The Wateragri Framework
An easy way to navigate complex solutions

Team

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- All involved stakeholders
- The entire Wateragri team

This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 858735.

Why a framework?

- Which solutions are suitable in terms of sustainability?
- Which technologies are feasible?

- What do the different stakeholders (farmers, consultants policy makers ect.) need to provide to get targeted answers?

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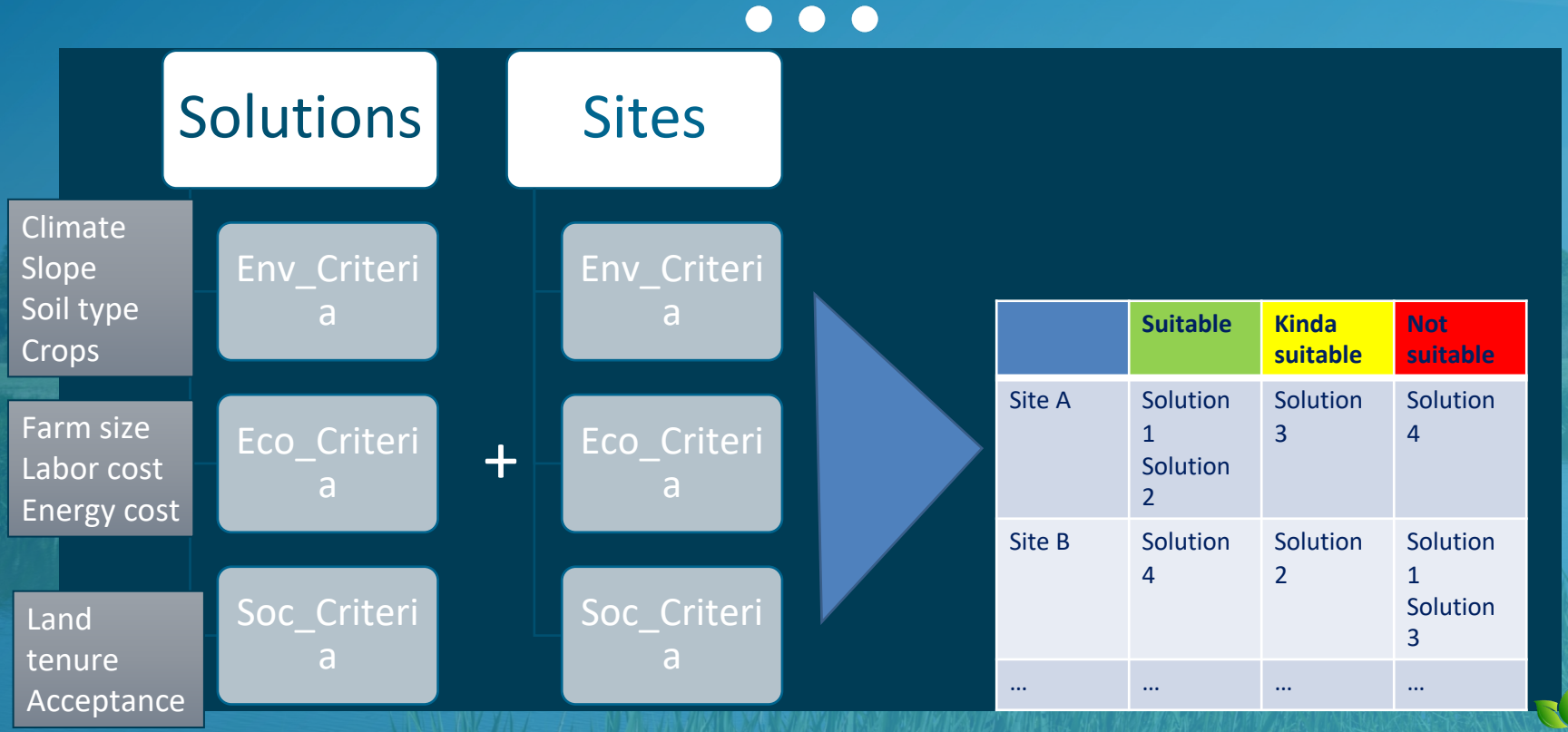
Co-design with stakeholders

- Design of the framework with Wateragri partners
- Testing with project stakeholders during meetings and General assembly:
  - Review of the General structure of the framework
  - Test the «Simplified Models»
- Co-design approach:
  - Integrate user feedback on initial version of the models
  - Review on functions and usability
  - Improvment of the interface

Components of the framework

- Wateragri website
- Simplified models: simple models to support users in using some specific solutions
- Factsheets
- Illustrations of complex technologies (e.g. Physically based models and real-time data assimilation)

Which solutions are suitable in terms of sustainability?



	Suitable	Kinda suitable	Not suitable
Site A	Solution 1 Solution 2	Solution 3	Solution 4
Site B	Solution 4	Solution 2	Solution 1 Solution 3
…	…	…	…

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Which solutions are suitable in terms of sustainability?

https://framework.wateragri.eu/rapidassessment.html

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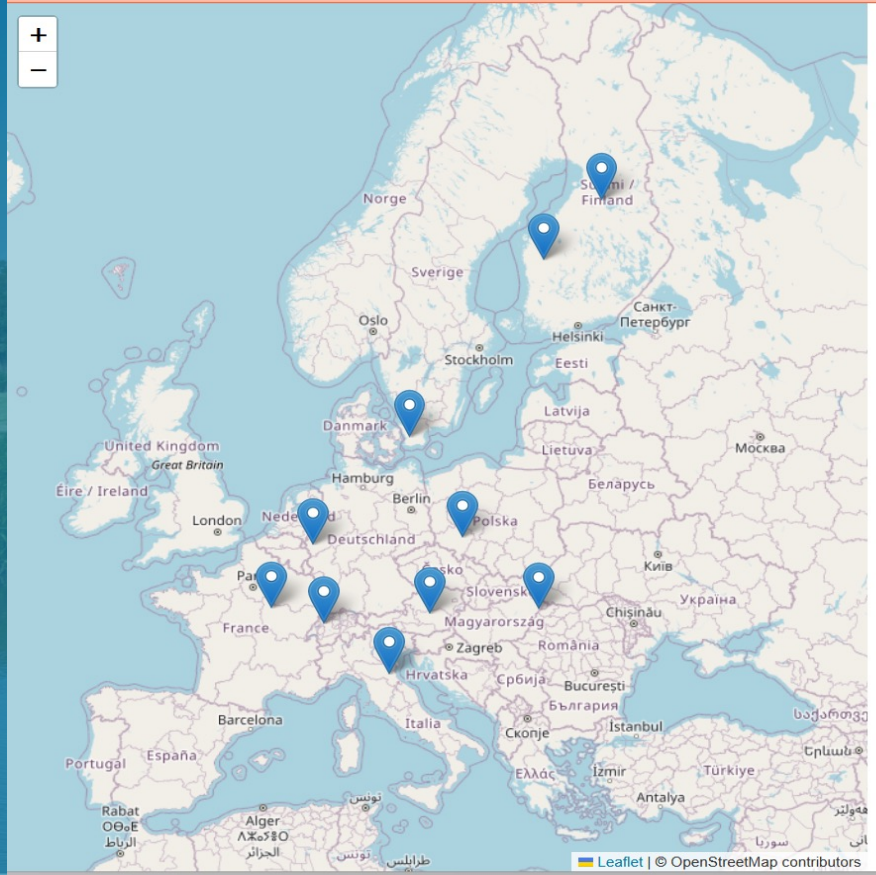


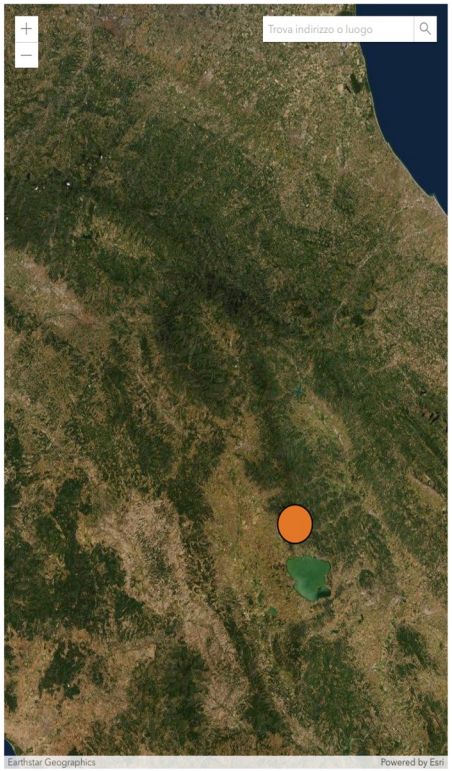
Wateragri Solutions Rapid Assessment

Best solutions for Finland - I Municipality of Tyrnava

Solution	Suitability			
	General	Environmental	Social	Economic
Biochar	Medium	Medium	High	Medium
Drainage Systems	Medium	High	High	Medium
Farm Constructed Wetlands	Medium	Medium	High	Medium
Enhanced Water Retainer	Low	Low	Medium	High
Precision Irrigation System	Low	High	High	Low

Which technologies are feasible?

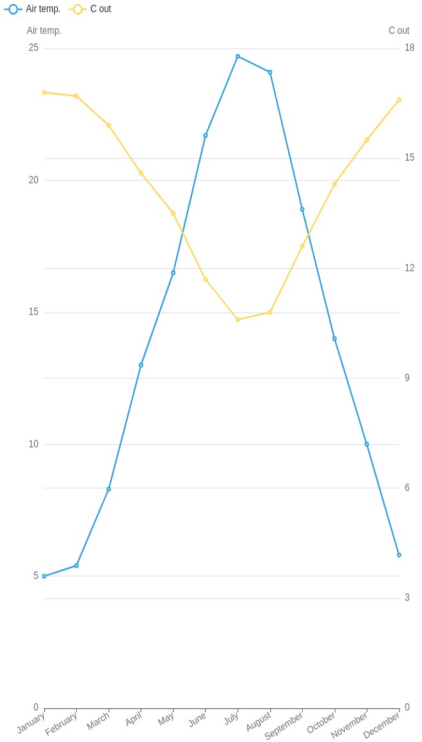
Simplified online models provide a first assessment



Address: **52044, ITA**

Month	Temperature (°C)	C out (mg/l)	Removal efficiency %
January	5	16.8	25 %
February	5.4	16.7	25 %
March	8.3	15.9	29 %
April	13	14.6	35 %
May	16.5	13.5	39 %
June	21.7	11.7	48 %
July	24.7	10.6	52 %
August	24.1	10.8	52 %
September	18.9	12.6	43 %
October	14	14.3	36 %
November	10	15.5	30 %
December	5.8	16.6	26 %

Inflow (Q)	80	m^3/d
Inlet concentration of Total Nitrogen (Ci)	22.3	mg/l
Area (A)	1000	m^2
Apparent number of Tanks in series (P)	3	
Background concentration of Total Nitrogen (Cb)	1.5	mg/l



Example to estimate the Nitrogen removal efficiency in constructed wetlands

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Factsheets help to interpret the data

FACTSHEET

A BIO-INSPIRED MULTI-LAYER FILTER SYSTEM (C2, B6, C4)

Simplified Flowchart

Key information

- Case study: **Mistelbach**, Austria
- A bio-inspired multi-layer drainage system designed to retain water and nutrients from agricultural runoff tested as experimental prototype
- Target audience: farmers, farm schools with further design needs (in-ground upscaling).

A. Brief Introduction:

Agricultural run-off transports a significant amount of nitrogen and phosphorus leached after fertilization. The specific characteristics of agricultural run-off are its high spatiotemporal load and flow variability (with high volumes of water during rainy events), and low concentration of nitrogen and phosphorus. alchemia-nova in collaboration with BOKU developed a multi-layer vertical filter system to address the agricultural run-off issue, which has been installed on the slope of an agricultural field in Mistelbach, Austria. The goal was to develop a drainage filter system to retain water and nutrients. Both multi-layer filter systems contain biochar and other substrates with adsorption properties of nutrients (nitrogen, phosphorus) and are designed according to the Austrian guideline for vertical flow wetlands ÖNORM 2505. The primary expected outcome is to test the capabilities of the bio-inspired filter to work as a water retainer and a nutrient retainer addressing agricultural surface run-off. The filter system can be of practical use if an excess of nutrients being washed out is of concern in the fields of the practitioner by keeping the surrounding waters clean. This approach may result in economic value by re-using the saturated biochar as fertilizer and improving the soil structure, thus increasing long-term soil fertility. The system is expected to be low maintenance apart from harvesting the plants yearly and changing the biochar when it is saturated with nutrients.

B. Design concept:

Three vertical-flow multi-layer systems were constructed above ground in three IBC tanks in June 2021, which received surface runoff from an agricultural fiel in Mistelbach. Each system had a surface area of 1 m^2 and 65 cm height composed of different layers of substrates. Filter 1: was an unplanted filter (with biochar in the main layer); Filter 2: a vegetated filter system (with Draingarden® substrate + biochar). Filter 3: vegetated system with local soil as reference. The surface agricultural run-off was collected from a catchment area of 30m^2 (1% slope) and directed with a 30 m long pipe in a three-way distributor, which fed each system with surface runoff. The system was constructed that way and not directly placed into the field for easier analysis and maintenance.

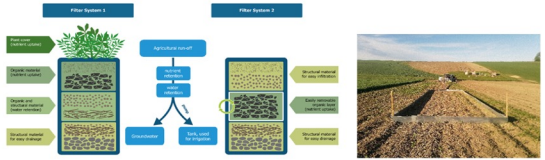

Figure 1 Drainage filter system concept (left), and photo of the catchment area 26.05.2022 (right)

Other components of the framework

- Explore the solutions through a serious game
- Targeted guides through solutions for farmers, consultants, general public
- Get inspiration from numerous case studies

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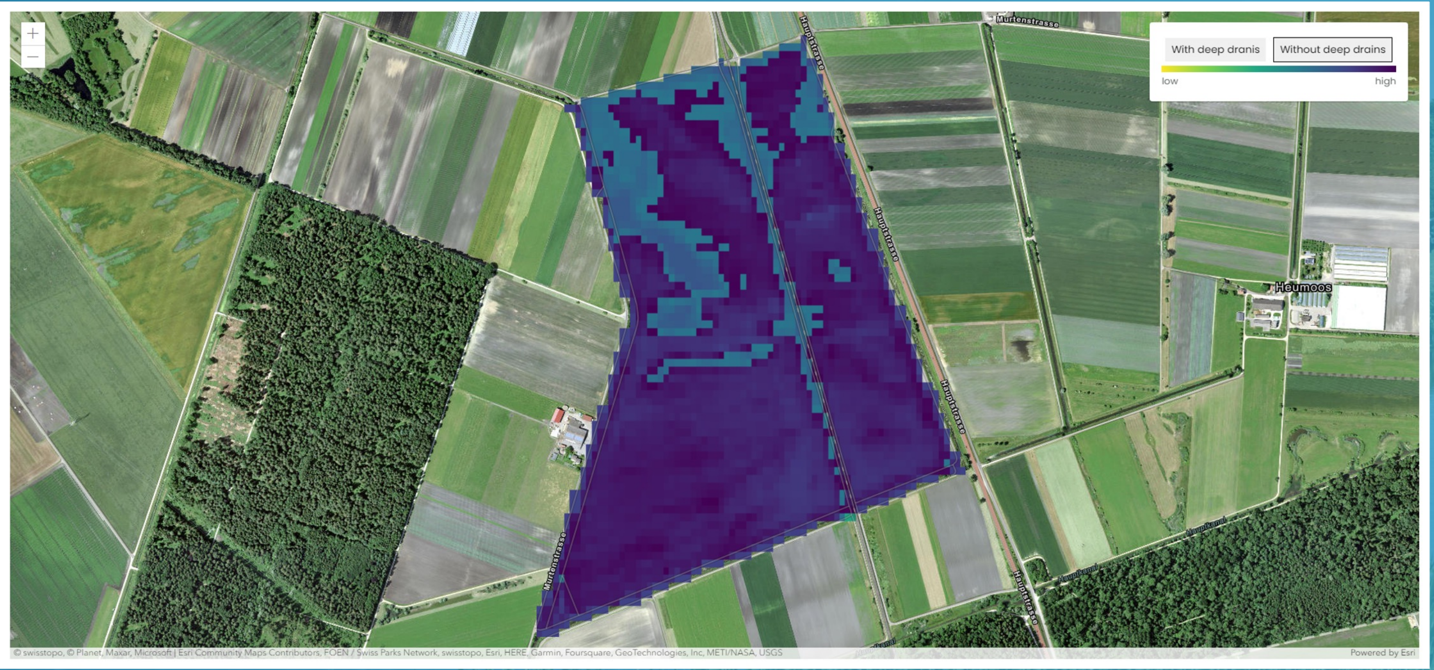
Other components of the framework

- Illustration of site-specific approaches



Example: Physically based, real-time models

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Conclusions

- Addressing the gap between research and stakeholders is required
- Involving stakeholders in the design of knowledge transfer was highly beneficial
- Tailored communication solutions for the different stakeholders is essential

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- As the framework is modular it can easily be extended
- Structure of the framework can easily be implemented in other projects

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THANK YOU!

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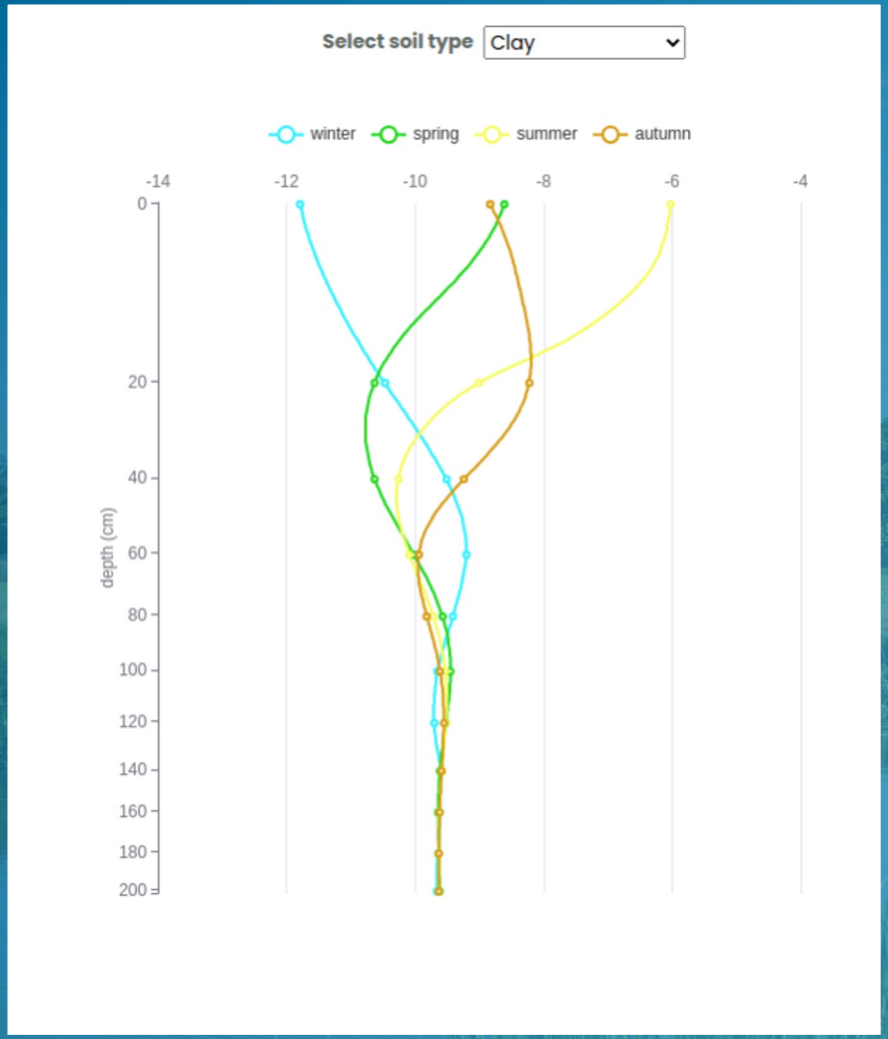

Which technologies are feasible?

Example 2: Tracer methods

Support researcher that are planning to use the tracers methods to define the best sampling methods according with methods and season

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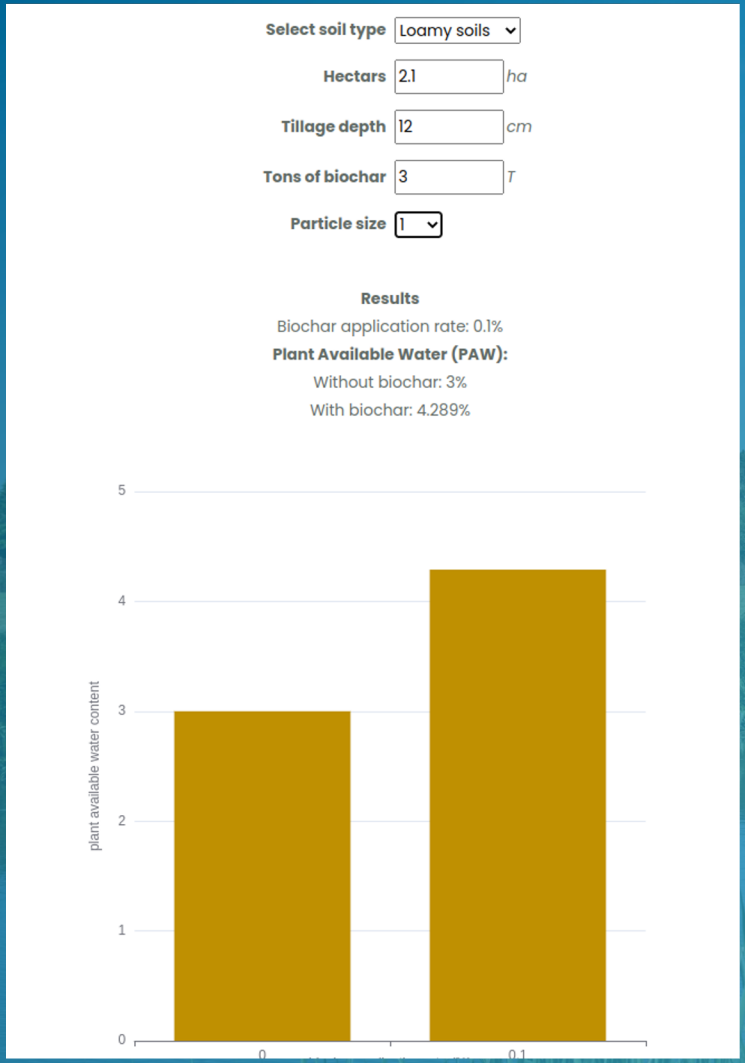
Which technologies are feasible?
Example 3 Biochar for water retention

Predictive tools for water retention in soils with added biochar can help to guide the development and implementation of biochar applications for improving soil water availability.



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Let us guide you through our solutions

Below we provide different ways on how you can explore the WATERAGRI solutions:

Play a game

Explore the solutions through the WATERAGRI framework

Look at our case studies

WATERAGRI Framework

Why a framework?

- Multiple technological solutions & innovations for improved water retention and more sustainable agricultural water resources management are developed

- Given the wide range of solutions provided, it will be difficult to asses which technologies are suitable to stakeholders