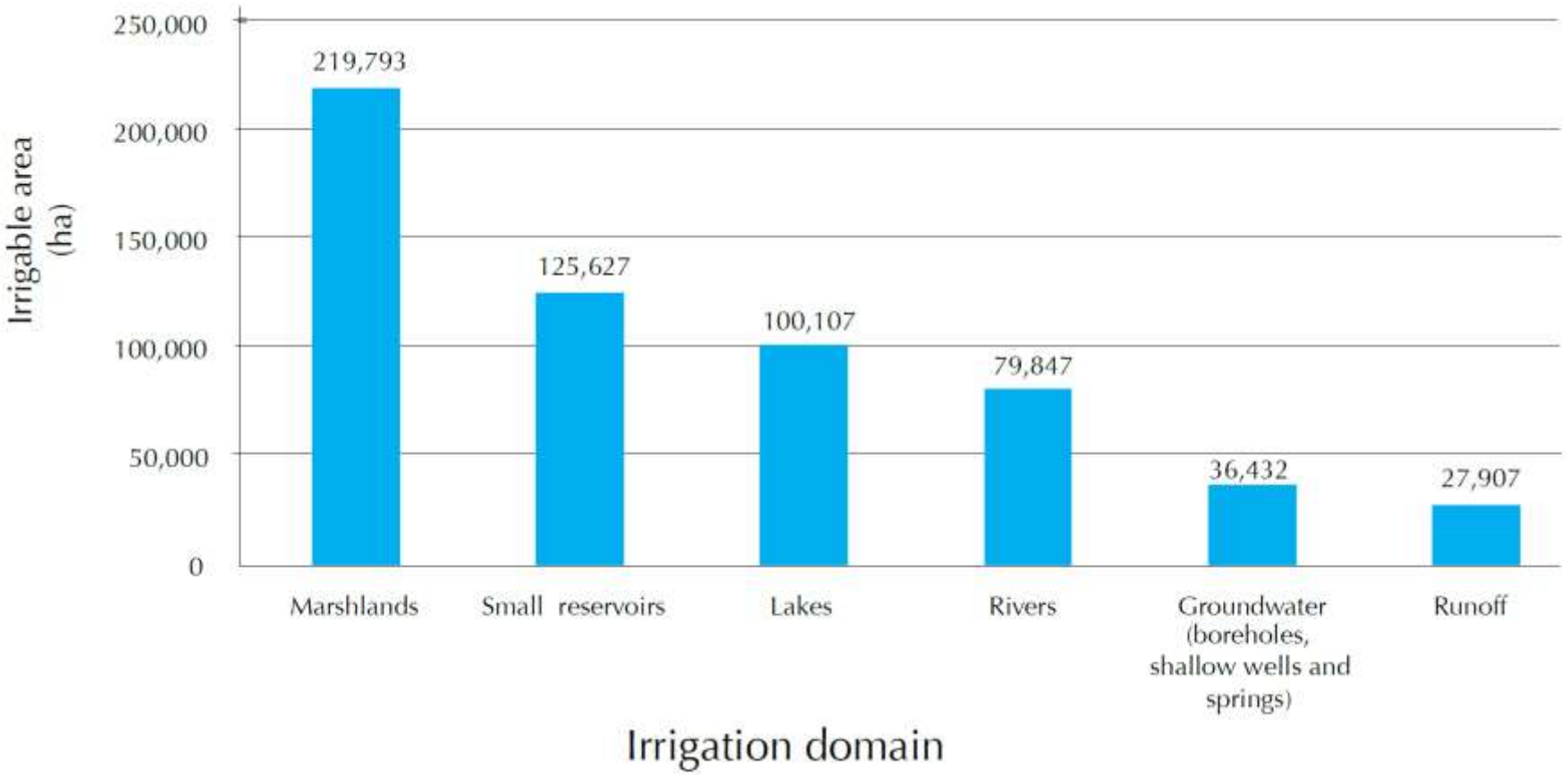
March 22, 2016

Run-off Catchment Systems



9 ponds/Km2 in Lare Kenya


IRRIGATION DOMAINS
Legend
Damming domain
River domain
Lake domin
Marshlands domain
Groundwater domain
Small reservoir domain
Damsites
Lakes
Gazetted/Protected areas
Country boundary
District boundary
350000
400000
450000
500000
550000
600000
9880000
9840000
9800000
9760000
9720000
9680000
N
W
E
S
0
12.5
25
50 Kilometers
World Agroforestry Centre
Republic of Rwanda
Ministry of Agriculture and
Animal Resources, MINAGRI

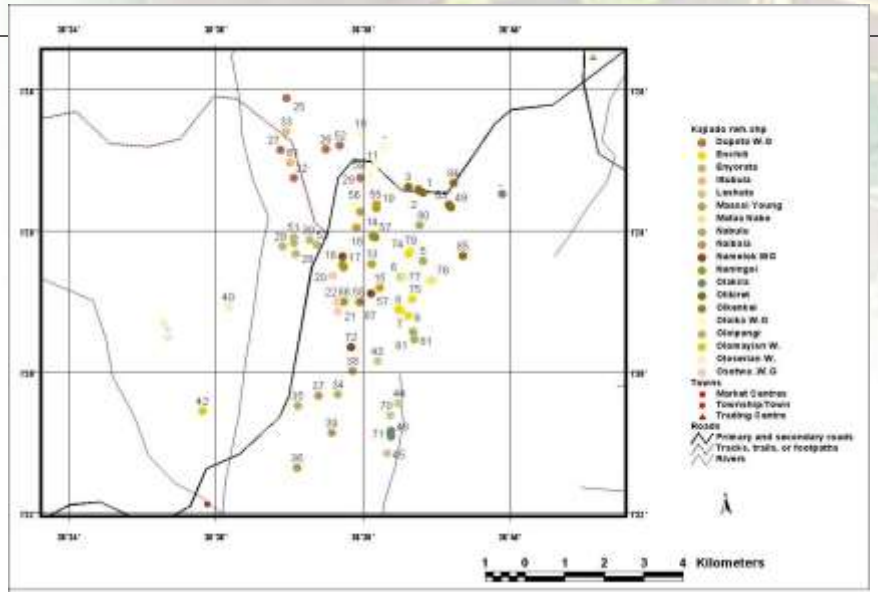

250,000
200,000
150,000
100,000
50,000
0
Irrigable area (ha)
219,793
125,627
100,107
79,847
36,432
27,907
Marshlands
Small reservoirs
Lakes
Rivers
Groundwater (boreholes, shallow wells and springs)
Runoff
Irrigation domain

Small Reservoirs -125,627 ha.

Irrigation from Runoff Ponds

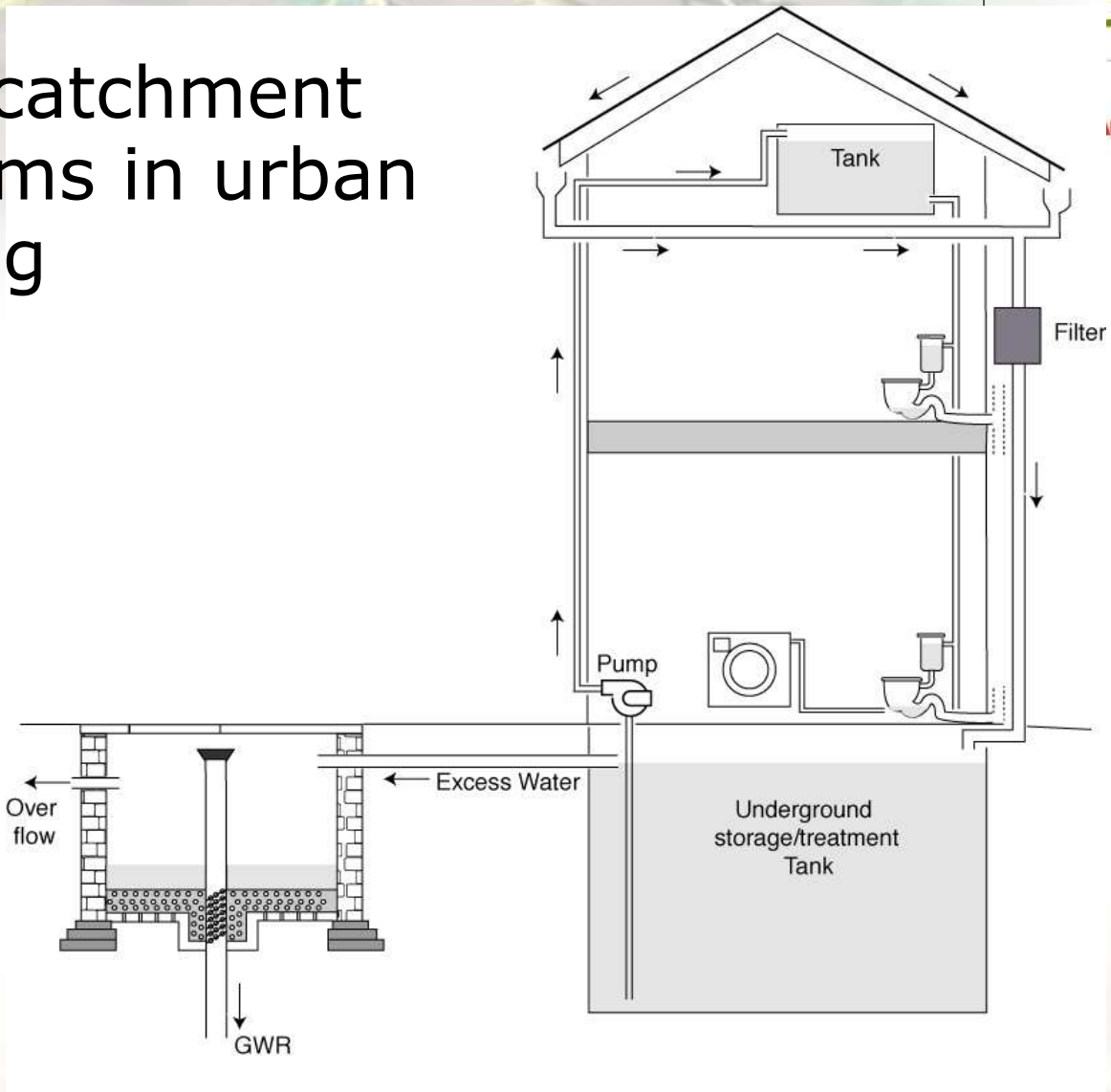
Burundi

Rwanda



Storage and Reuse

Roof catchment systems in urban setting



Capacity Building

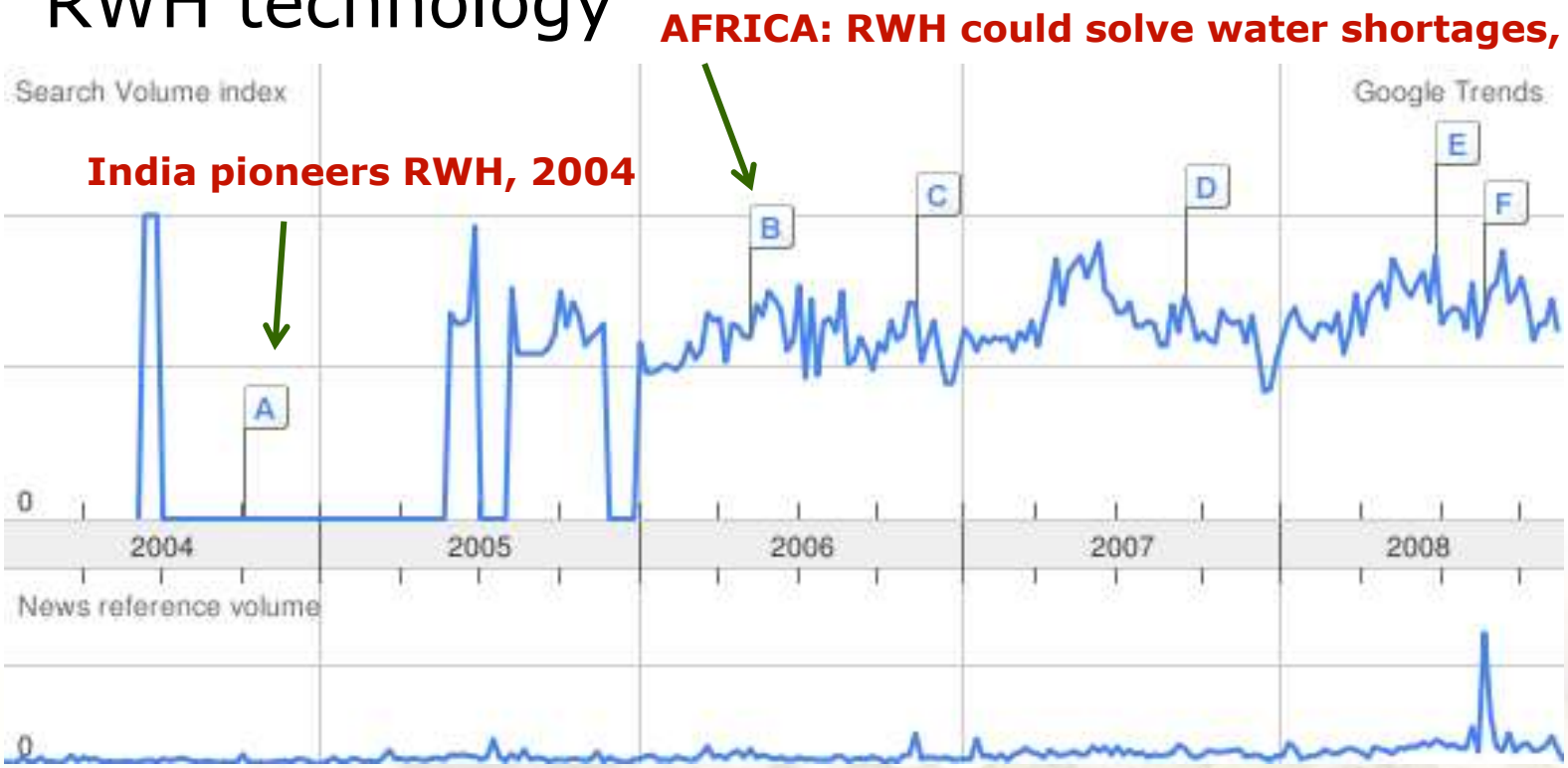
Before making massive investments on RWH infrastructure, it is important to build capacity of key actors at all levels

Capacity building of Key stakeholders

- Curriculum Development
- Training of Target Groups and Beneficiaries
- Scholastic Support
- Rain Centre
- Study Tours
- Production of RWH Manuals and Books

Awareness Creation

Initial heavy investments in awareness creation later contributes to easy acceptance of the RWH technology



Creating an Enabling Environment

- Policies adjusted to the interests of different categories of farmers.
- Institutional framework to upscale integrated water and soil management techniques and value chain development adapted to different categories of farmers.
- Inclusive and integrated approach developed and applied.

SEARNET CONFERENCE - GABORONE

ARUSHA STATEMENT

" We the Participants of the 7th SEARNET Conference held at Arusha, Tanzania on 1 – 5 December, 2003 take cognisance of the great potential rainwater harvesting (RWH) should have as a major option in Africa Development Agendas:

- To reduce poverty of men and women
- To increase ecosystem conservation
- To improve livelihood in peri-urban areas
- To improve crop production and food security
- To prevent conflict
- To balance flooding
- To diminish risks of drought

In view of the aforementioned, we hereby urge governments, NGOs, ESAs and the donor community in general to put integrated RWH in policies, programmes and projects to reinforce the on-going contribution to the Millennium Development Goals"

AFRICAN MINISTERS' COUNCIL ON WATER
CONSEIL DES MINISTRES AFRICAINS CHARGES DE L'EAU

JUNE 2004

15. RAINWATER HARVESTING:

The Minister from Mauritius made a presentation on rainwater harvesting. A call was made on Council to include rainwater harvesting technology option in the policies and strategies for water supply. It was also recommended that rainwater harvesting be part of the water policy package that AMCOW will be presenting at the 13th Session of the Commission on Sustainable Development.

The Council requested the TAC to look into above proposal with a view to advise the Ministers appropriately.

Conclusion:

The Council directed TAC to study the proposals on rainwater harvesting and make concrete recommendation to EXCO.

RAINWATER PARTNERSHIP

Members as at 2 November 2004 – The Hague

1. United Nations Environment Programme (UNEP)
2. Caribbean Environmental Health Institute (CEHI)
3. Organization of the Eastern Caribbean States (OECS)
4. Southern and Eastern Africa Rainwater Network (SEARNET)
5. Earth Care Africa Monitoring Institute (Earth Care)
6. Rainwater Implementation Network (RAIN)
7. International Rainwater Catchments Systems Association (IRCSA)
8. International Rainwater Harvesting Alliance (IRHA)
9. South Pacific Applied Geosciences Commission (SOPAC)
10. International Center for Integrated Mountain Development (ICIMOD)

Sunita Narain - CSE
2005 Stockholm Laurette

"It is clear that the management of water, and not scarcity of water, is the problem in many parts of the world. CSE's work on rainwater harvesting has shown the many ingenious ways in which people learnt to live with water scarcity. The solution practised diversely in different regions, lies in capturing rain in millions of storage systems – in tanks, ponds, stepwells and even rooftops – and to use it to recharge groundwater reserves for irrigation and drinking water needs."

Brazzaville Declaration 29 May 2007

- *Initiate a **rainwater harvesting** programme within AMCOW, which will promote best practices;*
- *To call on all **member countries to adopt rainwater harvesting strategies for their water policy strategies**; and address the need to reach out to the private sector to support rain water harvesting.*

2012

World Agroforestry Centre

African Water Facility
Facilité africaine de l'eau
Mobilising Resources for Water in Africa

Language: English
Original: English
Distribution: Limited

SCALING UP OF INTEGRATED RAINWATER HARVESTING AND MANAGEMENT AND COMPLEMENTARY LIVELIHOOD SYSTEMS IN SEMI ARID DISTRICTS OF KENYA

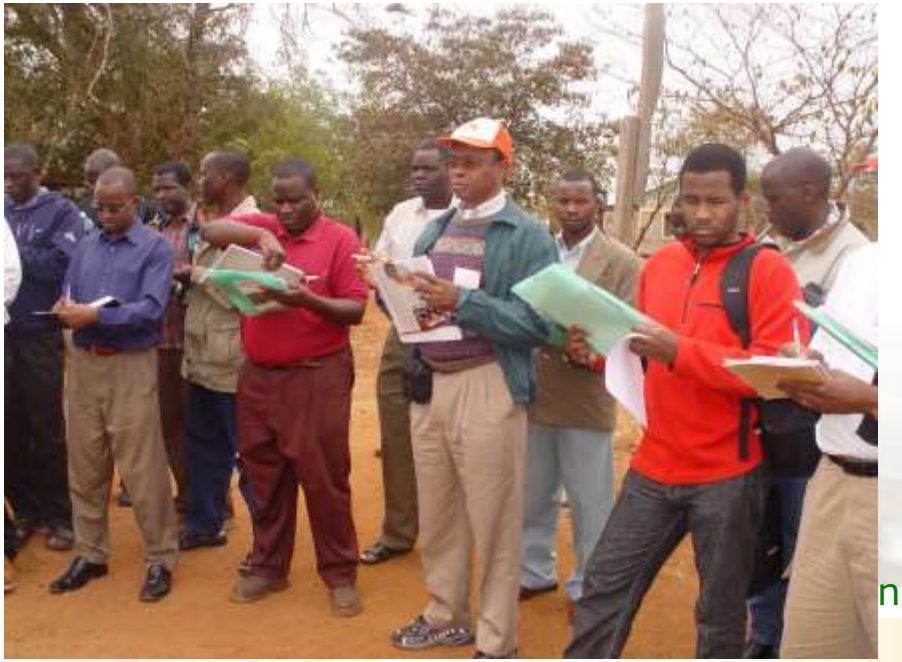
WHaTeR

EC 266360 WHaTeR Project

http://whater.eu/

Water Harvesting Technologies Revisited

Potentials for Innovations, Improvements and Upscaling in Sub-Saharan Africa



Managing Water for Food Self-Sufficiency

Regional Rainwater Harvesting seminar Proceedings for Eastern and Southern Africa

Edited by Alex R. Oduor and Maimbo M. Malesu

Technical Report No. 32

World Vision

World Agroforestry Centre

2015 Stockholm Water Prize Laureate
Mr Rajendra Singh

cent innovations

The Addis Ababa Declaration

Addis Ababa Declaration

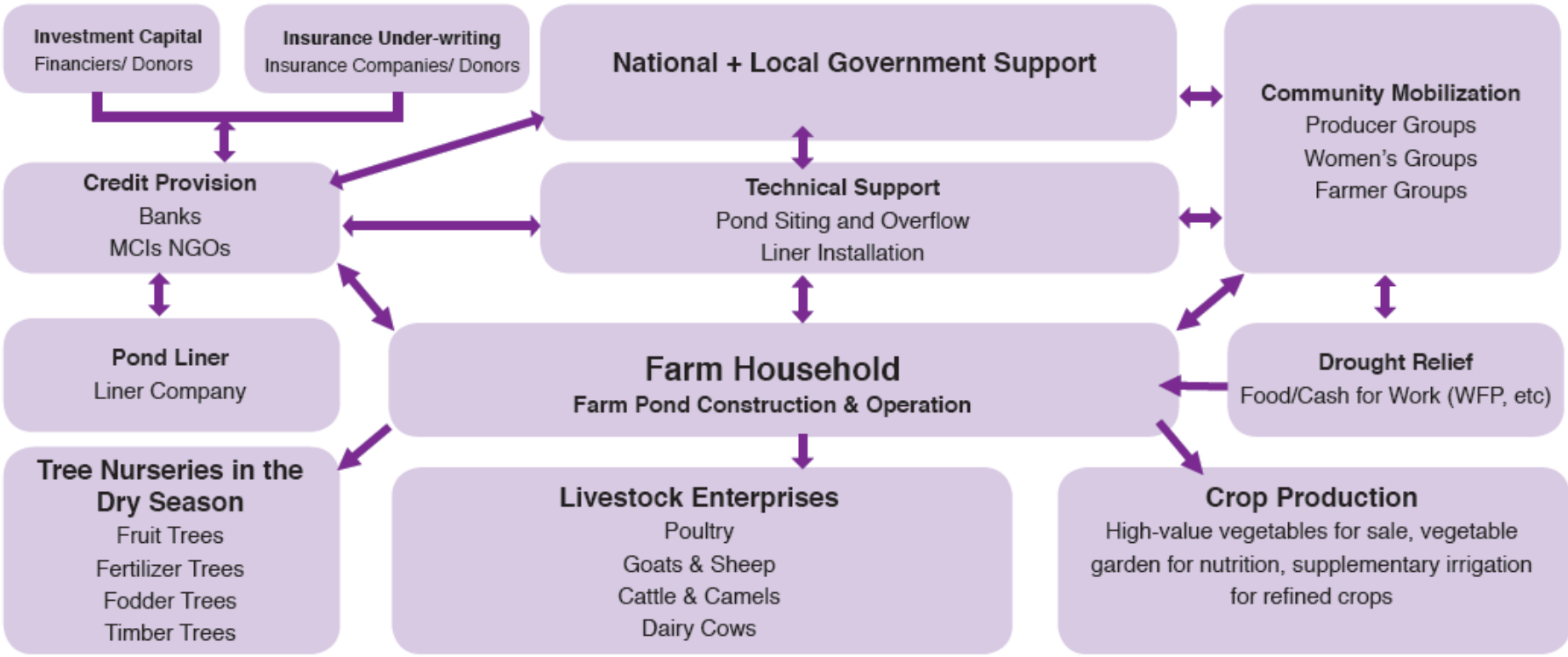
For effective scaling-up of rainwater harvesting, we call on policy makers:

- To develop effective policy mechanisms that facilitate the promotion and scaling-up of rainwater harvesting based on its proven potential, costs and benefits, as well as the impacts on implementers, beneficiaries, and potential users
- To incorporate rainwater harvesting and management into broader approaches such as Integrated Water Resource Management (IWRM), Natural Resource Management (NRM), and Sustainable Land and soil Management (SLM)
- To foster inter-sectoral collaboration by setting up coordination platforms to share knowledge, contacts, opportunities, experiences, innovation, and good practices on rainwater harvesting and management and its scaling-up
- To stimulate private sector involvement along the value chain, e.g., by allowing for more flexibility in regulations and taxes, facilitating access to financial services, and by investing in good infrastructure
- To support communities and individuals by facilitating ownership

Scaling-Up Rainwater Harvesting with Farm Ponds

The Billion Dollar Business Plan

The SearNet Billion Dollar Business Plan for Massive Upscaling of Rainwater Harvesting Ponds



The SearNet Billion Dollar Business Plan

Photo Credits: Kenya Rainwater Association

A multi-sectoral initiative aimed at improving household livelihood and resilience by scaling up rainwater harvesting farm ponds throughout the Arid and Semi-Arid Areas of Africa

Kenya Stakeholders during the Workshop 21-22 October 2015

To get engaged in the Billion Dollar Business Plan:
Contact the Southern and Eastern Africa Rainwater Harvesting Network at the World Agroforestry Centre, Nairobi

Direct phone: +254 718434370
Email: Searnet@cgiar.org
Website: www.worldagroforestry.org

ions

Way Forward - Research Areas

- Quantifying the performance of rainwater harvesting systems;
- Establishing livelihood impacts of rainwater harvesting;
- Estimating the distribution and spatial extent of specific techniques;
- Understanding the impact of rainwater harvesting subsidies and
- Assessing the policy and institutional arrangements that favor spread of water harvesting

THANK YOU

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