



# Agricultural Water Management in Africa

## Highlights from 3 SDC supported initiatives

Département fédéral des affaires étrangères DFAE  
**Direction du développement et de la coopération DDC**

Federal Department of Foreign Affairs FDFA  
**Swiss Agency for Development and Cooperation SDC**

Dipartimento federale degli affari esteri DFAE  
**Direzione dello sviluppo e della cooperazione DSC**

Departamento Federal de Asuntos Exteriores DFAE  
**Agencia Suiza para el Desarrollo y la Cooperación COSUDE**



# Overview

- *Strengthening Agricultural Water Efficiency and Productivity at the African and global level*
- *Innovative Monitoring, Modelling and Managing Water (iMoMo)*
- *Water and Land Resources Centres*



# Background

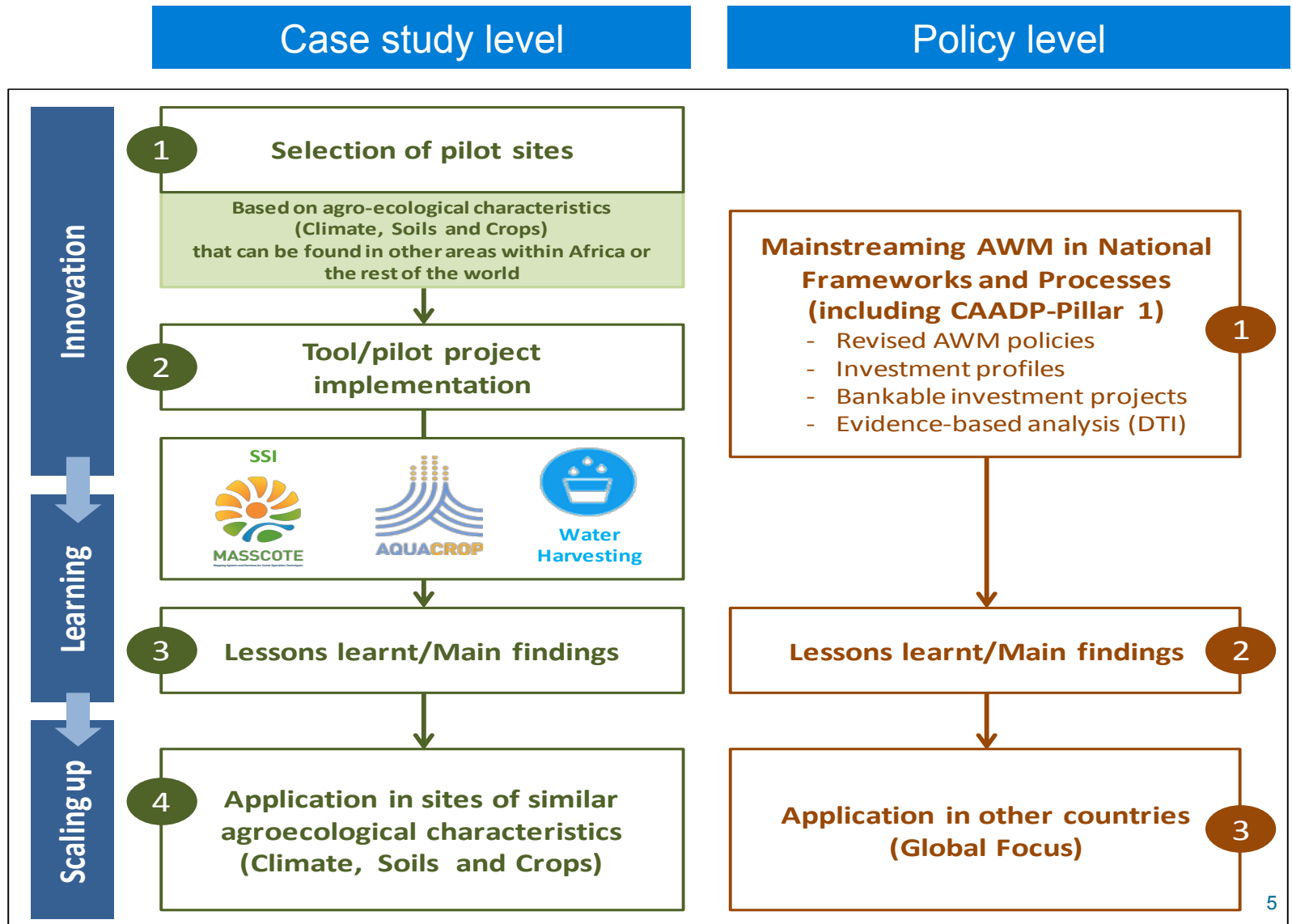
- Agriculture accounts for more than 70% of global freshwater withdrawal and 90% of consumptive use
- The biggest potential to enhance water efficiency and at the same time to increase yields is in rainfed areas. Potential is highest where agricultural productivity levels are far from reaching their full potential.
- Irrigated areas contribute more than 40% of global food supply, but water efficiency is low in general. Most irrigation systems in developing countries need upgrading.

# Challenges and Opportunities

- Agricultural policies in DC often lack an IWRM perspective and set unrealistic targets of agricultural area expansion without considering water availability
- Current policies often fail to address the potential and need of better agricultural water management
- NEPAD has identified agricultural water management (AWM) as central for poverty alleviation and food security
- CAADP pillar 1 aims to extend the area under sustainable land and water management in Africa. CAADP process and compact allows to strengthen agricultural policies, but so far not sufficient attention to AWM



# Intervention Strategy





# Innovation

- Project based on national water audits, allowing for a cross-sector IWRM approach
- Combination of top-down activities at the policy level and bottom-up activities with case studies on the ground
- Leverage effect through development of bankable investment projects
- Development of targeted outreach material for practitioners (in collaboration with agricultural extension services) and policy makers (in collaboration with CAADP country processes)



 Schweizerische Eidgenossenschaft  
Confédération suisse  
Confederazione Svizzera  
Confederaziun svizra

Swiss Agency for Development  
and Cooperation SDC

## iMoMo Global Initiative

*Innovation in Monitoring, Modeling & Managing Water*

Using integrated low-cost, high-tech and user centred approaches in order to measure and account for water at local levels in irrigation

Tobias Siegfried,



, Zurich, Switzerland



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# Local, Regional & Global Data Challenges



Data for sound water management are scarce



Traditional monitoring approaches are expensive and not scalable



Existing data/information often hard to access for end users



Disconnect between end users and agencies



Agency underfunding and weak institutions leave little room for improvement



Need for paradigm shift



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## Global iMoMo Initiative: Mission Statement

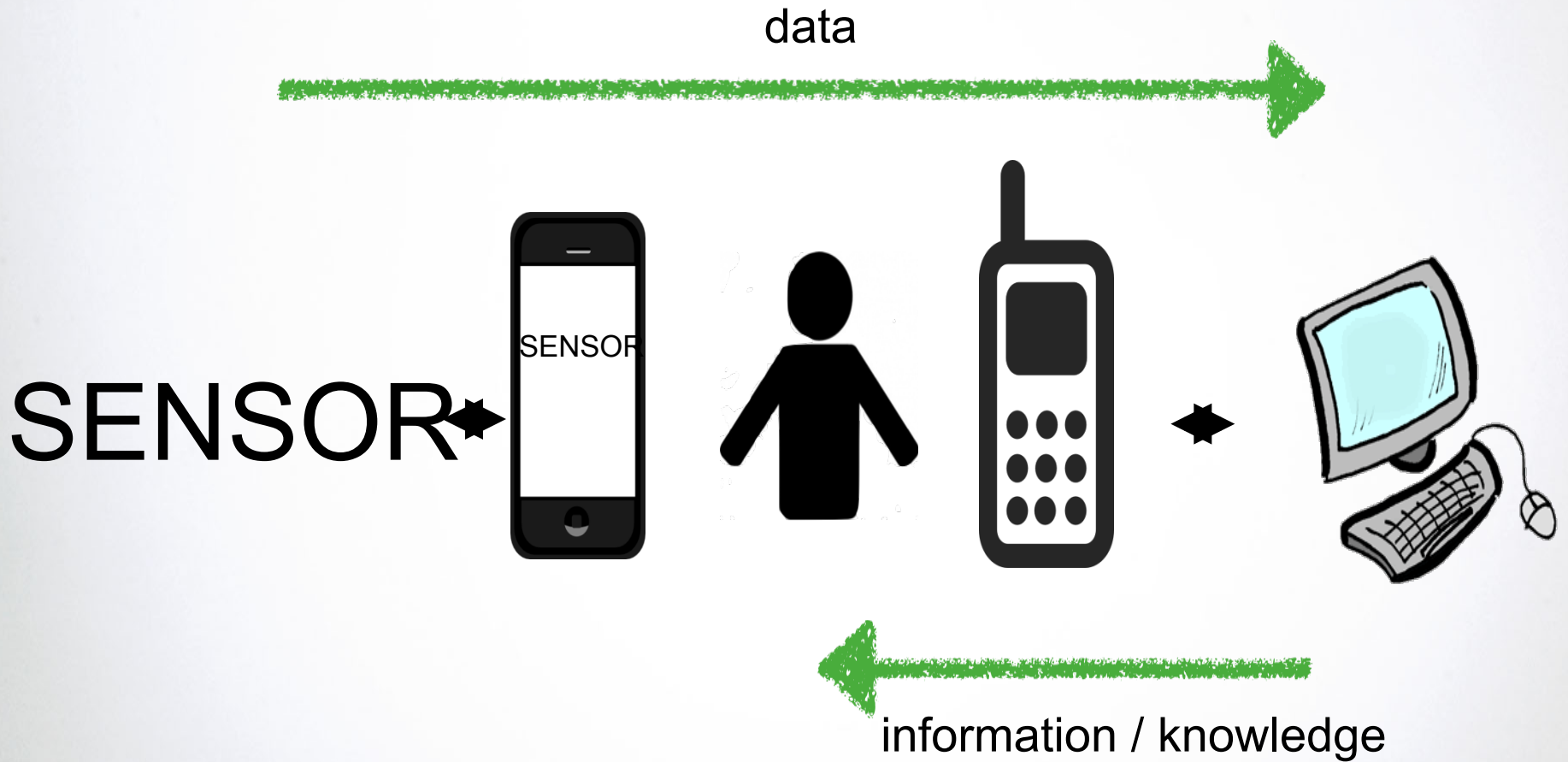
- Fostering innovation in hydro- and agro-meteorology for
  - low-cost, user-centered & non-traditional monitoring / crowd-sensing
  - automatic / secure transmission of data
  - digital data management, analysis and exchange using open-source and secure web technologies for the modernisation of (existing) workflows
- Started in 2013, incubated by the Swiss Agency for Development and Cooperation (SDC)

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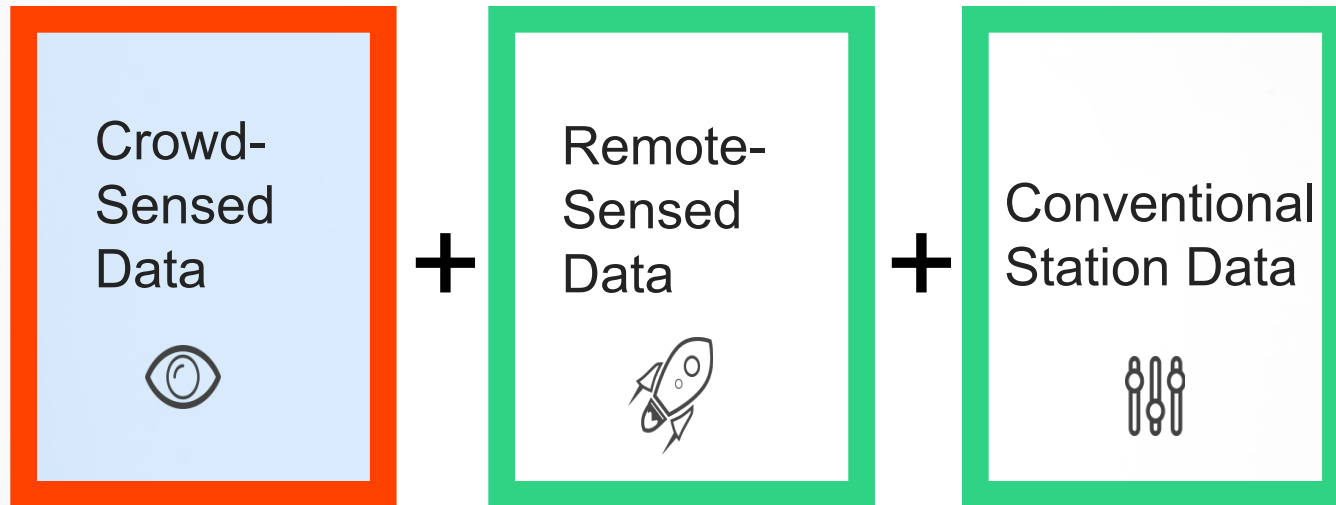
## Global iMoMo Initiative: Innovation HUB & Solutions

- iMoMo Global Innovation HUB to be embedded in an upcoming WMO Global Hydrometry Support Facility for global advocacy and innovation scouting.
- Implementation of tailored solutions in projects jointly with local and international partners.
- Current activities in Tanzania, Mozambique and Kyrgyzstan. Upcoming in the greater Central Asia Region and elsewhere.

# iMoMo Innovation Technologies for Crowd-Sensing



# Complementarity of Non-Traditional Data to Existing Data



# Monitoring: iMoMo Sensor Technology SmartStick NFC & Smartphone App

- Intended for users of NFC compatibles smartphones
- Data transmission via SMS or Internet
- Direct link from sensor to database
- GPS time & space referencing of measurements
- Configurable stick length
- Very low cost & sustainable
- No installation, No battery, Easy to use
- Local manufacturable & maintainable

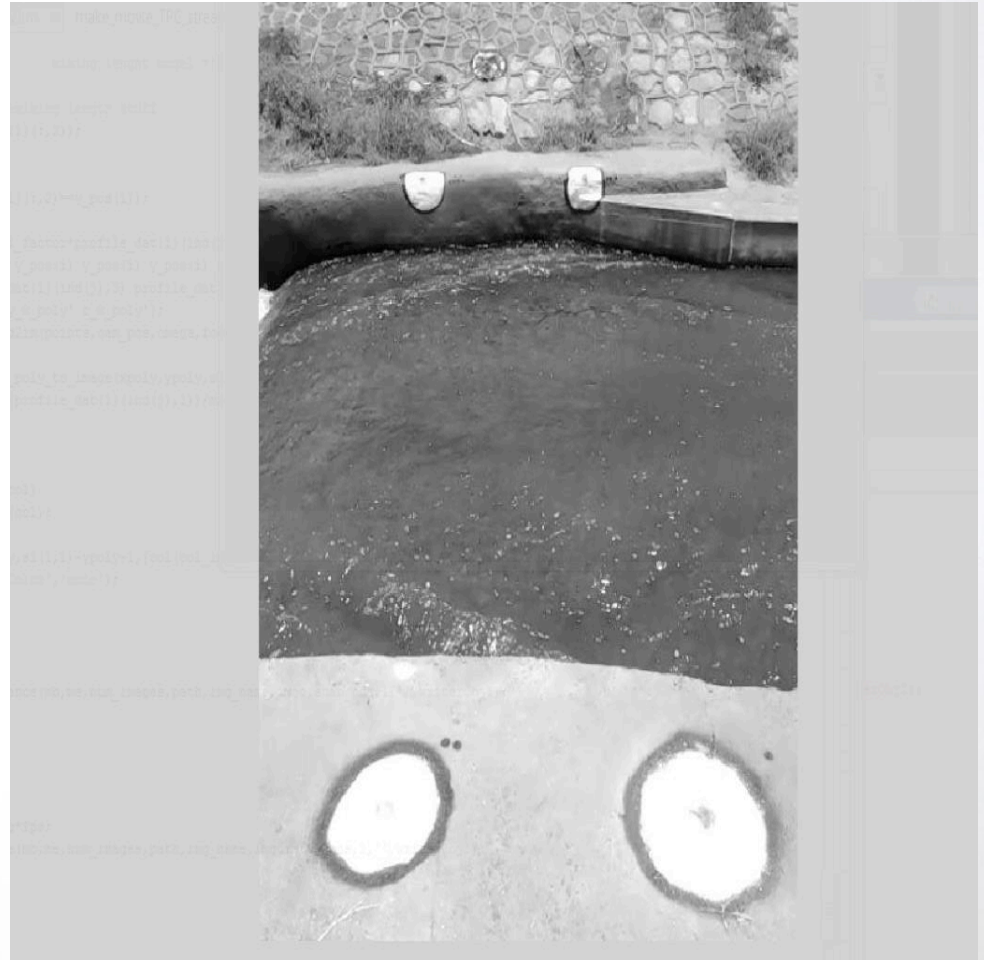


# Monitoring: iMoMo Smartphone App for Water Level & Discharge Measurements (Beta)

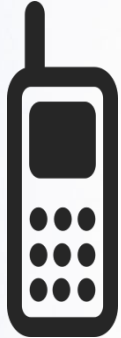
## Site Calibration



## Measurement and Analysis



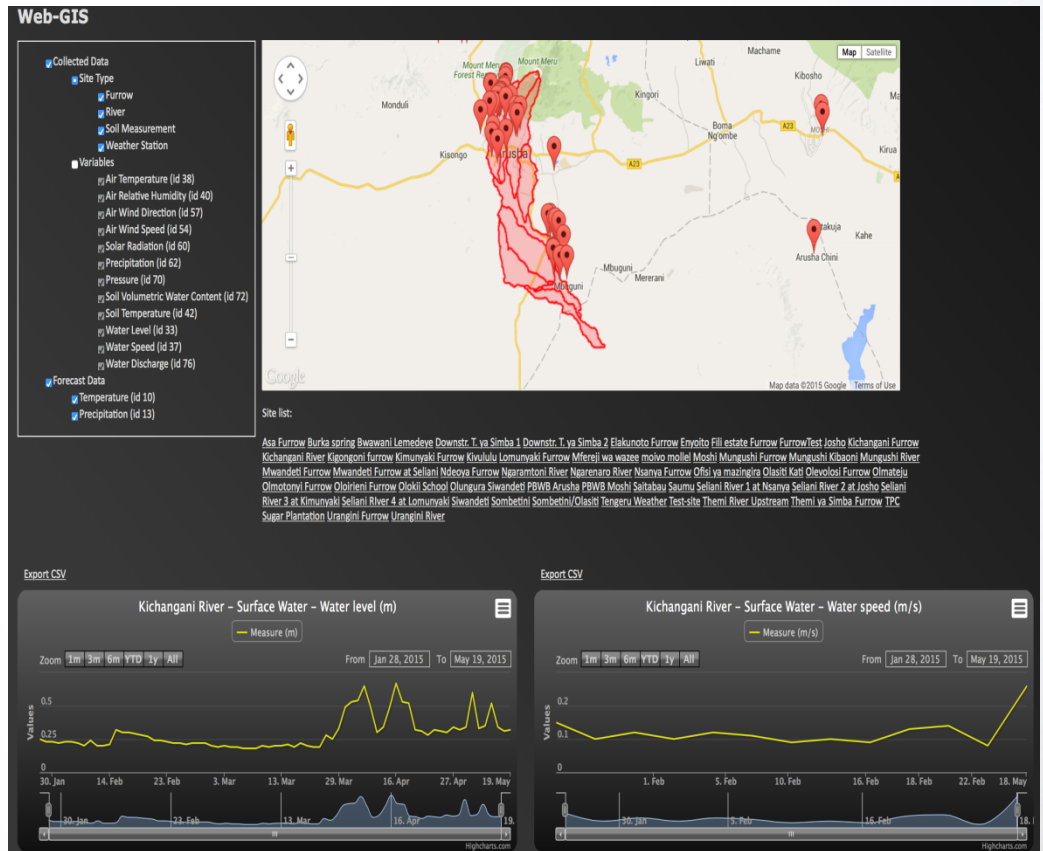
# Operational Management: Water Manager Toolkit / Dashboard



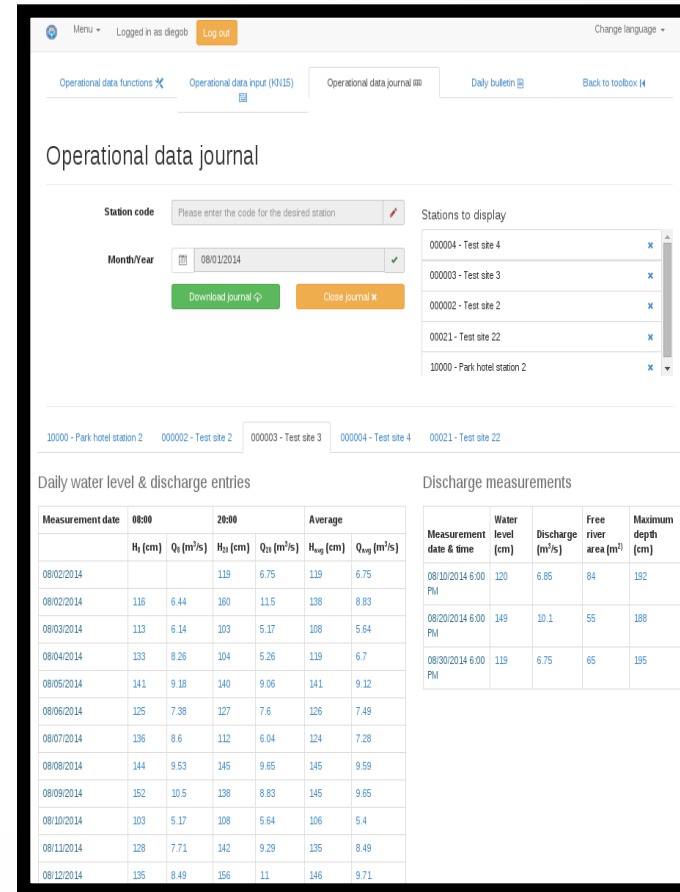
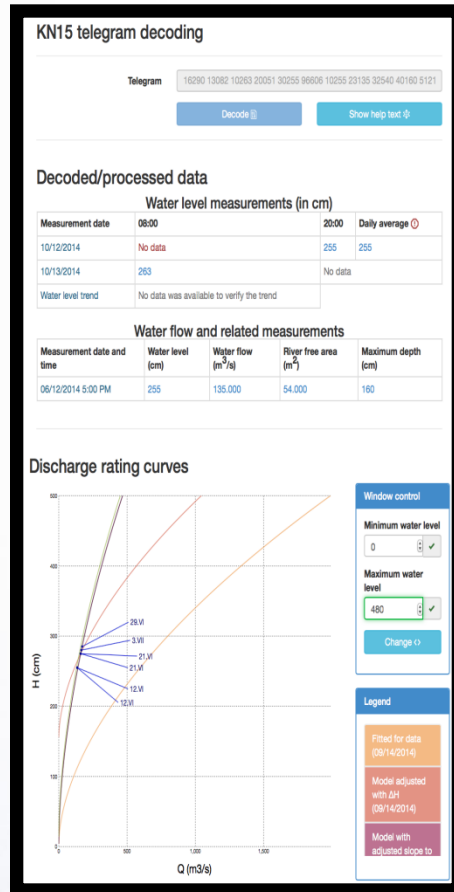
Data Authority



iMoMo Database  
based on open-source  
HIS database



# Operational Management: Gauging Station Administration for Operational Hydrology



Water level & Discharge Data



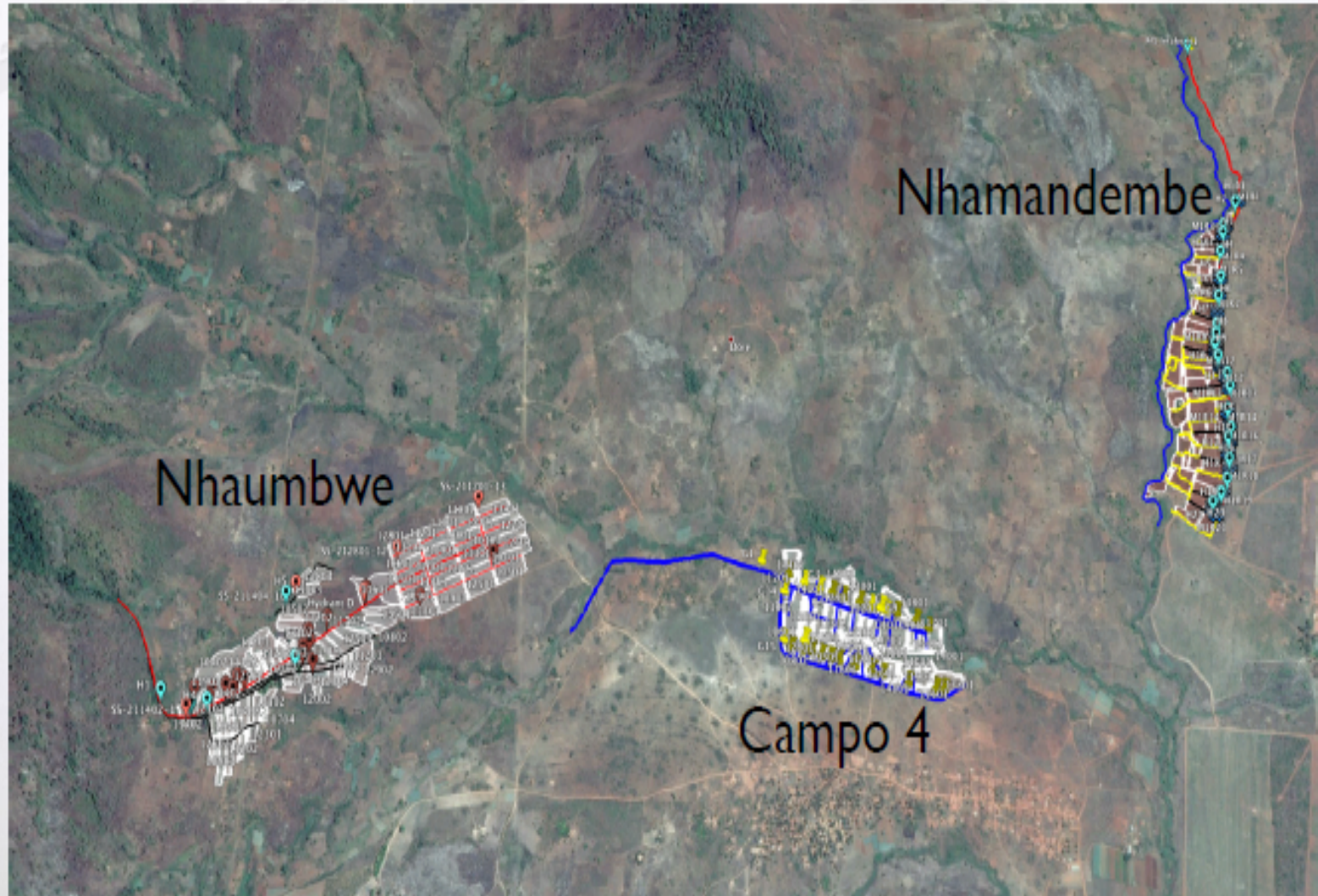
Bulletins

Used for a) station administration, b) maintenance and update of rating curves, c) generation of bulletins and d) forecasting flows

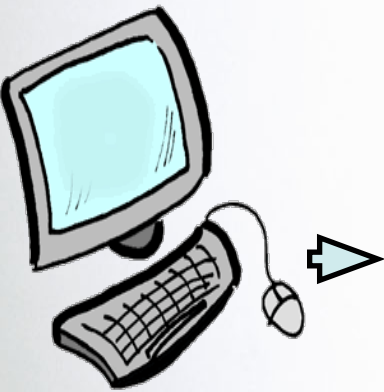




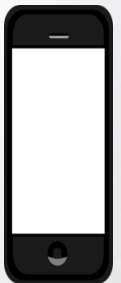
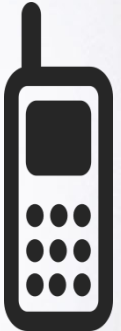
Result: 3 Schemes instrumented, daily measurements and web accounting for water productivity assessments



# Information Services: iMoMo Push Service via SMS



- ✓ Forecasts on expected water availability etc., inc. flows and reservoir levels
- ✓ Advice on agricultural calendar and water demand estimates
- ✓ Weather and agro-meteorological information, including early warnings
- ✓ Agro-economic market information
- ✓ All timely, place-specific and quality managed



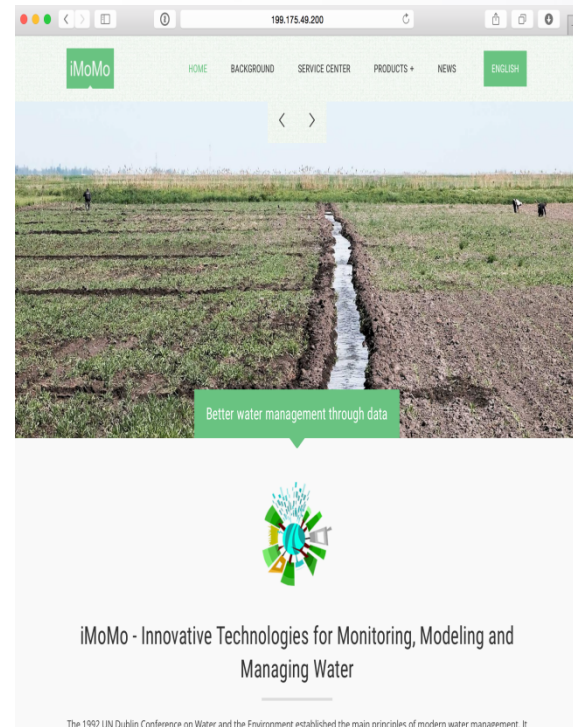
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## Global iMoMo Initiative - Overall Conclusions

- Open-source, low-cost, high-tech technology innovations offer exciting new opportunities in hydro- and agro-meteorology for improving the data situation in water.
- These technologies should be developed and deployed in a place-specific context where needs are determining the particular monitoring and management technology choice.
- In conjunction with a global innovation HUB linked to the WMO, iMoMo solutions can be deployed in a timely and highly scalable manner.
- Technology diffusion and appropriation is made easier by existing institutions (formal and informal) which can benefit from them.
- Under any circumstances, institutional long-term support should be guaranteed by local iMoMo Service Centers and Field Offices.

# More Information available on the Web

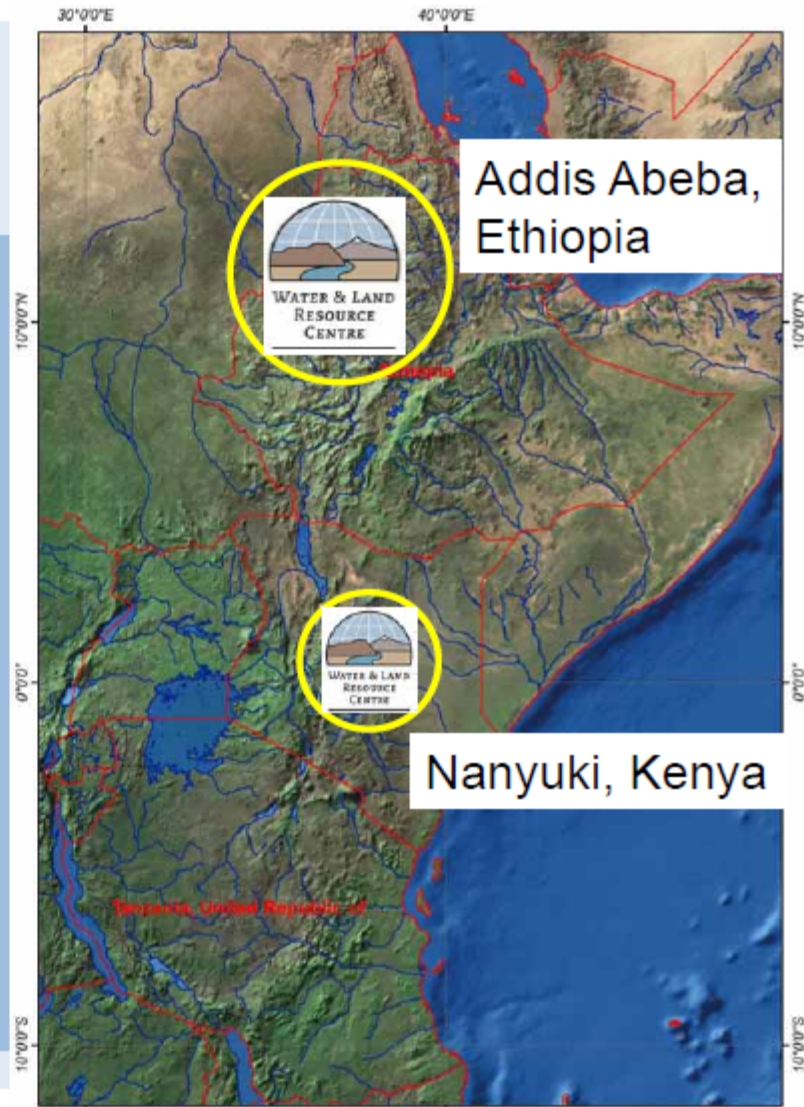
[www.imomohub.org](http://www.imomohub.org)



## Project context: WLRC – Phase II

**Goal:** Water and land governance and management is improved through knowledge generation and management....

- > **Consolidation** of the Water and Land Resource Centres
- > **Up- and outscaling** of products to national and regional/transboundary level



# Key outcomes / outputs

**u<sup>b</sup>**

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AND ENVIRONMENT

**1**

**Knowledge  
generation**



**2**

**Knowledge for  
cross-scale policy  
dialogue**



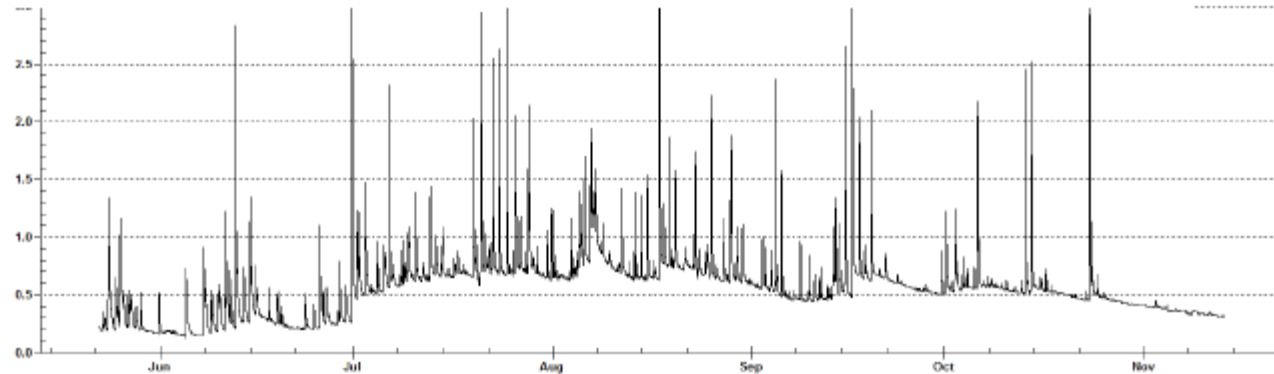
**3**

**Outreach  
through  
capacity  
building**



## Data generation and integration into WALRIS

- Existing small observatories (3) and learning watersheds model cases
- Meso-scale observatories



Gerda Meso-Scale Observatory



# Outcome 1: Knowledge Generation Ethiopia component

## Specialised studies

### > Ethio-GIS-II

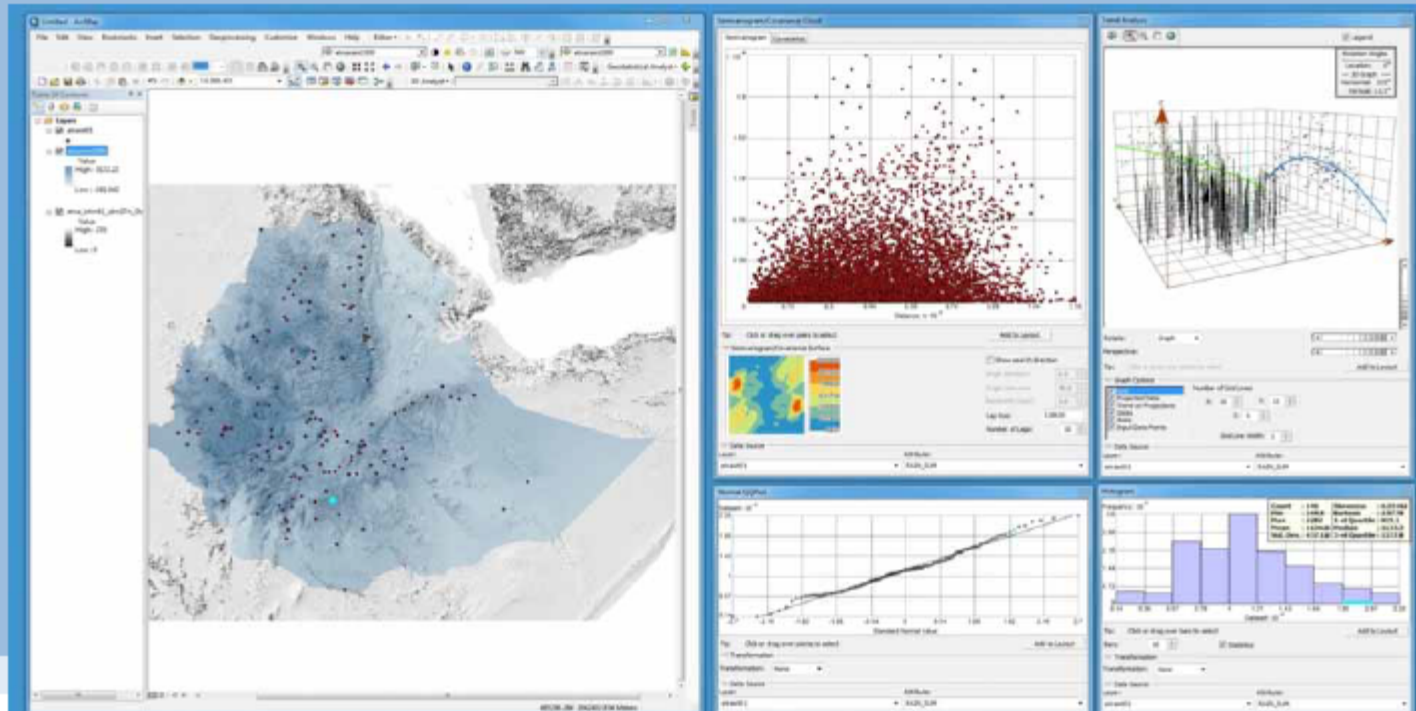
- Improvements of different layers (climate, water resources, land resources, soil, etc.)

1

2

3

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CDE  
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AND ENVIRONMENT



# Outcome 2: Knowledge for cross-scale policy dialogue

## Ethiopia component

1 2 3

### WALRIS uploaded to web

- > Used by different users
- > Updated based on SDC / users comments

**Water & Land Resource Centre**

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**Gash Watershed**  
Local Watershed Profile

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**Background**

Soil erosion and associated poverty have been major development challenges facing Ethiopia and the Eastern Nile sub-region at large. Although joint attempts have been made to tackle soil degradation, little progress has been made to date. In order to address the important challenge both in the country and in the sub-region, some of the key elements are:

- The existing information on water and land resources within the country and in the sub-region, which can be used for proper planning of land management practices and policy formulation, enactment or revision. This is partly related to the lack of a systematic collection, storage and analysis of information, as well as analytical and computerized approaches to water and land use and management; all geographical entities beyond the development of integrated and comprehensive monitoring and data generation.
- Weak capacity and awareness of local level users and local institutions on integrated watershed development, data generation and management, including data sharing to address the problems of land degradation and associated poverty challenges.

**Rationale for the establishment of the WLC and key functions**

In response to the above key shortcomings, the Water and Land Resource Centre (WLC) was established in 2013 as an institution established by Addis Ababa University based on the bilateral agreement between the Government of Ethiopia and United Nations Development Programme (UNDP). The Resource Centre is an initiative to address the above mentioned gaps and it aims to establish a robust information management system for water and land resources of the country to build on past experiences of the university of their earlier projects supported by SDC and other agencies on water and land resource management.

**WATER & LAND RESOURCE CENTRE OF ETHIOPIA**  
*Water & Land Resources Information System (WALRIS)*

**WLC - Ethiopia in Brief**

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**Welcome to Water And Land Resources Information System (WALRIS)**

Log In | Register | Forgot Password | Register

**http://walris.wlrc-eth.org/**

**WALRIS Dashboard**

Monthly Summary: 2024/01/01 - 2024/01/31

Watershed	Area (km²)	Population	Land Use	Water Use	Soil Erosion
1	100	10000	1000	100	100
2	200	20000	2000	200	200
3	300	30000	3000	300	300
4	400	40000	4000	400	400
5	500	50000	5000	500	500
6	600	60000	6000	600	600
7	700	70000	7000	700	700
8	800	80000	8000	800	800
9	900	90000	9000	900	900
10	1000	100000	10000	1000	1000

**Map**

**Bar Chart: Long term average monthly rainfall**

Month	Rainfall (mm)
Jan	100
Feb	150
Mar	200
Apr	250
May	300
Jun	350
Jul	400
Aug	450
Sep	500
Oct	550
Nov	600
Dec	650

## Outcome 2: Knowledge for cross-scale policy dialogue Ethiopia component

1

2

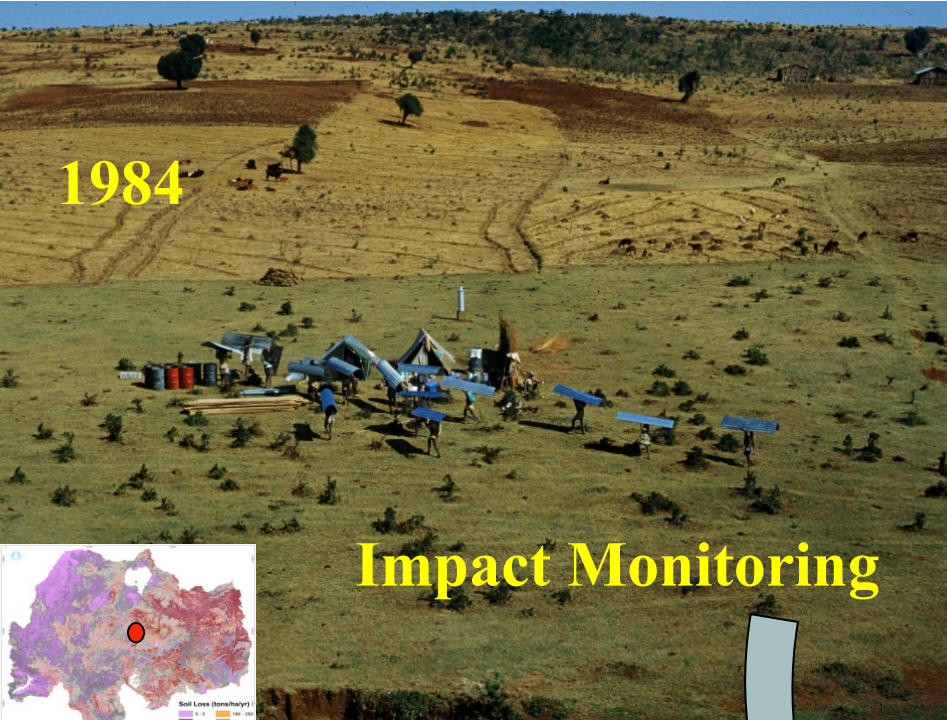
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### Learning watersheds

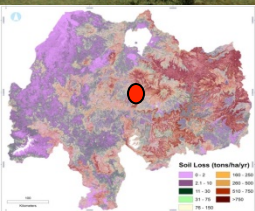
- > as live learning platforms for policy makers, land users, researchers, extension, other projects



1984



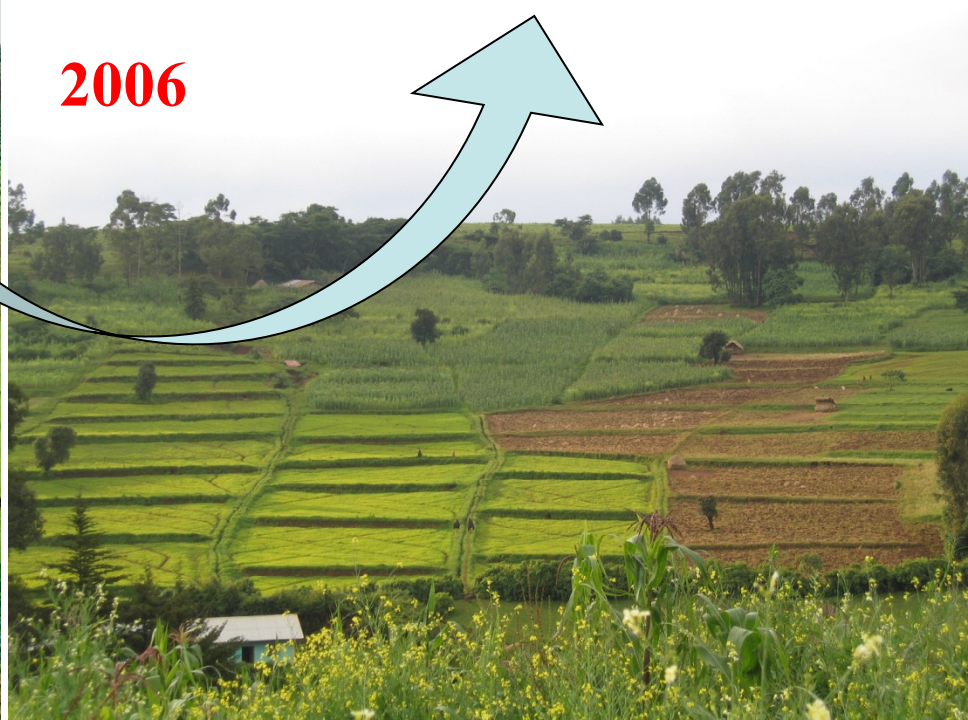
Impact Monitoring



2010



2006



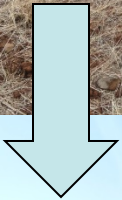
1988



Anjeni Observatory

# Transformation in Learning Watersheds

Feb 2012



Dec 2014



January, 2012



February, 2015



# Results

- Through its Learning Watersheds WLRC showed that:
  - Integ. Water and Land Res. Mangement (IWLRM) improves land productivity and livelihoods of upstream communities
  - IWLRM can also significantly reduce siltation of dams, increase base flow and enhance power generation
  - Overall regeneration of ecosystems









