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WEBINARS SERIES ON RAINWATER HARVESTING

5th July 2022 – 12th July 2022

Module n°3: Mapping the Potential for RWH

The Water Harvesting Explorer (WHE) tool

Anne van der Heijden, Acacia Water

ACACIAWATER

Boost your crop water productivity in selected farming systems: assess and adapt

About Acacia Water

Leading partner in (ground)water and water management consultancy services

- Availability of water resources
- Applied research and scientific substantiation
- Practical solutions for IWRM at all scales
- Stakeholder engagement and inclusiveness

https://www.acaciawater.com

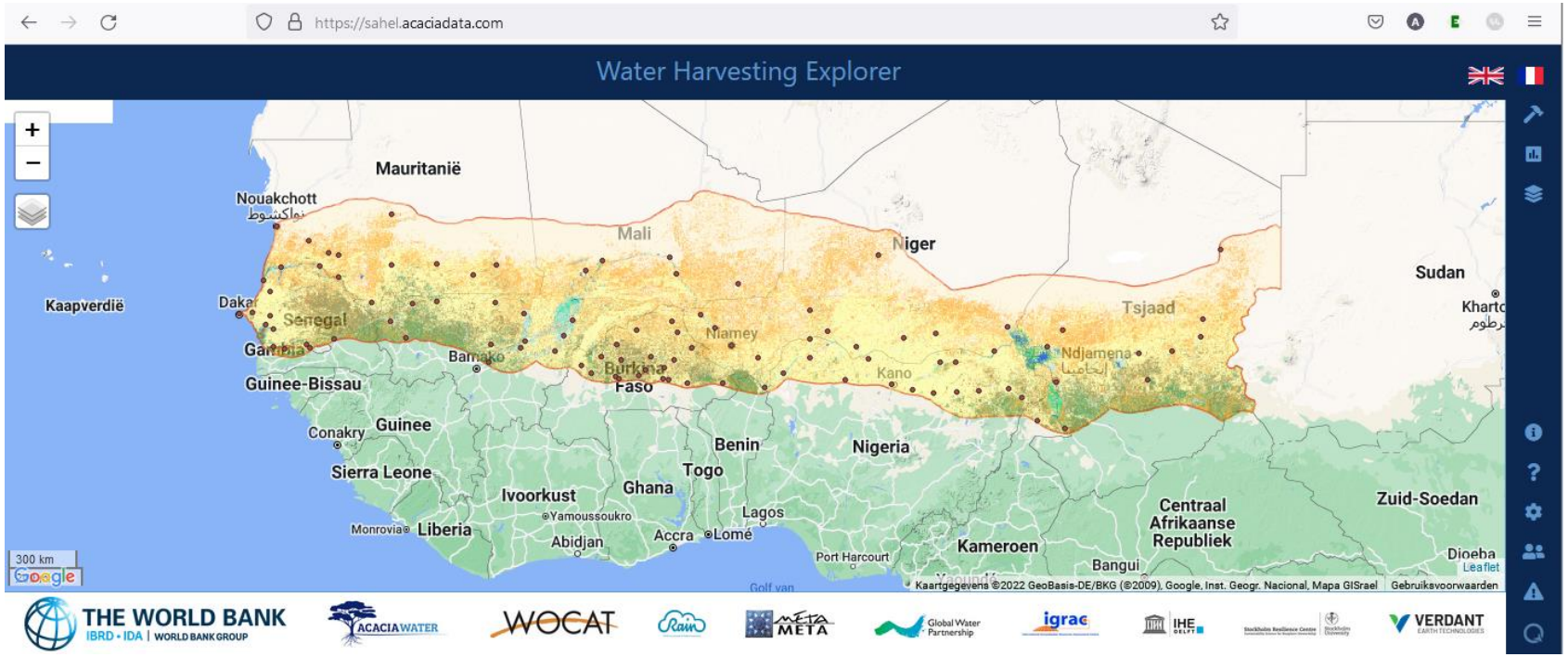
IWRM

System Specific Approach

Strategic Assessments

Innovative Techniques

Urban planning



The Water Harvesting Explorer (WHE) tool

DECISION SUPPORT TOOL FOR SMALL-SCALE WATER STORAGE INTERVENTIONS IN THE WESTERN SAHEL

ACACIA WATER · Rain (RAIN is a brand of Aidenvironment) · META · WOCAT · UNESCO IHE DELFT · THE WORLD BANK IBRD • IDA | WORLD BANK GROUP

& TECHNICAL BACKSTOPPING PARTNERS

Water Security

Land degradation leads to changes in the distribution of runoff, the storage of water in the soil and the recharge of groundwater tables, and eventually to loss of livelihoods.

Additionally

- Increased vulnerability to **climate change** (and variability)
- Lack of consideration for **wider catchment hydrology** and **upstream-downstream effects**.

-> Large number of dispersed small-scale interventions have lesser risk and higher resilience to climate change as well as to threats associated with conflict/fragility environments

Main goal

→ Store water in the landscape to mitigate the impact of land degradation on water resources :

- Reduce runoff rate
- Promote water infiltration and groundwater recharge
- Promote land and water conservation
- Improve the resilience of rural areas to provide food security

Necessary: tool to help identify options and locations

General approach

- Developed a **biophysical landscape typology** based on overlay of annual precipitation, slope, and landcover
- For each typology zone, develop **a longlist of interventions** in order to provide the implementing agencies a menu of options
  - Kickstart community-led WRM
- Developed a survey that helps identifying the **important socio-economic aspects** that acts as a guidance manual for implementation
- Addition of **notifications and warnings** on other contextual elements to consider before implementing water storage interventions.

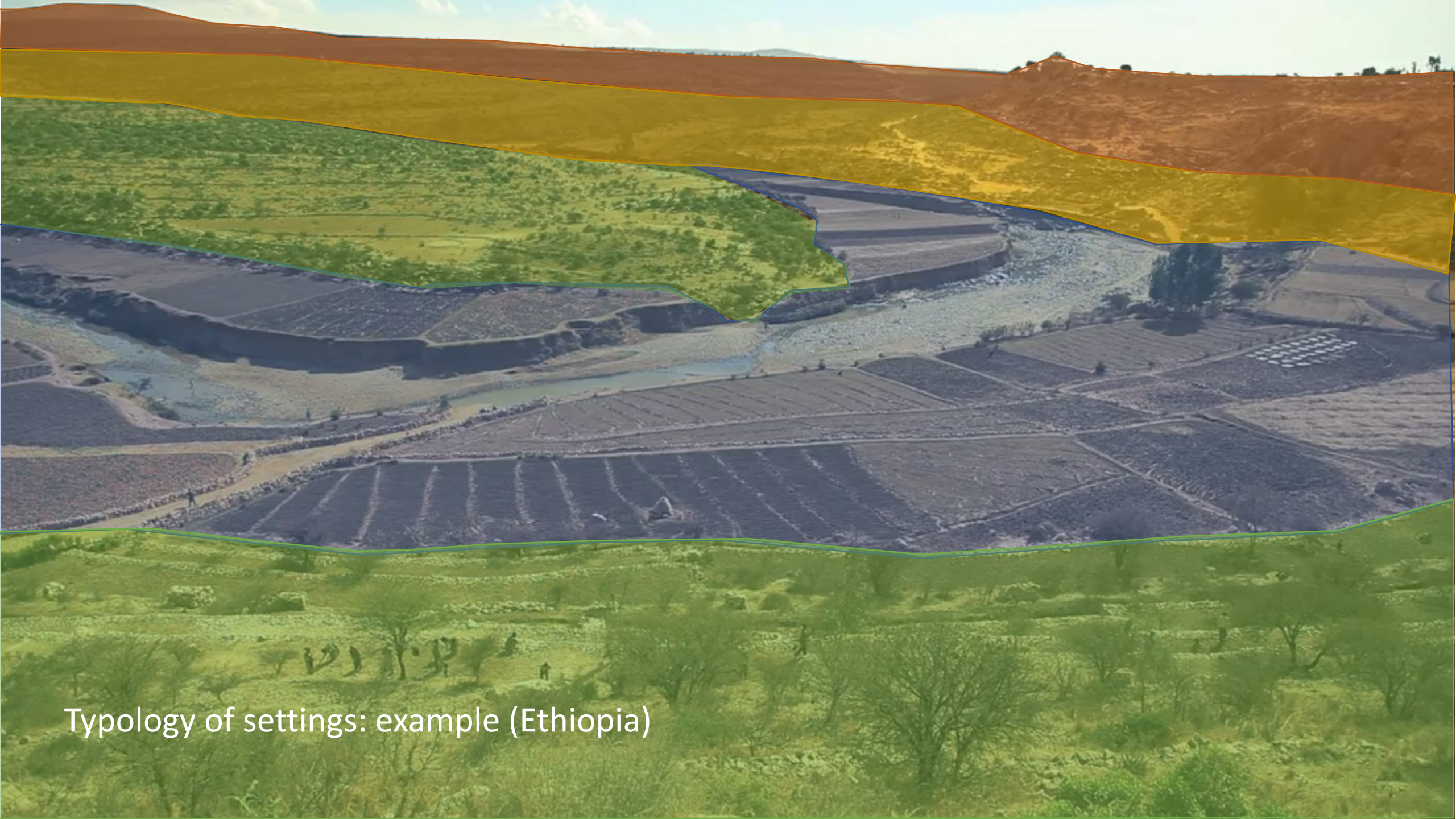
Definition

Typology of setting

A map that displays homogeneous zones within a wider area (e.g.(sub)catchment) based on several biophysical and land use/socio-economic features.

For each setting, the map gives an indication of the potential of small-scale water storage. A typology map is therefore an overlay of different thematic maps that allow to identify and characterize homogenous zones for which specific water storage solutions will be developed.


Typology of settings: example (Ethiopia)


Typology of settings: example (Ethiopia)

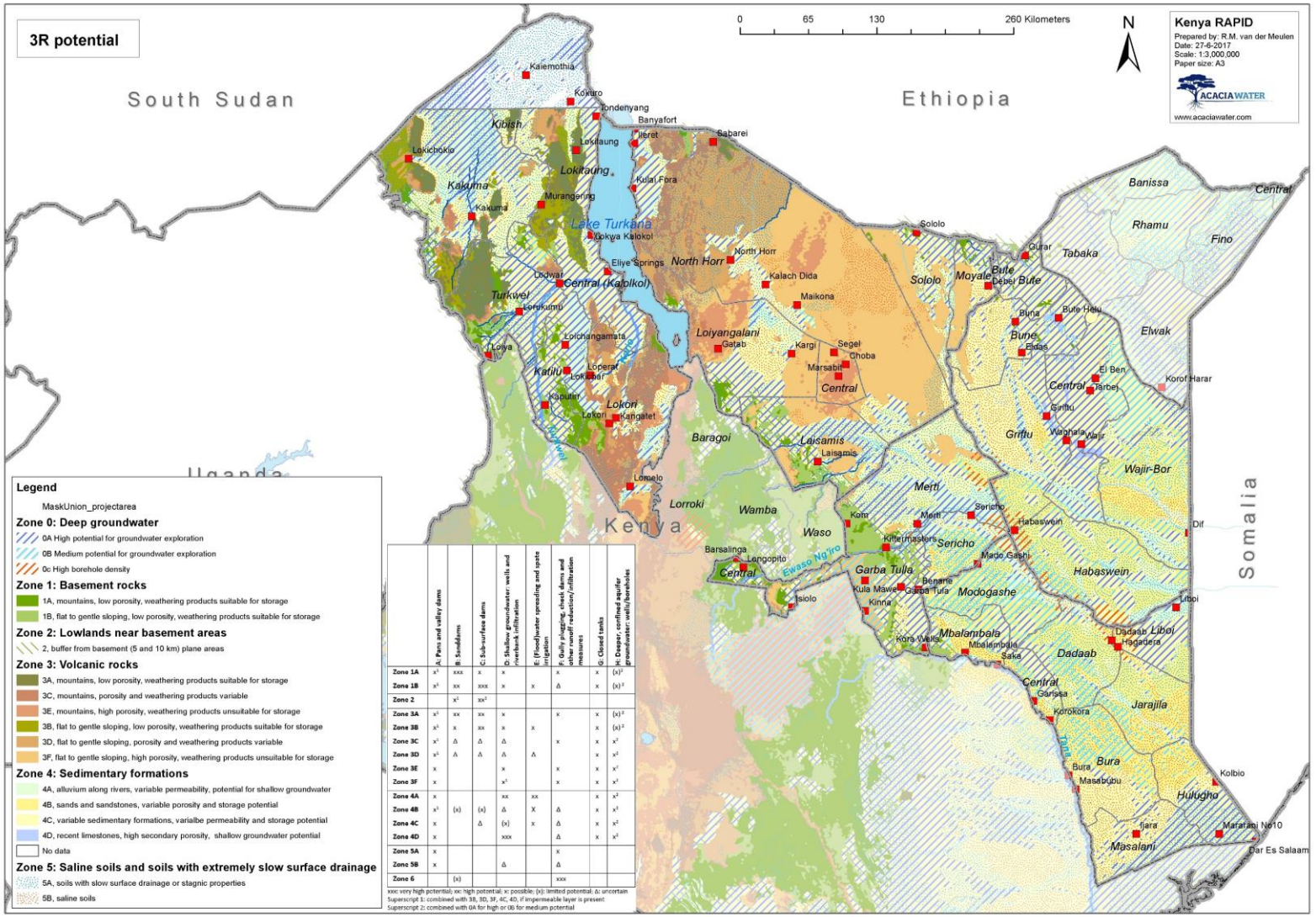
Example of a potential map

The effectiveness interventions is strongly dependent on landscape characteristics.

The typology or landscape zones are linked to a list of possible interventions.

Map development based on remote sensing, field data, community consultation and stakeholder engagement process

Tailor made for this region



3R: Retention, Recharge and Reuse of water

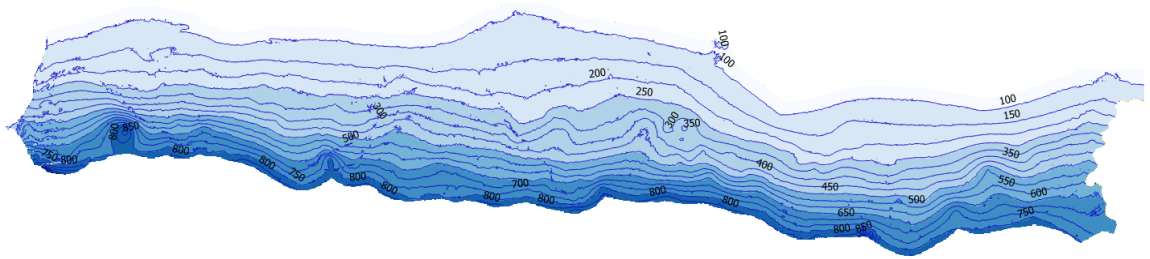
Retention: Retain water on the land, so that:

Recharge: Water can infiltrate into the soil, so that:

Reuse: The water is stored in the ground, so that it is available in the dry season and can be used (preferably in an efficient way).

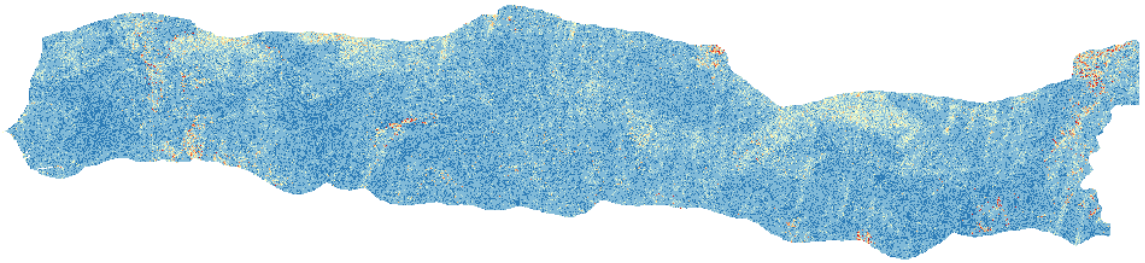

Protection and management
Soil and water conservation
Off-stream water storage
In-stream water storage
Floodwater diversion ditch
Countour trenching
Pond, land surface runoff
Sand dam
Area closure with thorns
Stone contour bunds
Lined pond, road run off
Riverbankwater abstraction
Riverbankprotection (Google)
Terracing
Lined birkad, surface runoff
Check dams in a gully

Main layers



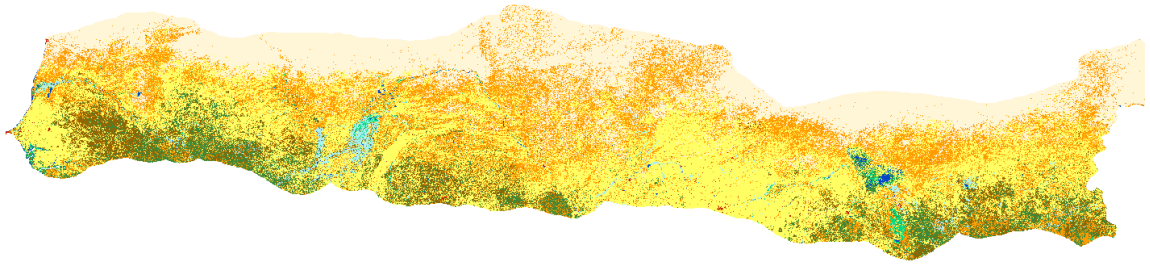
- **Annual average precipitation**

WorldClim 2.1 dataset at 1-km resolution (2020)



- **Slope**

ALOS dataset at 30m resolution (2016)

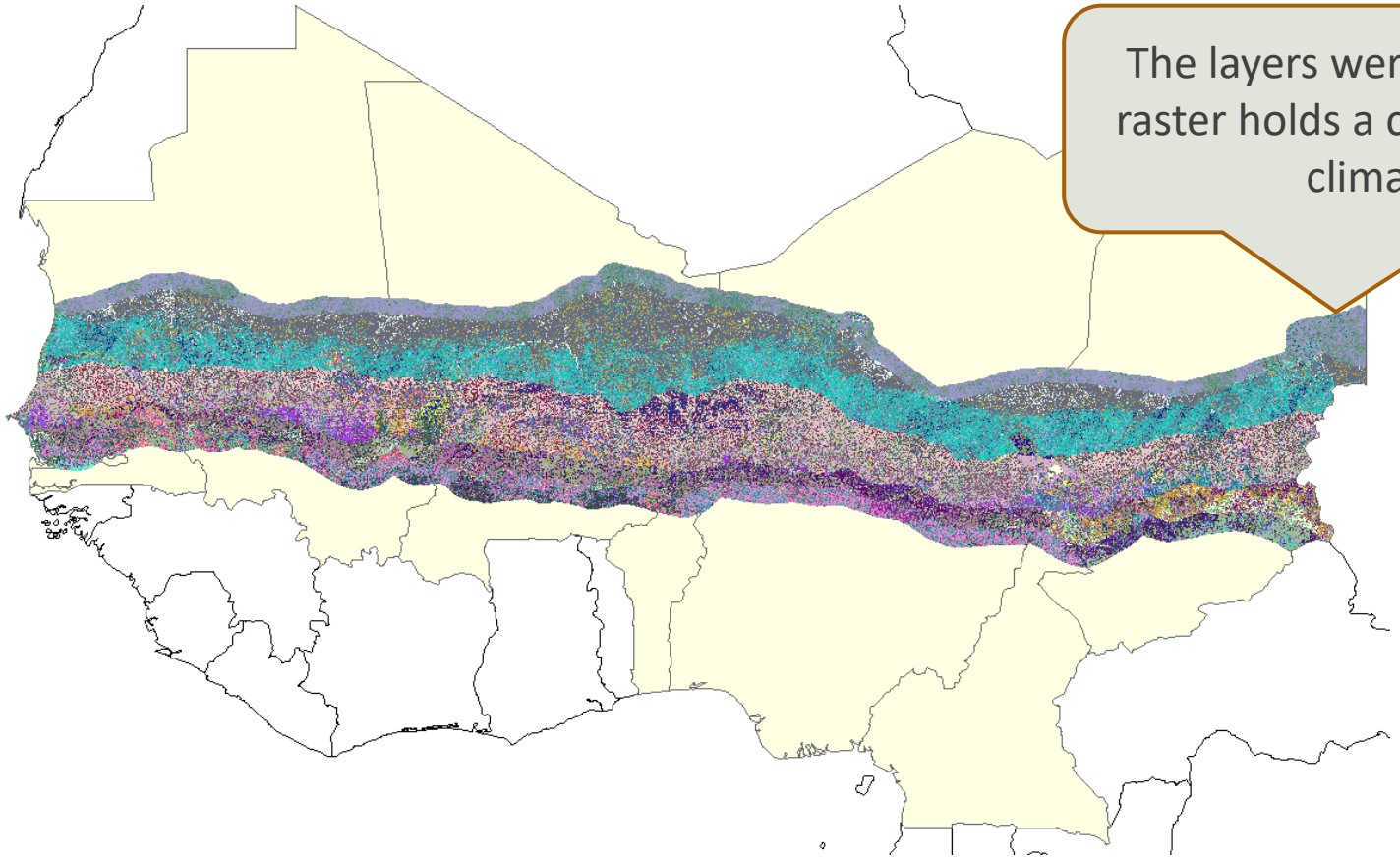


- **Land cover**

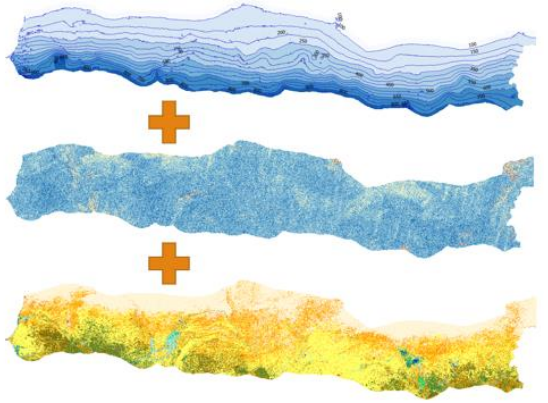
Combination of datasets

- *ESA CCI S2 prototype LC 20m of Africa (2016)*
- *ESA CCI LC 300 m (2019)*
- *Copernicus 100 m (2015)*

Unique typologies

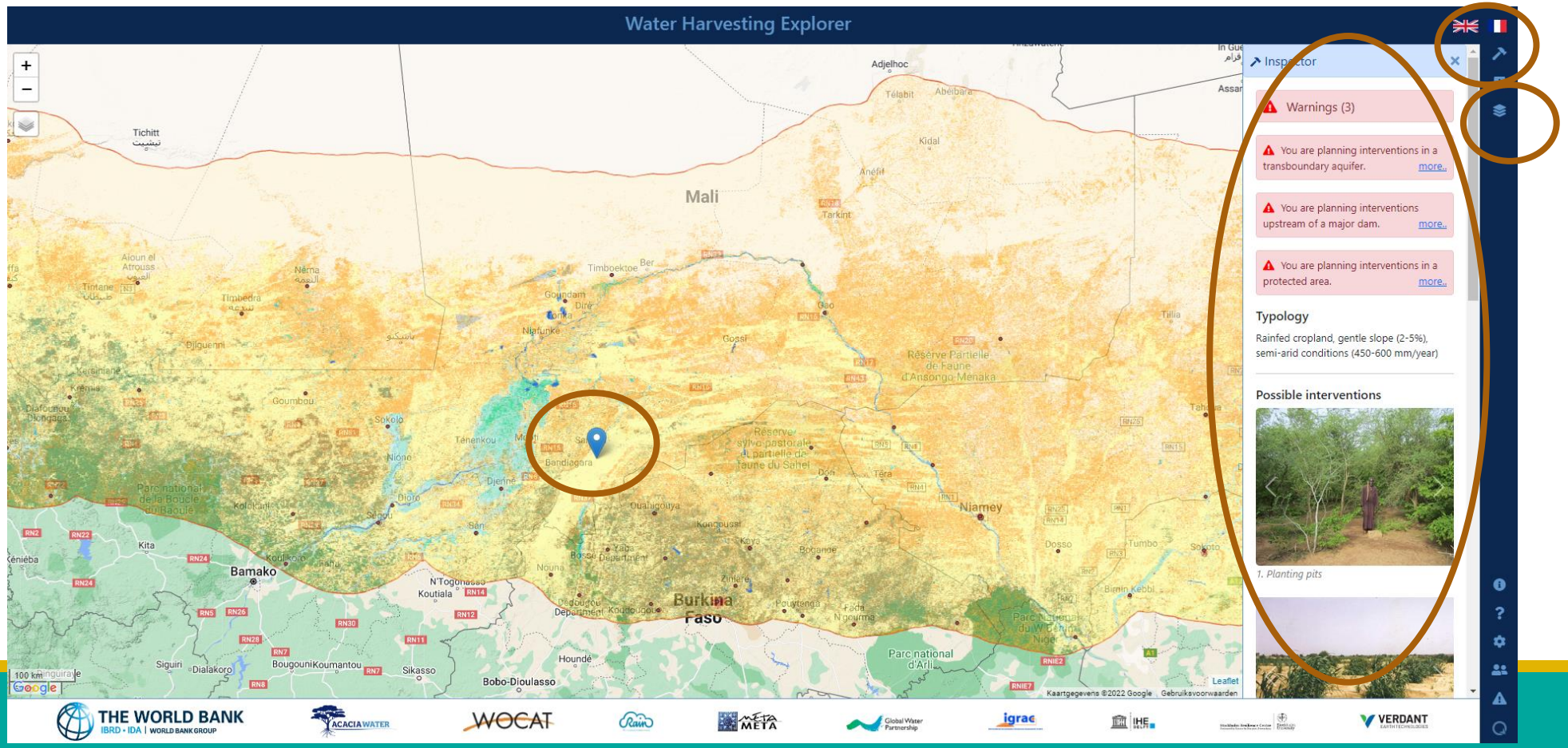


The layers were summed, and the resulting raster holds a code per pixel that tells us the climate/slope/landcover



Walk-through

Open access on the site: https://sahel.acaciadata.com/ (EN/FR)



Recommended interventions

- Combined all WOCAT entries (location specific data of pilots)
- Entries group together by type

Planting pits	Microbasins	Contour barriers - Steep slope	Contour barriers - Gentle slope	Vegetative barriers	Agroforestry	Concentrated runoff control	Off-stream storage	Water from impermeable surfaces

- Generalized the information of the entries, into bandwith per group.

5.1 Climate

Annual rainfall

- < 250 mm
- 251-500 mm
- **501-750 mm**
- 751-1,000 mm
- 1,001-1,500 mm

5.2 Topography

Slopes on average:

- flat (0-2%)
- **gentle (3-5%)**
- **moderate (6-10%)**
- rolling (11-15%)
- hilly (16-30%)
- steep (31-60%)
- very steep (>60%)

Landforms:

- **plateau/plains**
- ridges
- mountain slopes
- **hill slopes**
- footslopes
- valley floors

Typology

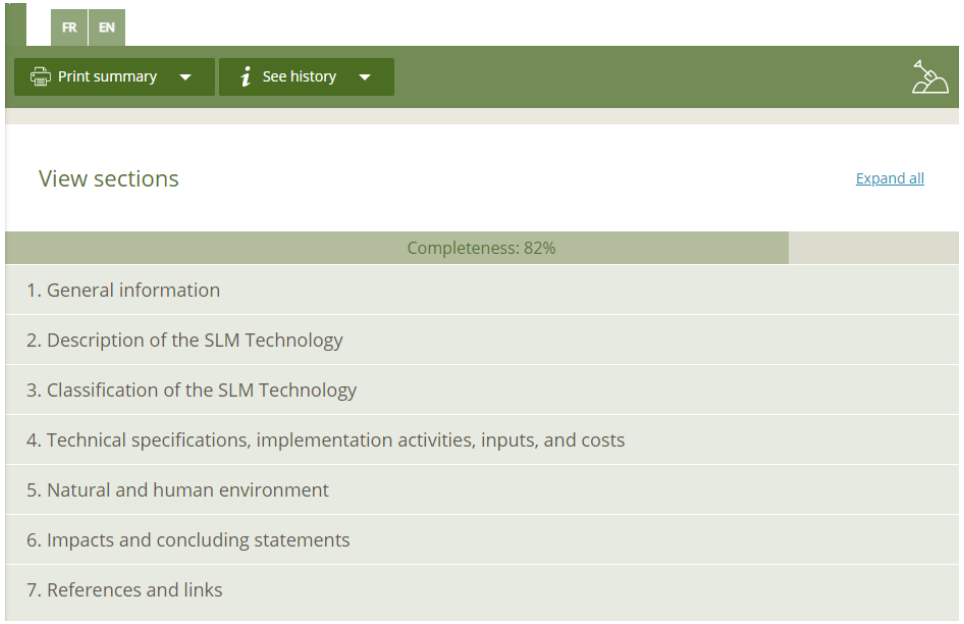
Rainfed cropland, gentle slope (2-5%), semi-arid conditions (450-600 mm/year)

Possible interventions

1. Planting pits

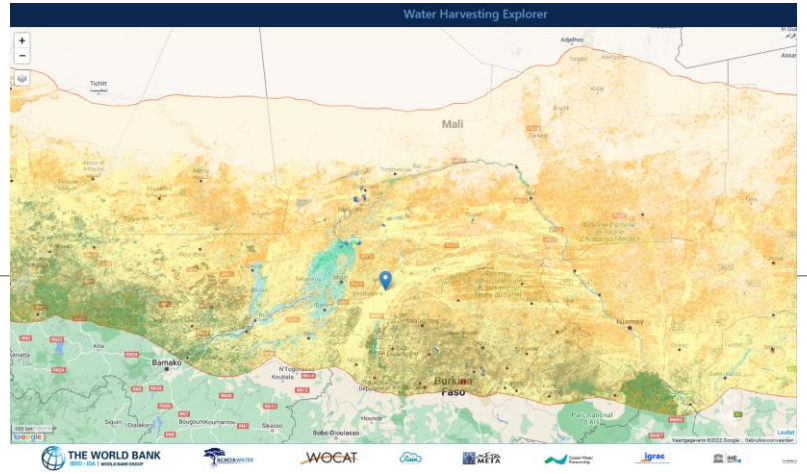
2. Microbasins

WOCAT SLM Database



- The **W**orld **O**verview of **C**onservation **A**pproaches and **T**echnologies
- https://www.wocat.net

Main Typologies

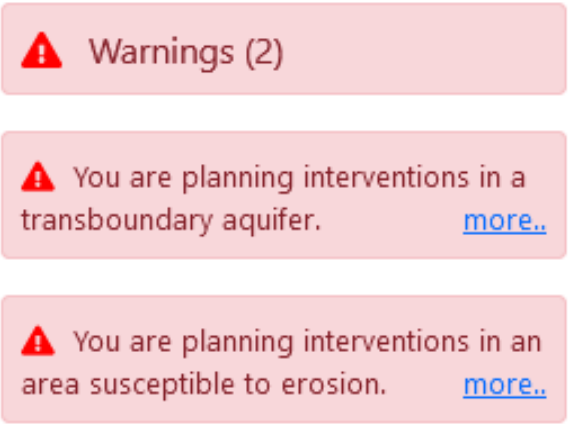


Coverage	Description
11%	Bare area and/or sparse vegetation, gentle slope (2-5%), arid conditions (100-250 mm/y)
9%	Rainfed cropland, gentle slope (2-5%), semi-arid conditions (250-450 mm/y)
6%	Grassland, gentle slope (2-5%), arid conditions (100-250 mm/year)

- Strategic pathways?

Warning layers

- Area susceptible to erosion
- Recharge area of transboundary aquifer
- Upstream area of major dams
- Arid and hyper-arid environment (< 250 mm/year)
- Area where human presence is unlikely (5 km buffer)
- Protected area



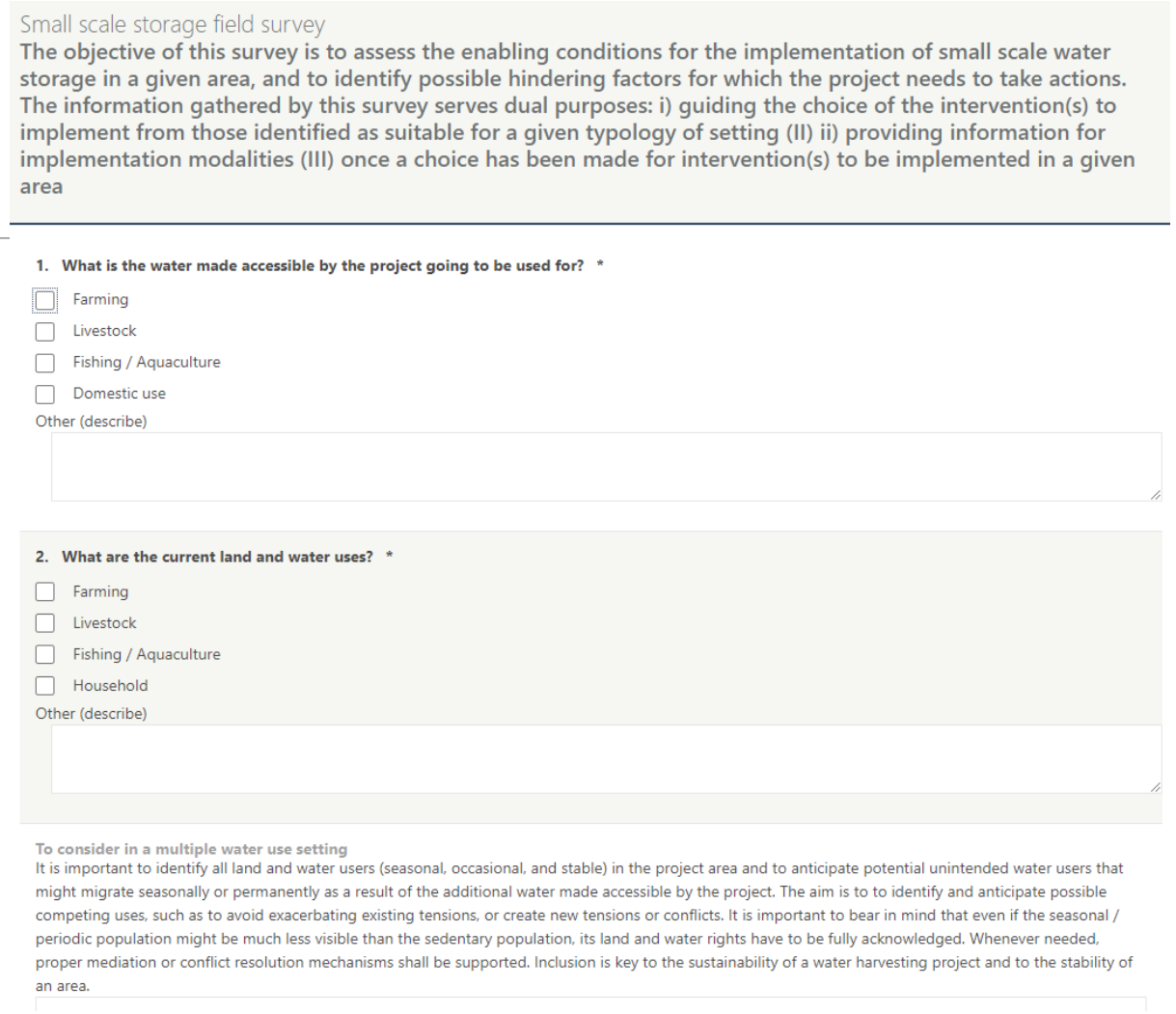
Your input? The warnings should be extended with…?

Survey

Considerations for choice of intervention and implementation

- Assessment of favorable conditions for the implementation of water storage at the local scale in a given area
- Identification of possible difficulties and obstacles for which the project must take measures

User-friendliness to be improved (saving results)



Small scale storage field survey

The objective of this survey is to assess the enabling conditions for the implementation of small scale water storage in a given area, and to identify possible hindering factors for which the project needs to take actions. The information gathered by this survey serves dual purposes: i) guiding the choice of the intervention(s) to implement from those identified as suitable for a given typology of setting (II) ii) providing information for implementation modalities (III) once a choice has been made for intervention(s) to be implemented in a given area

1. What is the water made accessible by the project going to be used for? *

- [ ] Farming
- [ ] Livestock
- [ ] Fishing / Aquaculture
- [ ] Domestic use

Other (describe)

2. What are the current land and water uses? *

- [ ] Farming
- [ ] Livestock
- [ ] Fishing / Aquaculture
- [ ] Household

Other (describe)

To consider in a multiple water use setting

It is important to identify all land and water users (seasonal, occasional, and stable) in the project area and to anticipate potential unintended water users that might migrate seasonally or permanently as a result of the additional water made accessible by the project. The aim is to to identify and anticipate possible competing uses, such as to avoid exacerbating existing tensions, or create new tensions or conflicts. It is important to bear in mind that even if the seasonal / periodic population might be much less visible than the sedentary population, its land and water rights have to be fully acknowledged. Whenever needed, proper mediation or conflict resolution mechanisms shall be supported. Inclusion is key to the sustainability of a water harvesting project and to the stability of an area.

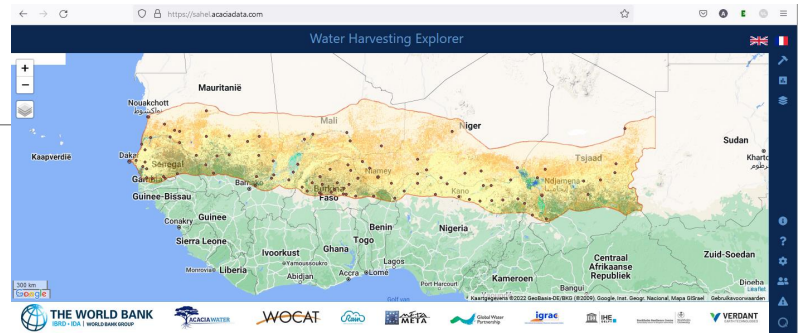
In-field validation and raising awareness

1. **Preliminary field exploration** using the online tool
2. **Field validation**: soil study, inventory of existing structures, community led planning, etc. → Use downloadable maps, accessible offline on a mobile device and editable using the Qfield application: https://we.tl/t-Pkn6ppVFY3 (Niger)
3. Expert advice
4. Implementation
5. Monitoring, control and handling

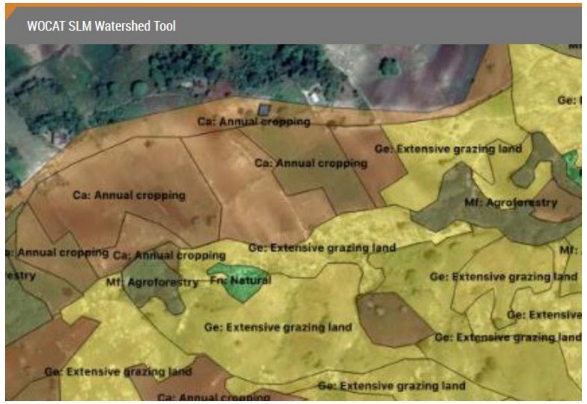
Integrated approach

- Trainings in using the webtool:
  - Given to policymakers and practitioners
  - Including IWRM, CC adaptation and mitigation, etc.
- Stakeholder consultation
- Further developments:
  - Improve user friendliness tool
  - Qfield download
  - Validation / testing in the field
  - Advice for in-stream storage & road water harvesting
  - Refinement of typologies
  - Link Water Harvesting Explorer (WHE) with Water Potential Estimator (WPE)

WHE



WPE



WOCAT SLM Watershed Tool

The Watershed Tool helps to categorize and map different land use/land management types, calculate their runoff rates, and determine their contribution to the total watershed runoff from daily rainfall events.

Weblinks and Documentation

WHE Tool: Open access website https://sahel.acaciadata.com/ (EN/FR)
Ideas? Feedback? Reach out to: Explorer@acaciawater.com

WOCAT database : https://qcat.wocat.net/en/wocat/ (EN/FR)

- SLM Approaches
- SLM Technologies

Overview report of the online Water Harvesting Explorer (EN/FR)

- https://acaciadata.com/doc/overview_report_sahel_water_harvesting_explorer_EN_Final.pdf
- https://acaciadata.com/doc/overview_report_sahel_water_harvesting_explorer_FR_Final.pdf

Questions? Reach out to anne.vanderheijden@acaciawater.com

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Thank you for your attention

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Annex – Main settings for final typology

- **Annual average precipitation**

WorldClim 2.1 dataset at 1-km resolution (2020)

- **Slope**

ALOS dataset at 30m resolution (2016)

- **Land cover**

Combination of datasets

  - *ESA CCI S2 prototype LC 20m of Africa (2016)*
  - *ESA CCI LC 300 m (2019)*
  - *Copernicus 100 m (2015)*