



HYDROUSA

Regenerative & Nature-Based Water Solutions

ADAPTtoCLIMATE Conference
The Horizon2020 HYDROUSA Project



Simos Malamis, HYDROUSA Coordinator, NTUA
19th April 2021

This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No 776643



Basic Project Info



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 776643

- **Title:** Demonstration of water loops with innovative, regenerative business models for the Mediterranean region
- **Acronym:** HYDROUSA
- **CIRC-02-2016-2017:** Water in the context of the circular economy, Innovation Action
- **Total budget:** €12,015,448.75; EC contribution: €9,958,706.88
- **Duration:** 54 months
- **Start date:** 01/07/2018
- **Number of partners:** 28

HYDROUSA is materialised through:

- ✓ 13 innovations
- ✓ 6 demo sites (HYDRO 1-6)
- ✓ In 3 Greek islands





HYDROUSA – Key Contributor to EU Climate Adaptation Strategy



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 776643

RESEARCH & INNOVATION KEY CONTRIBUTOR TO THE NEW EU CLIMATE ADAPTATION STRATEGY

February 2021

The new **EU Strategy on Adaptation to Climate Change “Forging a climate-resilient Europe”** sets the scene for more ambitious action on climate adaptation. The objective of the strategy is to progress swiftly toward the 2050 resilience vision by making adaptation action smarter, more systemic, and faster. It is a cornerstone of the **European Green Deal** and complements the proposed Climate Law and the Climate Pact, but also other initiatives such as the Biodiversity Strategy, the Renovation Wave, the Farm to Fork Strategy, the upcoming Forest Strategy and the Renewed Sustainable Finance Strategy.

The role of Research and Innovation

Responding to the challenges posed by the climate emergency requires scientific breakthroughs, as well as testing and de-risking innovations in various domains ranging from digital tools to water treatment technologies. The EU is set to expand the frontiers of scientific excellence in the domain of adaptation to climate change, drawing on work done under the Research and Innovation Programmes, and building on the proposed **Horizon Europe Mission on Adaptation to Climate Change**, including Societal Transformation.

EU Framework Programmes for Research and Innovation

The EU Research and Innovation Programmes – FP7 and Horizon 2020 – have focused on **bridging knowledge gaps and the development of effective solutions** in areas such as high-end climate change, the economics of climate adaptation, disaster risk reduction, nature-based solutions, climate services and climate-resilient agriculture and forestry. The results from these programmes have significantly contributed to the development of the new EU Climate Adaptation Strategy.

Horizon Europe will be vital to achieving the objectives of the new EU Climate Adaptation Strategy. It will continue strengthening the scientific understanding of climate change and its impacts, building capacity across sectors and stakeholders and, crucially, engaging citizens to trigger transformational change. Moreover, Horizon Europe will continue funding investigator-driven, bottom-up research through the European Research Council (ERC).

“ 2021 is the year of Climate Adaptation. It started with the first global Climate Adaptation Summit and it will culminate in the COP26 in Glasgow, in November. The new European Climate Adaptation strategy could not be timelier. Research & innovation have a pivotal role in addressing the multifaceted challenges of today's climate emergency, including accelerating behavioural change. Together, we will build a climate-resilient Europe. ”

Mariya Gabriel, EU Commissioner for Innovation, Research, Culture, Education and Youth

Research and Innovation

RESEARCH & INNOVATION KEY CONTRIBUTOR TO THE NEW EU CLIMATE ADAPTATION STRATEGY

February 2021

European Commission

Selection of **Horizon 2020 projects** contributing to the new EU Climate Adaptation Strategy

VISCA developed a decision support system (VISCA DSS) integrating climate, agricultural and vineyard-management services helping the agriculture sector become more resilient to climate change. VISCA DSS proved its value by real demonstrations with European wine producers at 3 demo sites (Codorniu in Spain, Mastroberardino in Italy, and Symington in Portugal) testing also novel adaptation agronomic techniques, crop-forcing and shoot trimming.

HYDROUSA developed a new circular business model, mostly suitable for Mediterranean and other water-scarce regions in Europe and worldwide. This will implement innovative nature-based and nature-inspired climate adaptation solutions for decentralised water scarce areas in terms of water/wastewater treatment and management, which will close the water loops and will also boost their agricultural and energy profile.

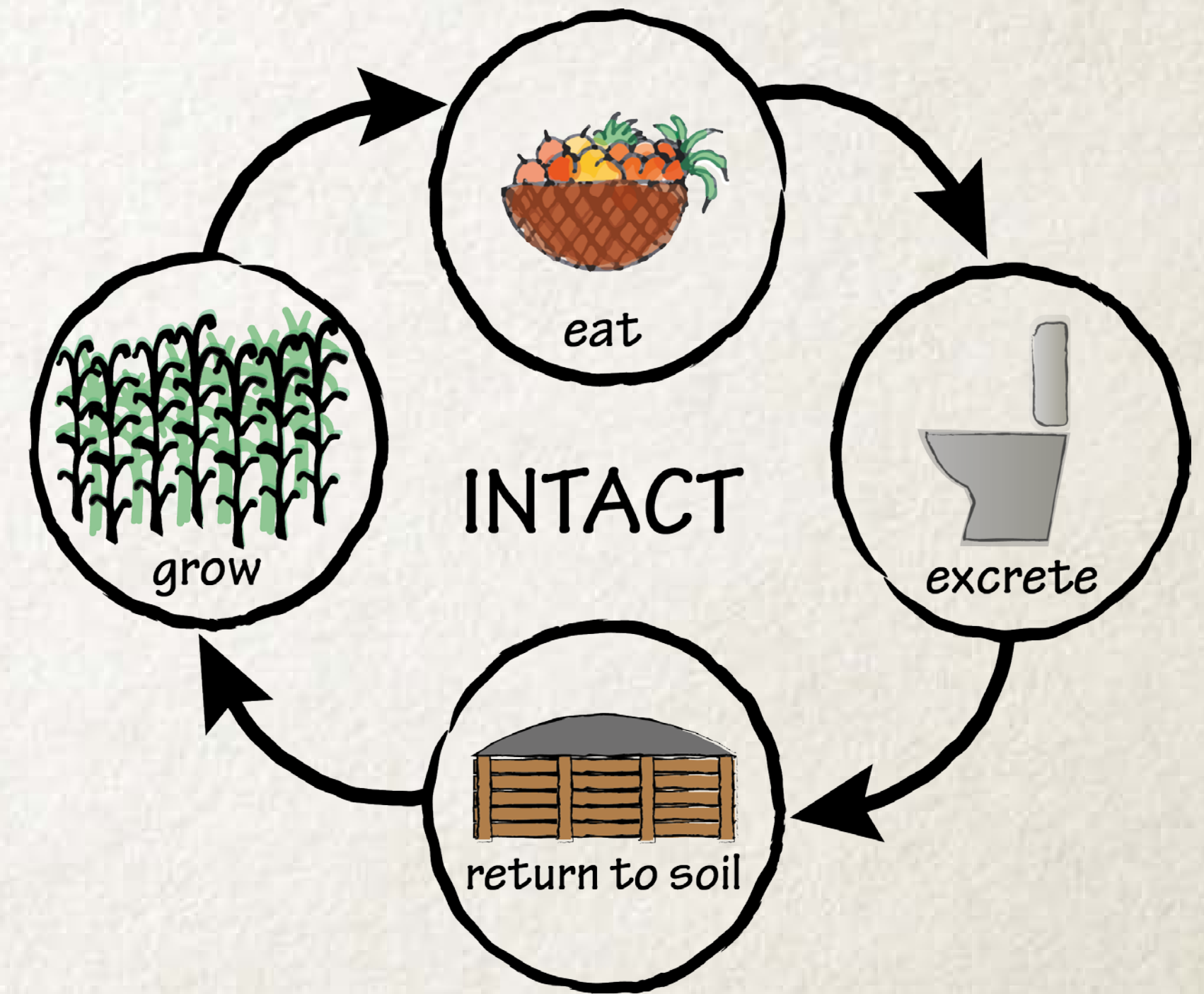
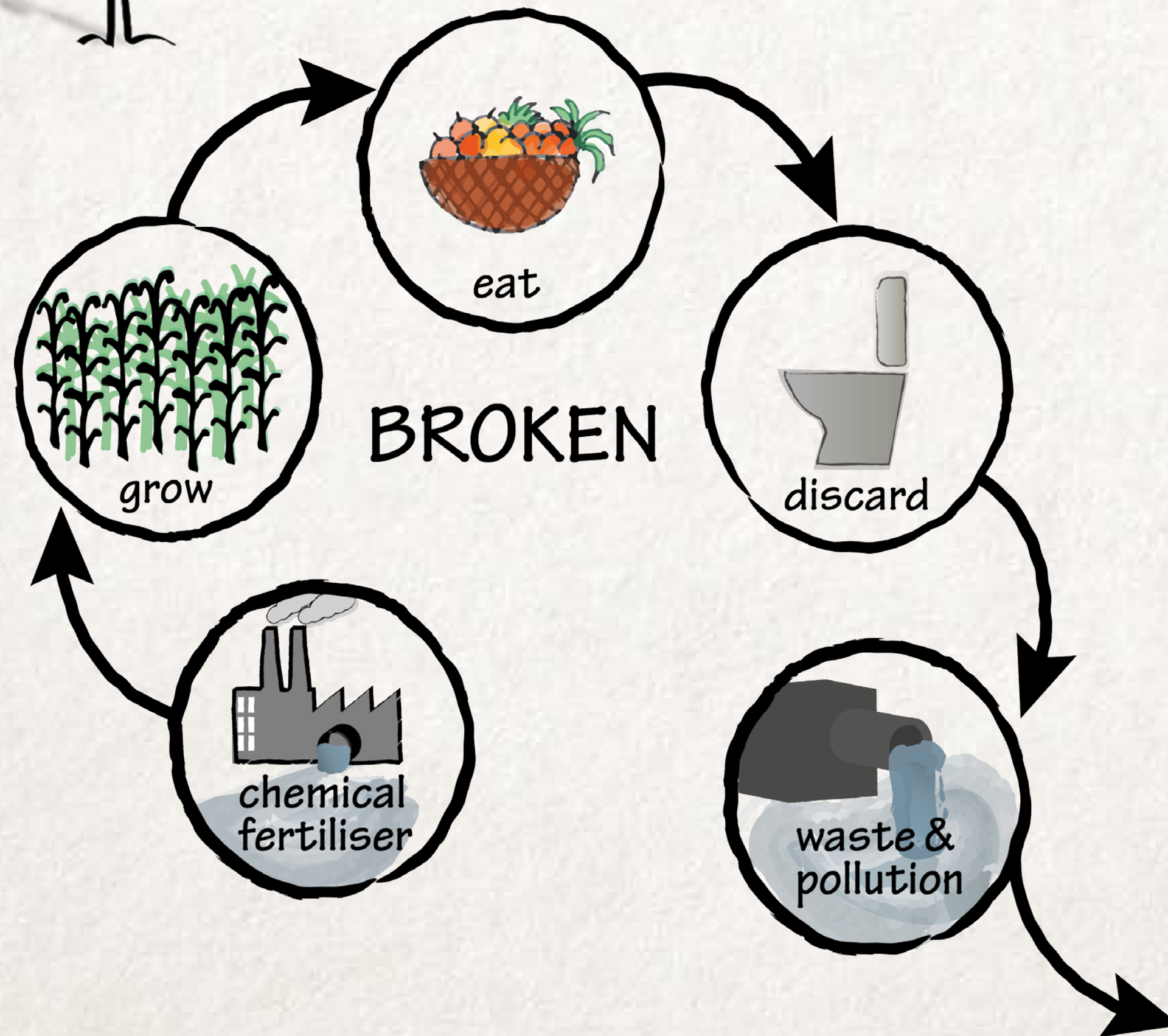




Broken vs Intact



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 776643

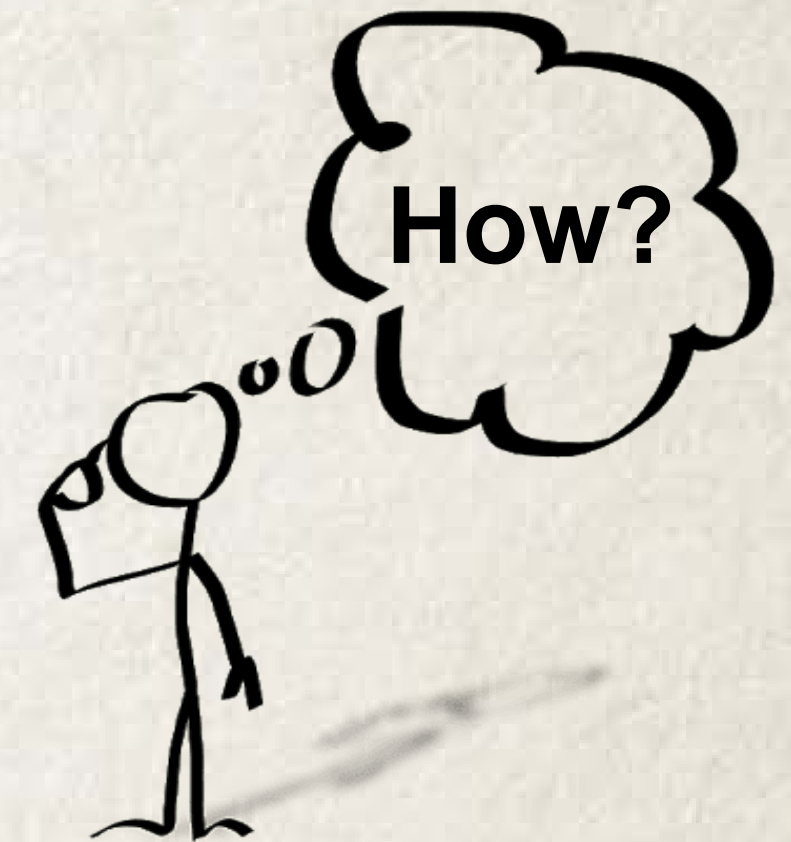
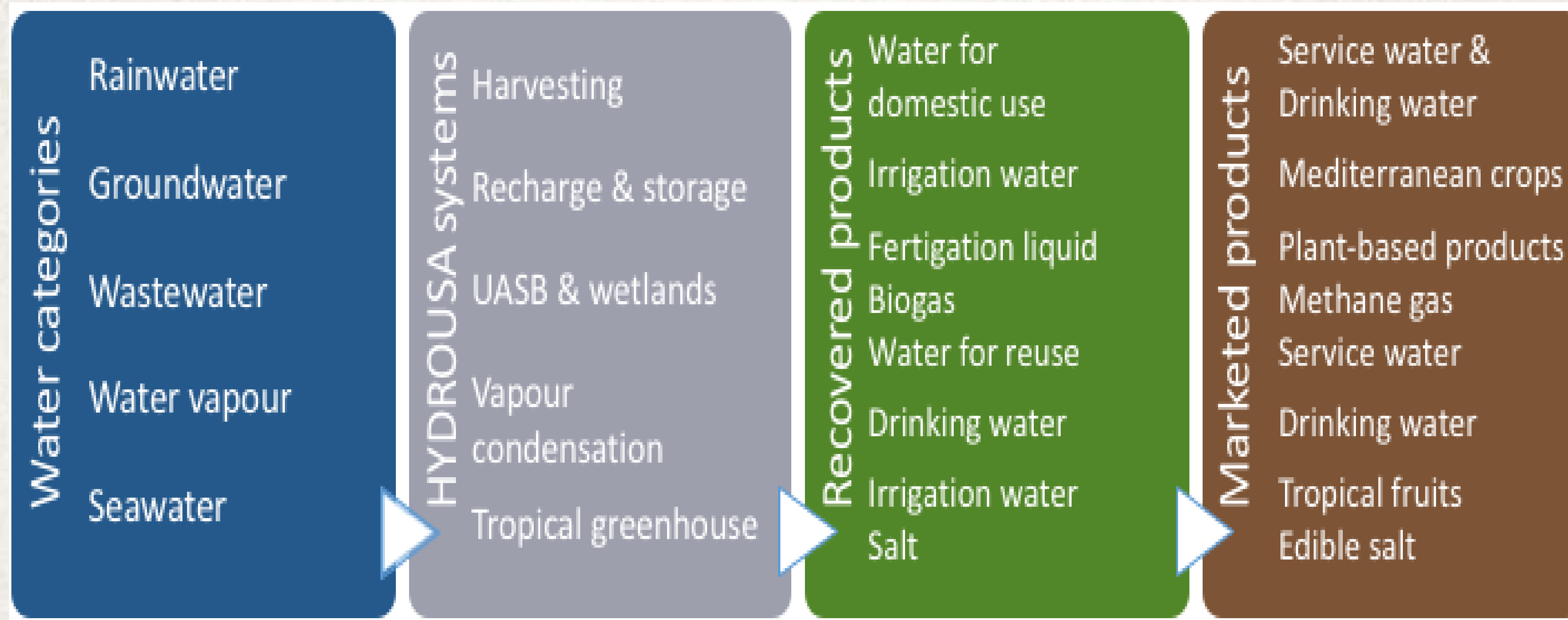




HYDROUSA Concept



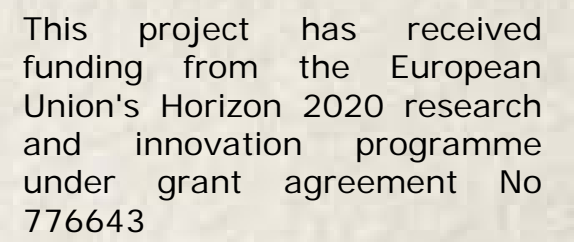
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 776643



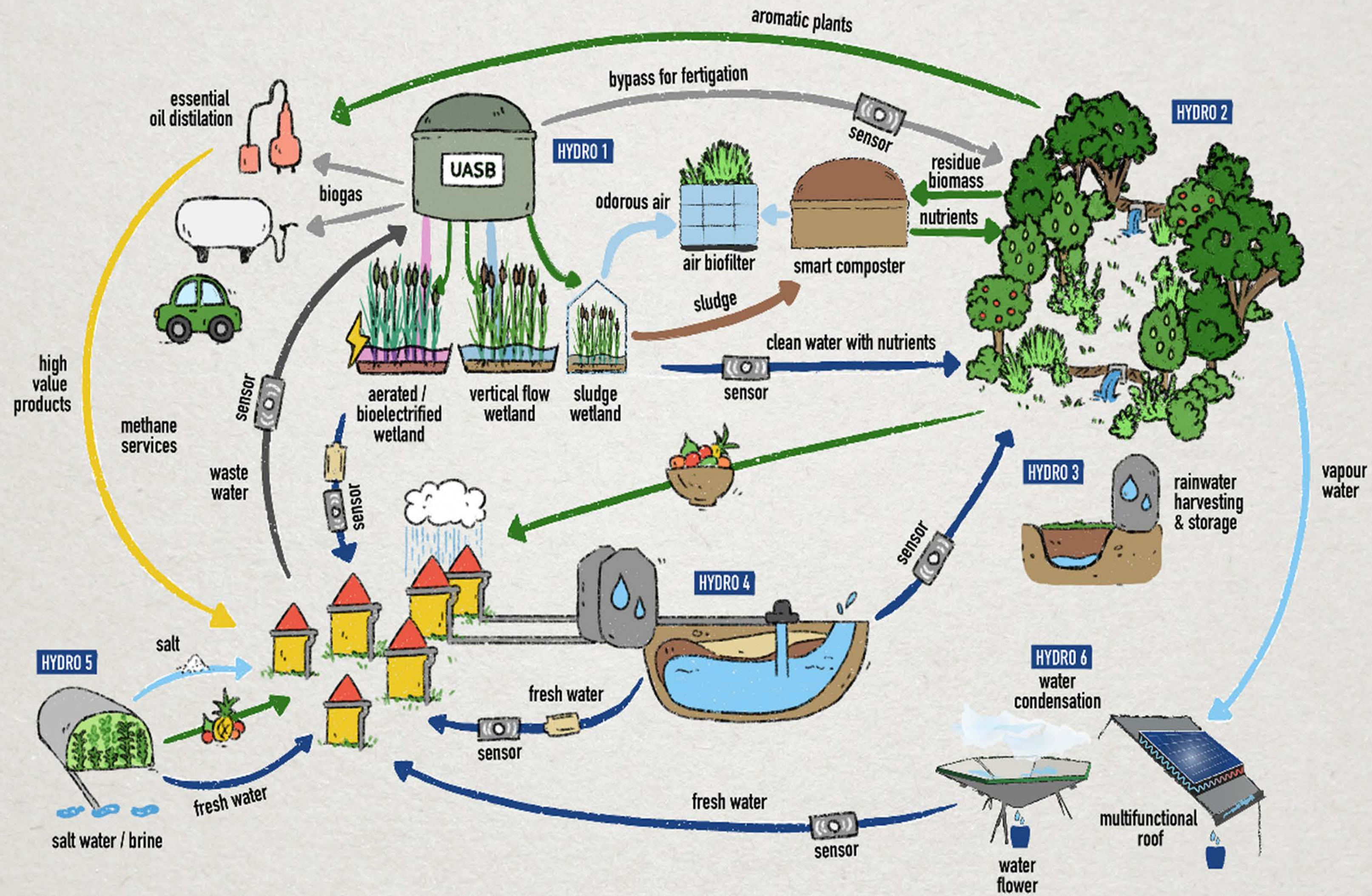
- 🌱 Demonstrate the feasibility of **innovative, nature-based solutions** to **recover** and **use** water, valuable materials and energy from different types of water
- 🌱 Demonstrate innovative supply chain within the concept of the circular economy
- 🌱 **Decrease water acquisition cost**

- 🌱 Applicability in **coastal areas** and in **islands**, particularly suitable for remote, water scarce regions
- 🌱 Integrating within the supply chain **citizen and farmer** based **activities**
- 🌱 Promote **novel agricultural practices** and **precision irrigation** within the water-food-energy nexus





A simple black and white line drawing of a stick figure. The figure is standing on two legs, with its arms slightly out. Its head is tilted back, and its eyes are looking up towards a large, cloud-shaped thought bubble. Inside the thought bubble, the word "What?" is written in a bold, sans-serif font. The background is plain white.



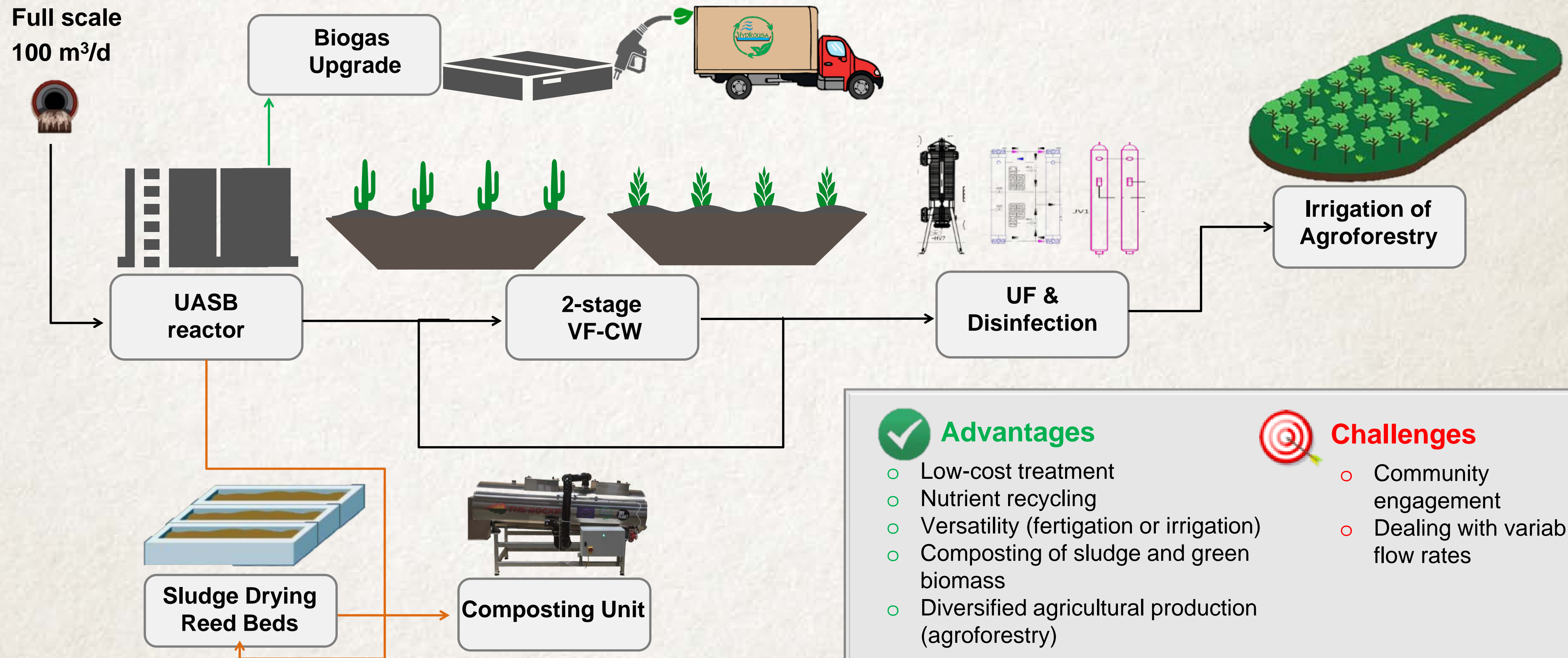


HYDRO 1, Lesbos Island

Decentralized wastewater treatment



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 776643



Advantages

- Low-cost treatment
- Nutrient recycling
- Versatility (fertigation or irrigation)
- Composting of sludge and green biomass
- Diversified agricultural production (agroforestry)



Challenges

- Community engagement
- Dealing with variable flow rates

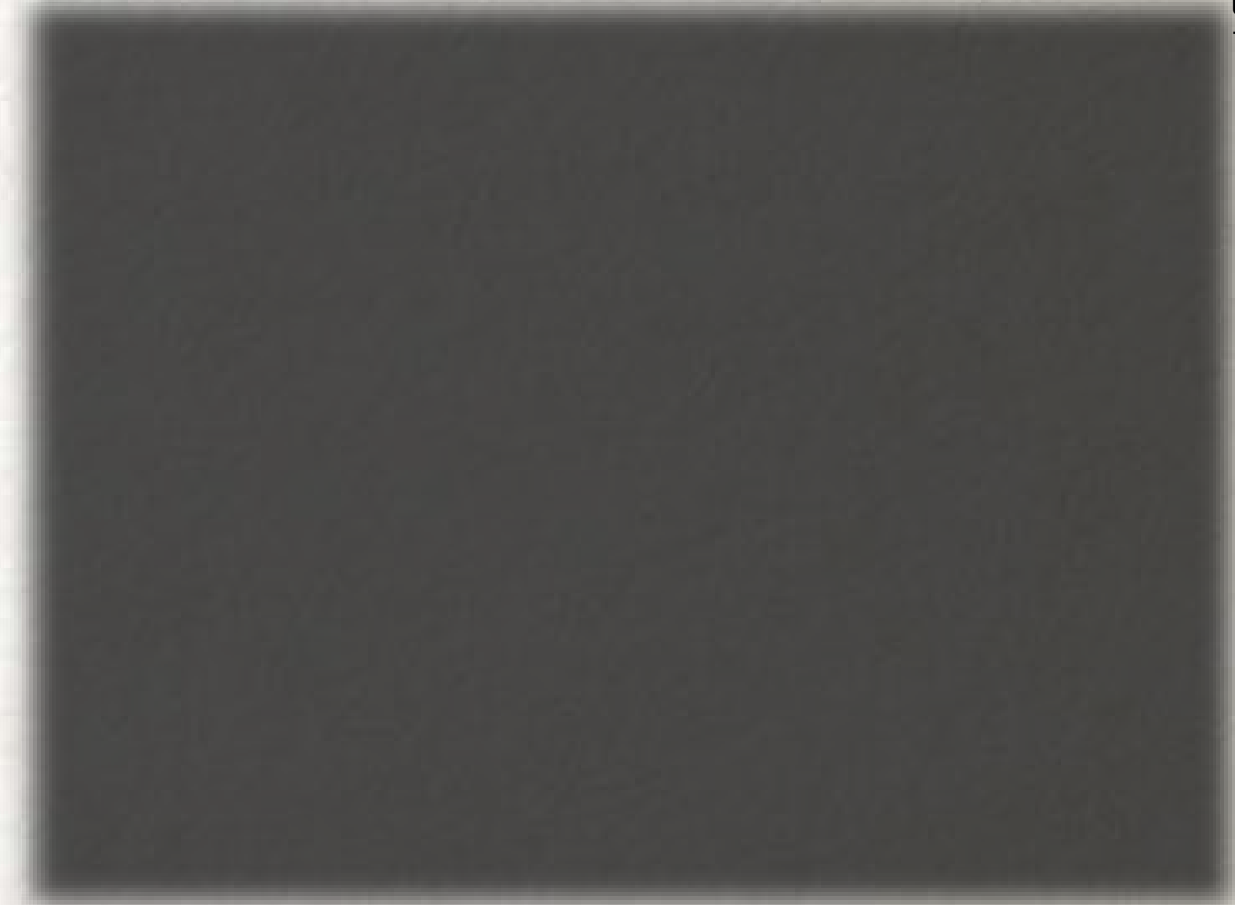
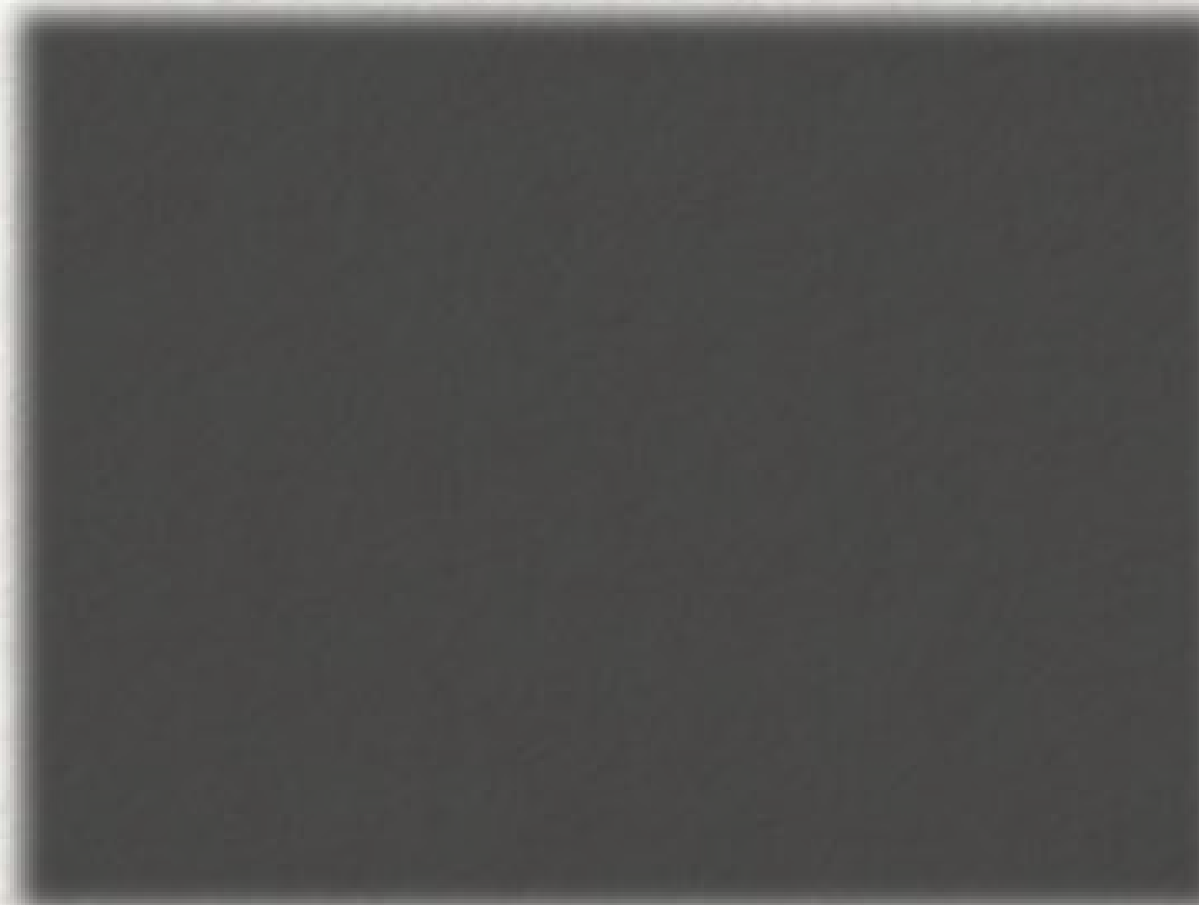




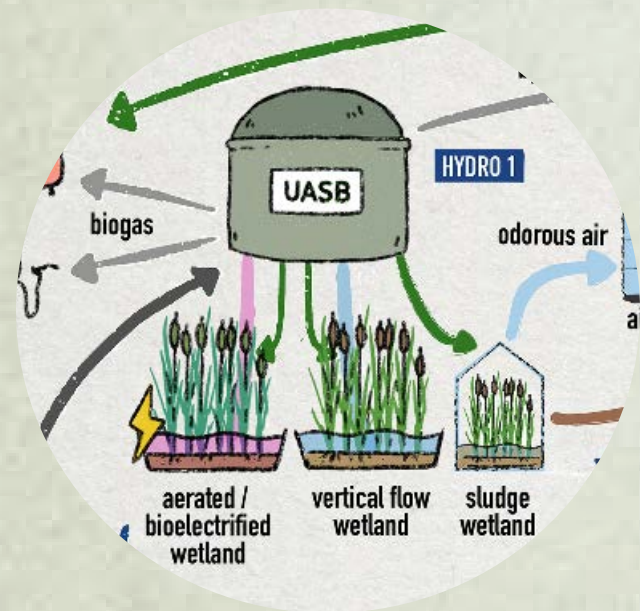
HYDRO1 – Decentralized Wastewater Management



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 776643



UASB reactors and biogas collection system



Constructed wetlands (CWs) and pilot electroactive CWs

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 776643





Scrubber



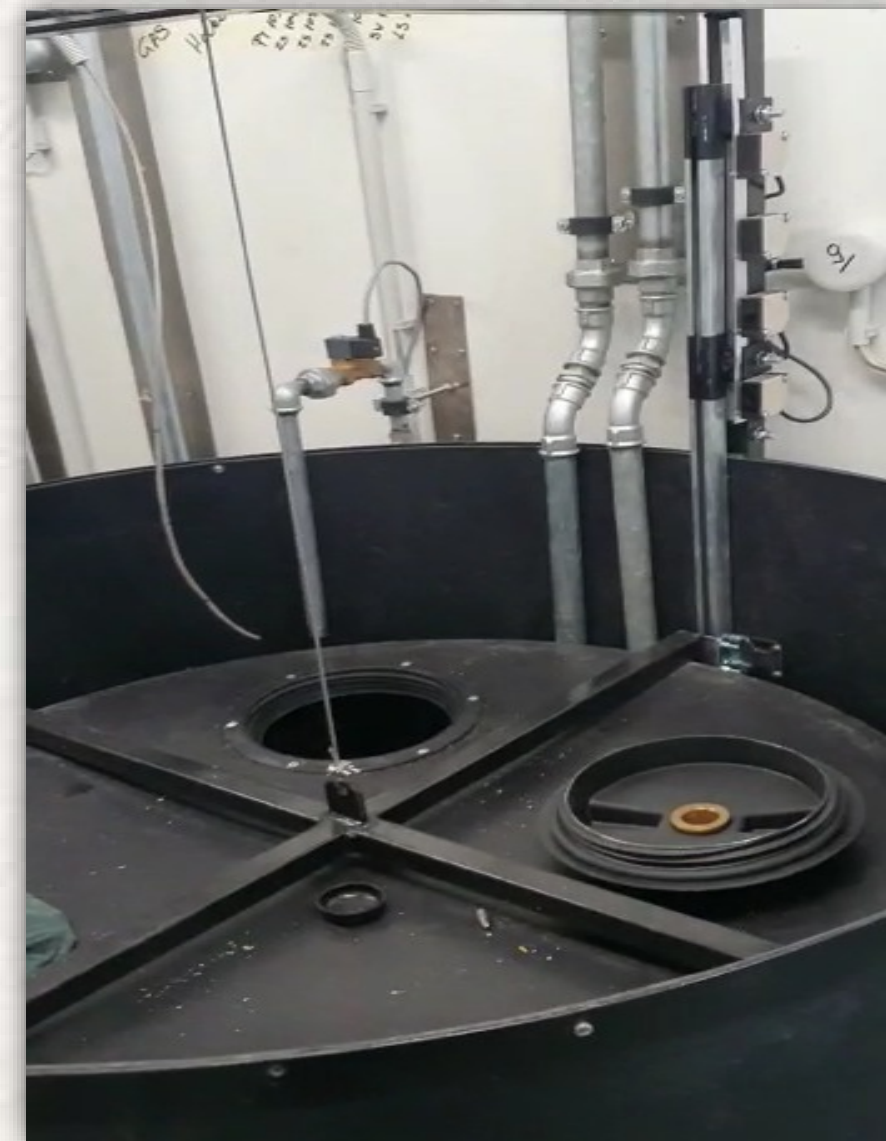
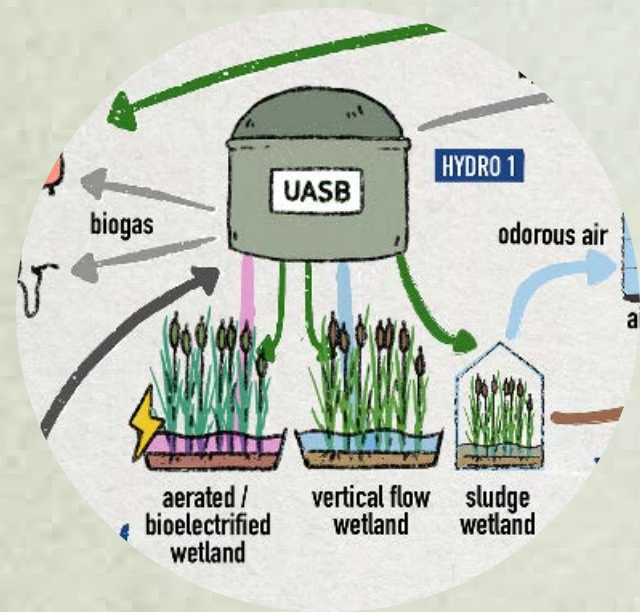
HYDRO1 – Decentralized Wastewater Management

Biogas upgrade to methane



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 776643

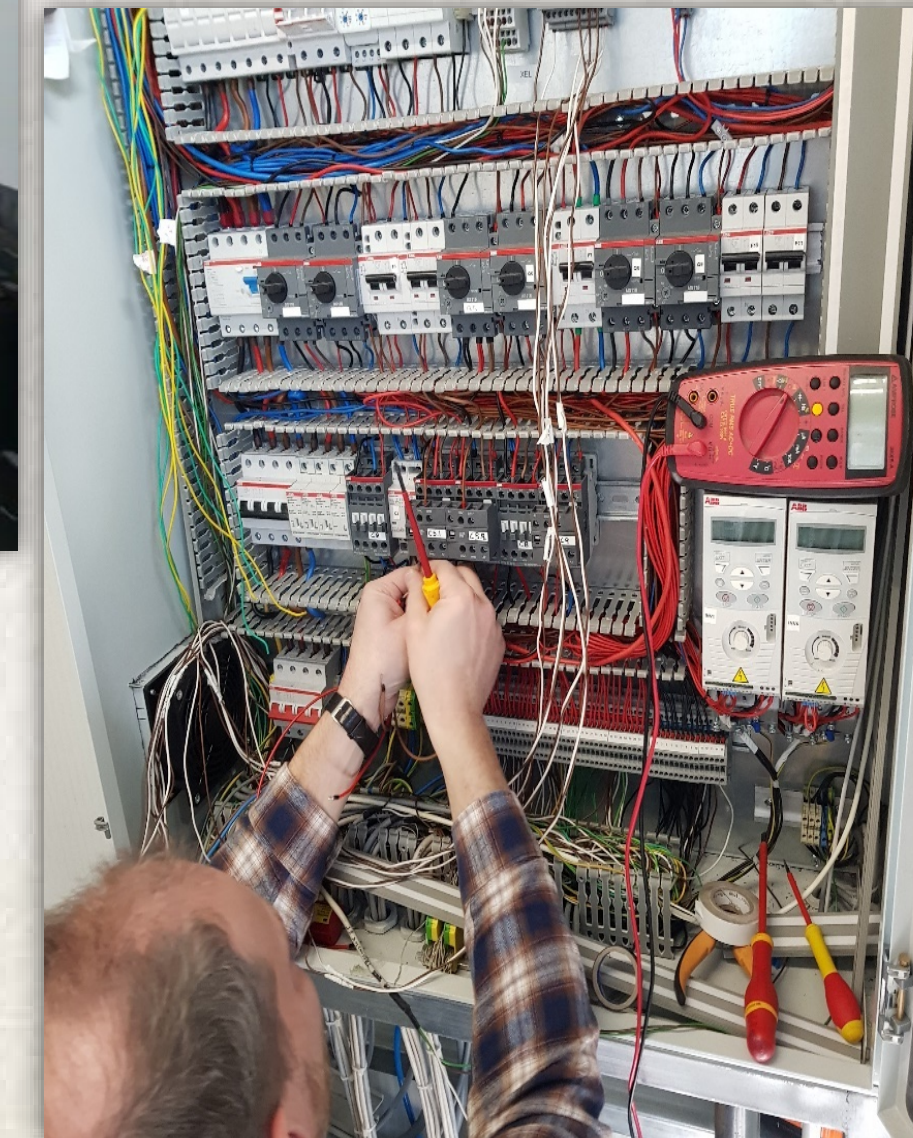
Biogas compressor & storage vessels



High pressure gasholder



Floating roof gasholder

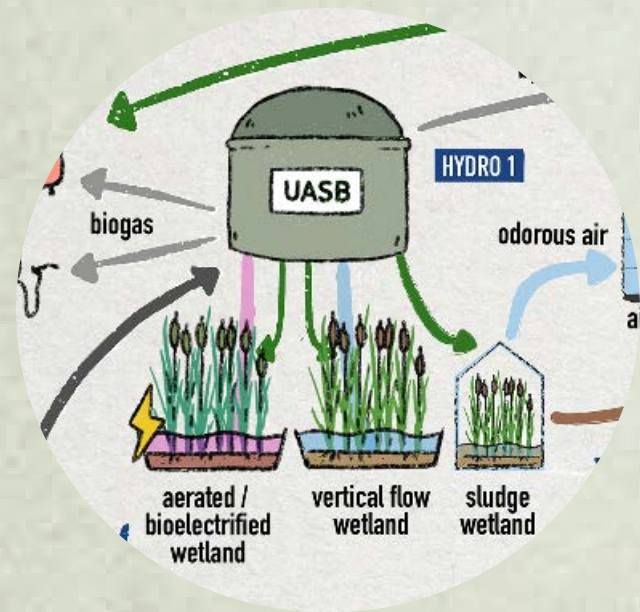




HYDRO1 – Decentralized Wastewater Management



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 776643



Post-treatment unit and irrigation tanks



Irrigation system installation and plantations



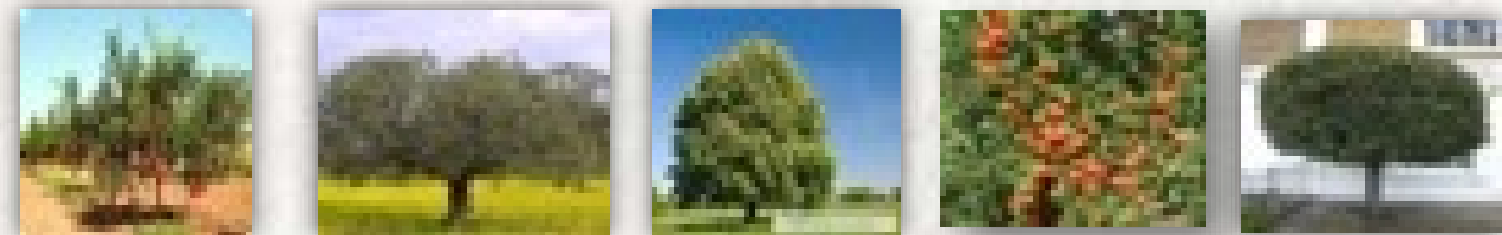


HYDRO2 - Lesbos Island Agroforestry System

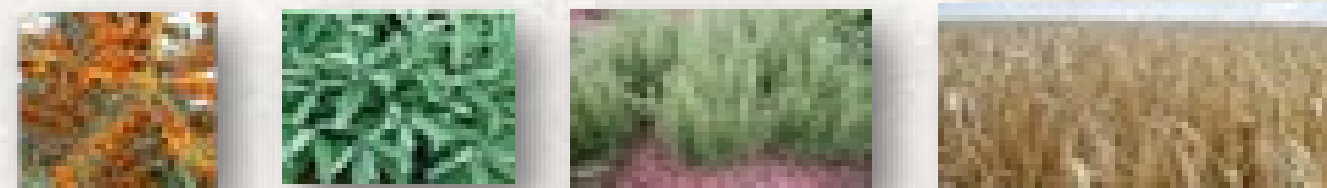


This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 776643

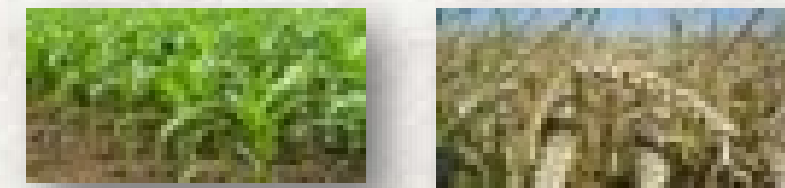
Trees



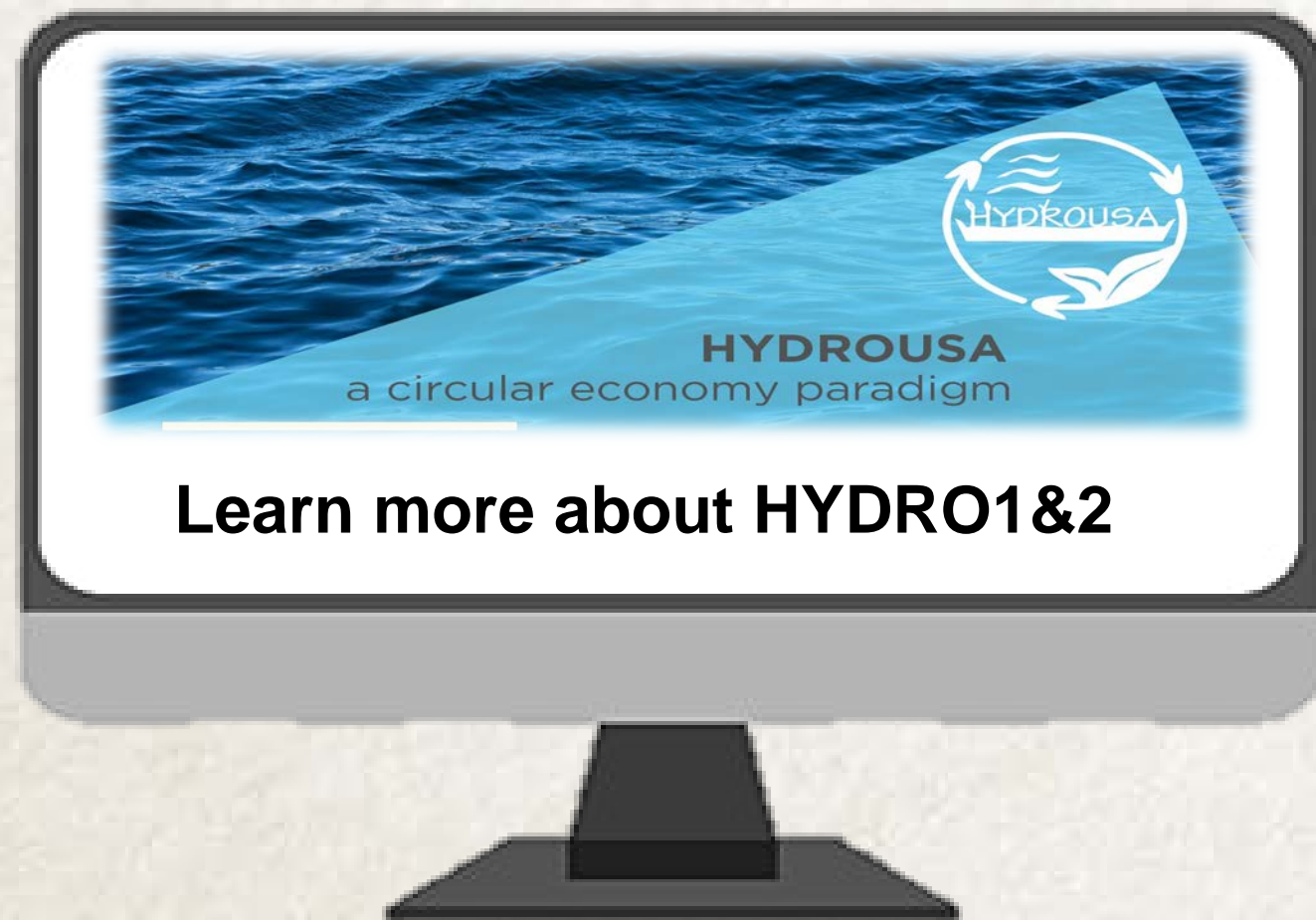
Bushes



Crops



1 ha of agroforestry system



Webinar
6 May 2021



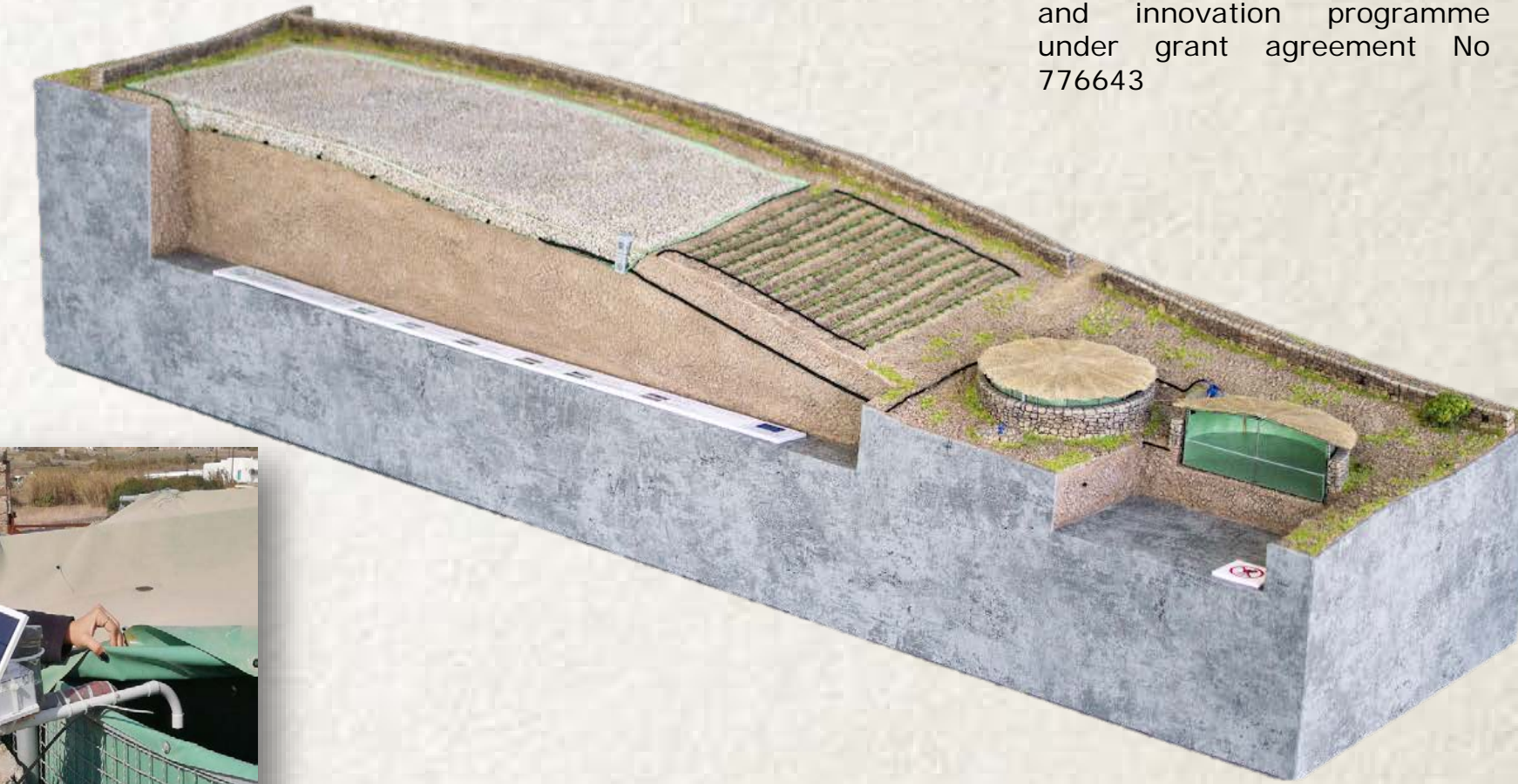


HYDRO3 – Mykonos Island

Remote rainwater harvesting system



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 776643





HYDRO4 – Mykonos Island

Residential rainwater harvesting system



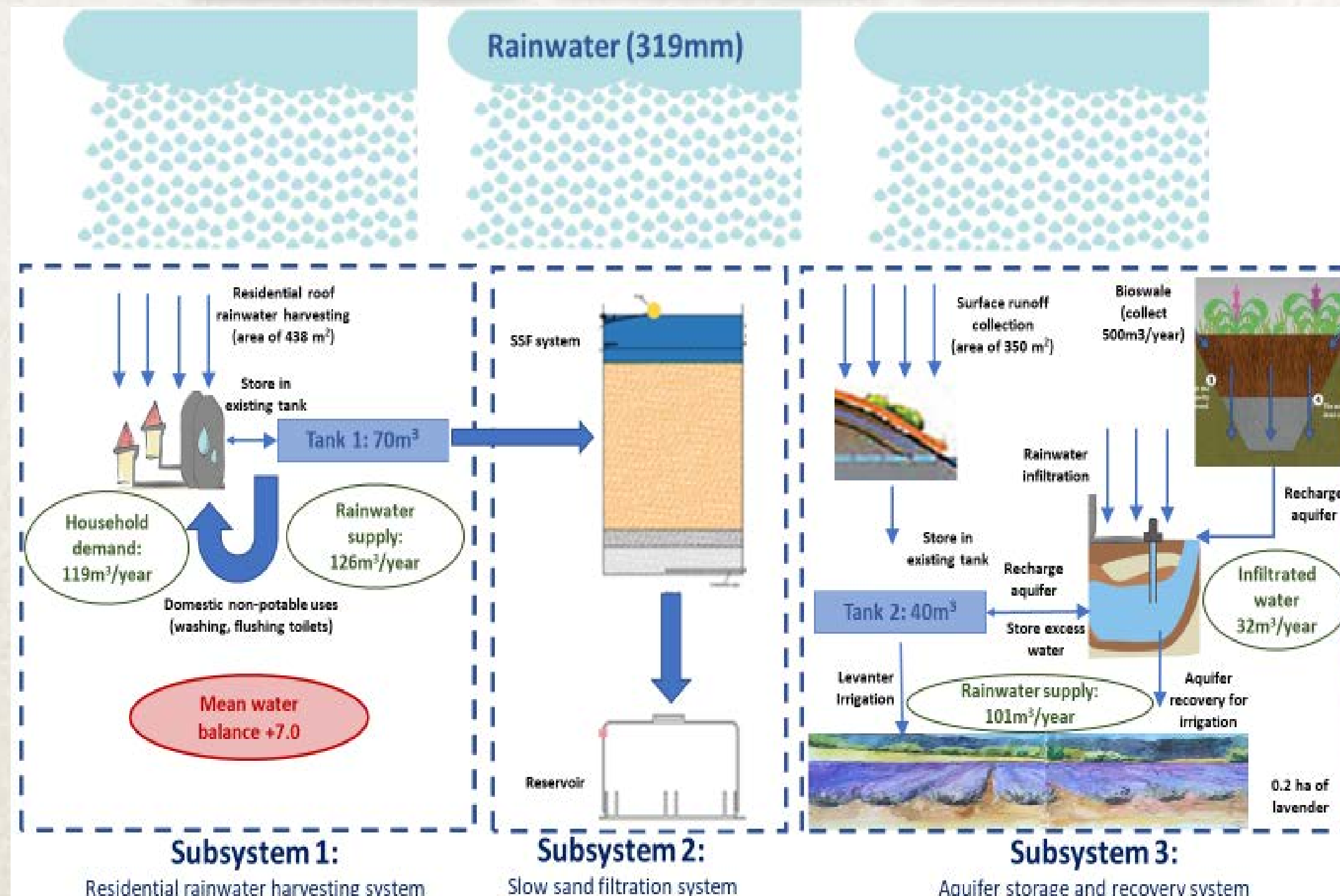
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 776643



Bioswale system



Sensor installation & sampling



**System 1:
Residential
rainwater
harvesting**

**System 2: Slow
sand filtration**

**System 3:
Bioswale and
aquifer storage**





HYDRO5 – Tinos Island Seawater Desalination



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 776643



Greenhouse



Mangrove Still System (MSS)

An integrated system capable of desalinating seawater and brine, producing distilled water and recovering salt through evaporation and condensation processes.

Mangrove still system





HYDRO6 – Tinos Island Eco-tourist facility



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 776643



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 776643





Impact & Exploitation



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 776643

HYDROUSA's Regenerative Model

Build a Water-Resilient Economy



Create Jobs



Build Green Infrastructures



Market Development

Mitigate Climate Change



Sequester Carbon



Rebuild Flourishing Ecosystems



Turn a Problem into a Solution

Reimagine the Food System



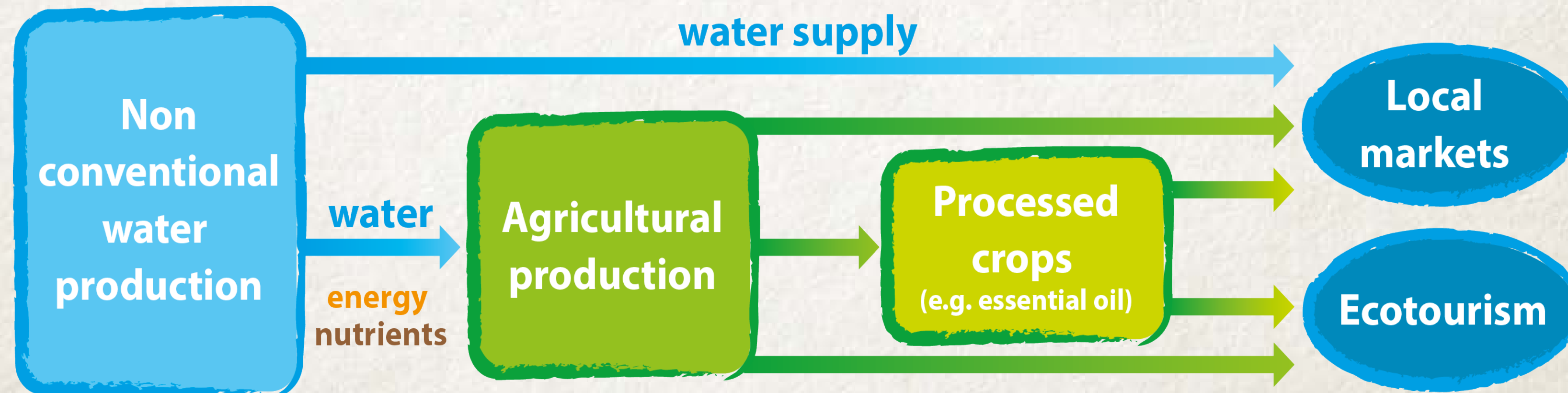
Rearrange Local Food Production



Zero km Farming



Establish Diversity as Commons

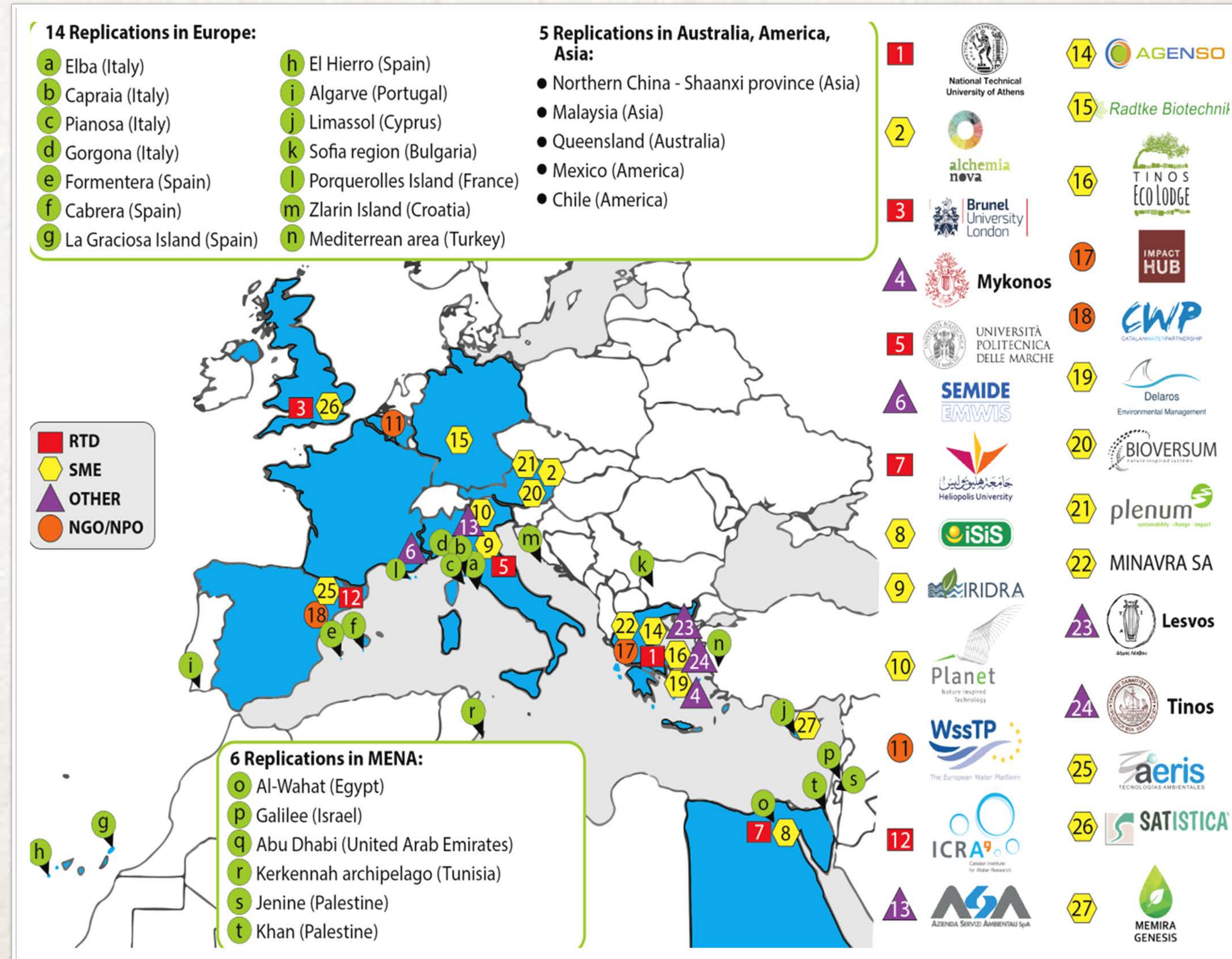




Replication & Transferability



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 776643





Build an active Community around Circular Water Solutions

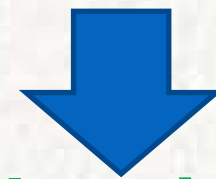


This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 776643



Co-Creation, Lesbos

Ethnobotanical study
based on locals input



>60% of the citizens suggestions on crops are applied to the agroforestry



>100 citizens participating in co-creation activities



Co-Creation Tinos

Salinity, pH and microbial contamination identified by **locals** as main water quality parameters to monitor

22 job opportunities from locals directly contributing to HYDRO development



Vegetables box

Available from the circular production of HYDRO 6 to **citizens and F&B businesses**

4 Synergies applied between HYDROUSA and local organisations for the co-production of activities on dissemination & community activities



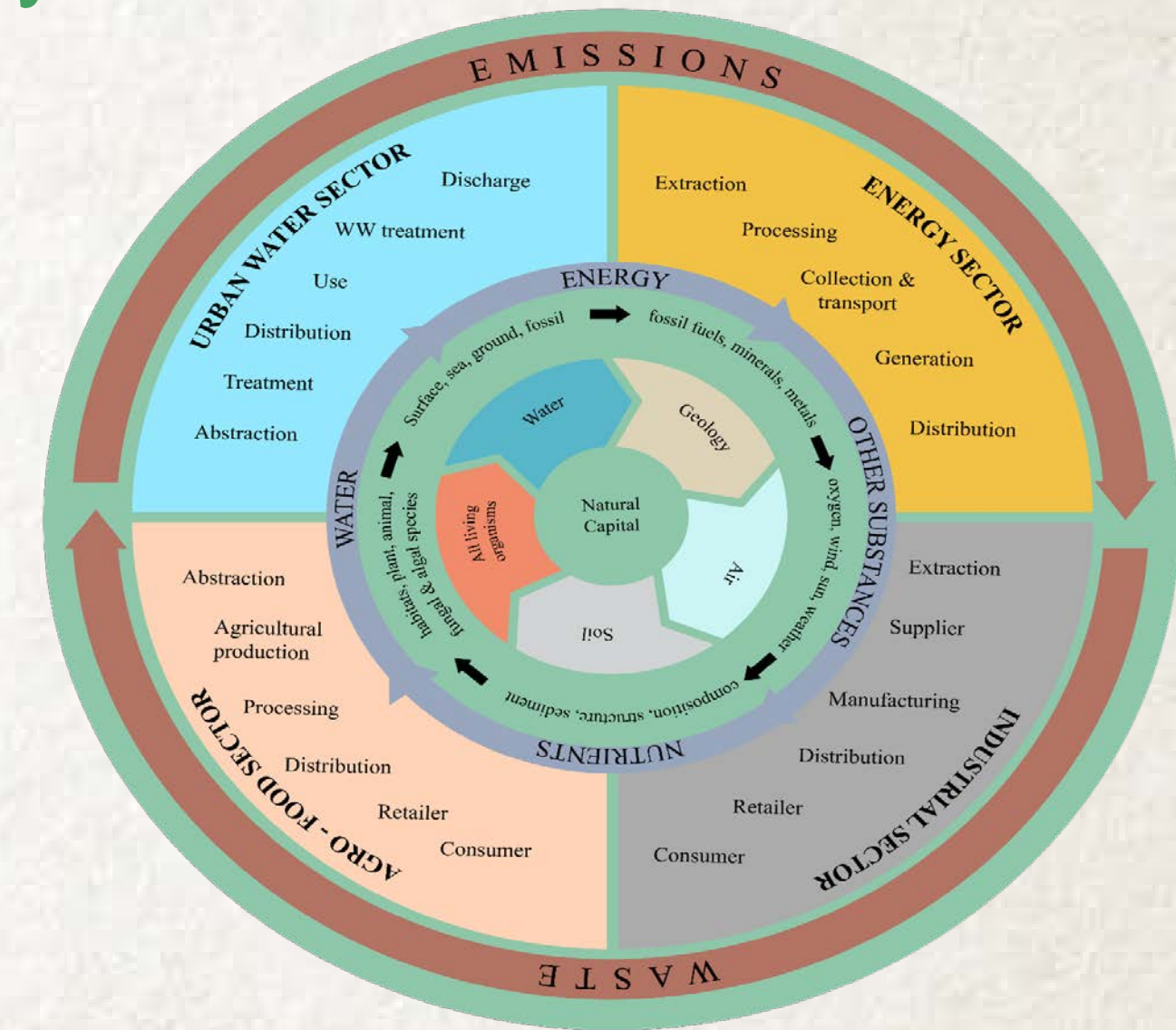
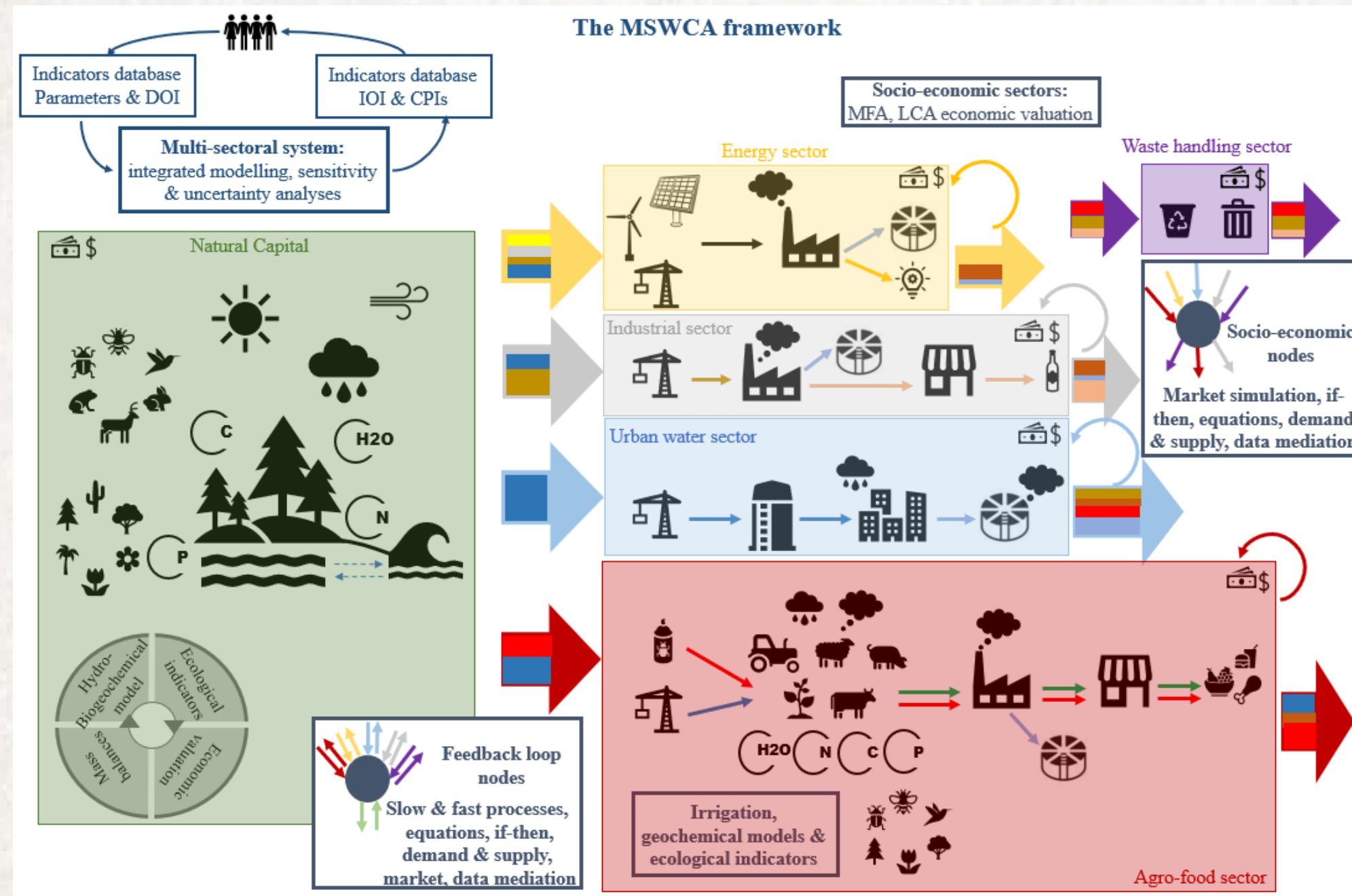


Multi-Sectoral Water Circularity Assessment (MSWCA)

Considers Water-Energy-Food and Industry Nexus



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 776643



- In particular, we would like to apply our innovative **Multi-sectoral water circularity analysis (MSWCA) framework** (image below) to assess circularity for the opportunities. Whilst this framework is intended to take a multi-sectoral systems approach, the data based and information based indicators we have developed will be relevant in agreeing a wider approach to 'benefits' in evaluation of resource recovery across the water cycle and applying this will offer the project an innovative approach not undertaken to date (HYDROUSA).

5

Framework included already in the application proposals of large companies for tenders in the UK Water industry



Jacobs

Where is the greatest sustainable economic benefit for resource recovery in the water cycle?

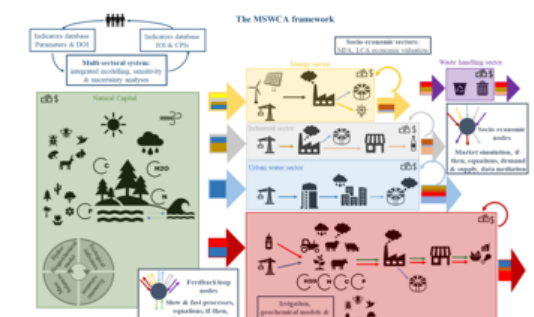
SL/12/5/202

23 September 2020

SL/12/5/202 Where is the greatest sustainable economic benefit for resource recovery in the water cycle?

Jacobs

- This framework for circularity assessment considers natural, financial and manufactured capitals, as well as some aspects of the human capital (e.g. local economy). To date it has not included the remaining 3 capitals in the framework given challenges around their emerging nature, definition and approaches but we would approach to develop an approach collaboratively drawing on our experience assessing the capitals and in social valuation.



- We would like to contrast this approach, recognising its innovative application would be a first of its kind, with a more traditional multi-criteria analysis, as undertaken to date in the UKWIR project – but with broader benefits assessment defined. This MCA analysis would use **MODA** – our VBA-driven Excel based tool we have developed – and applied extensively in the water industry for economic, environmental and social project or programme options assessment. This will offer a more evolved output than existing work to date (from CREW and UKWIR).

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 776643



HYDROUSA Social Media



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 776643

- ▶ **> 300** Dissemination activities of HYDROUSA

- ▶ **615 k** reach from reported activities so far



- ▶ **128** offline and online features in media outlets, journals, magazines, news portals & references to the project



- ▶ **20 k** visits to www.hydrousa.org

- ▶ **4,250** followers on social media @HydrousaProject



- ▶ **4,500** animation video views on YouTube  and on HYDROUSA channel videos in total.





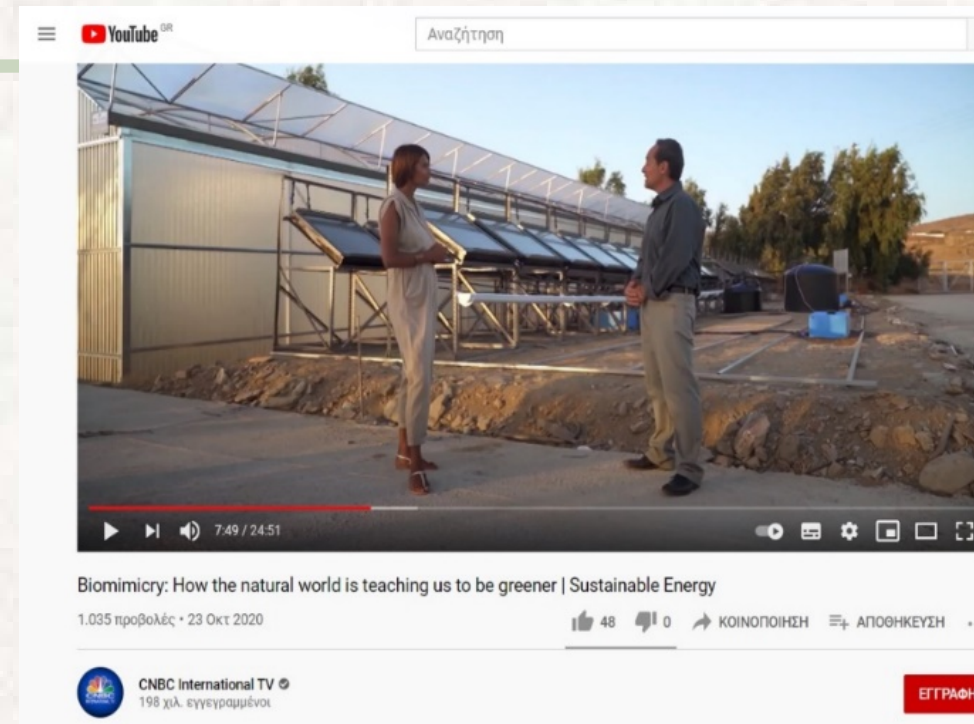
Dissemination Highlights



This project has received funding from the European Union's Horizon 2020 research



News Broadcast ANT1



CNBC documentary on biomimicry solutions



National Greek TV ERT1



Amsterdam International Water Week



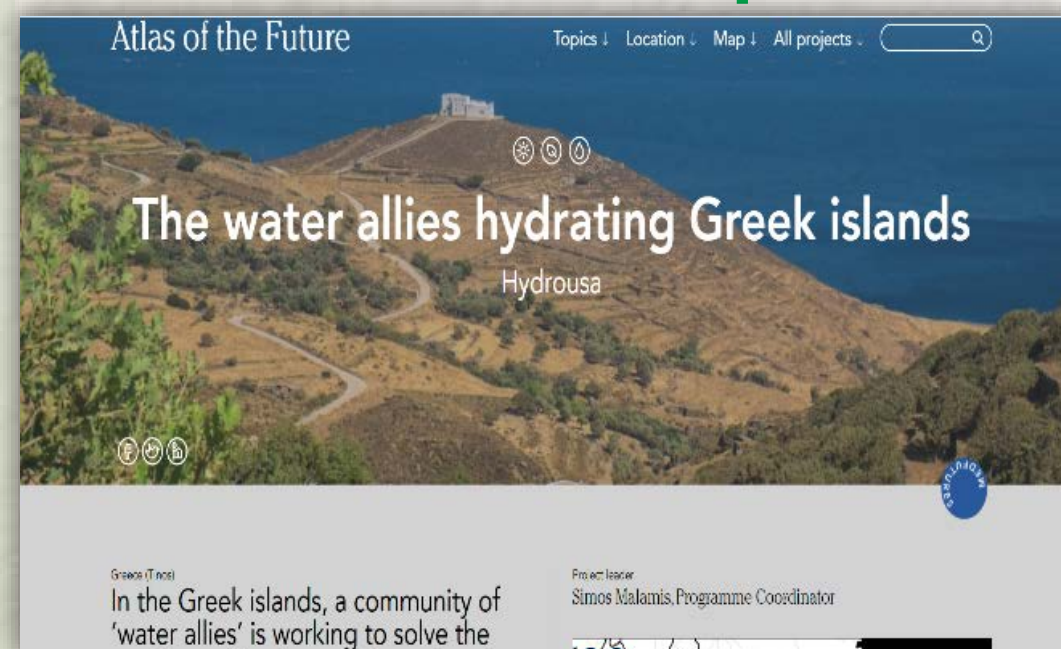
SUWANU Workshop



Open Access Government



European Chemistry



Atlas of the Future

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 776643

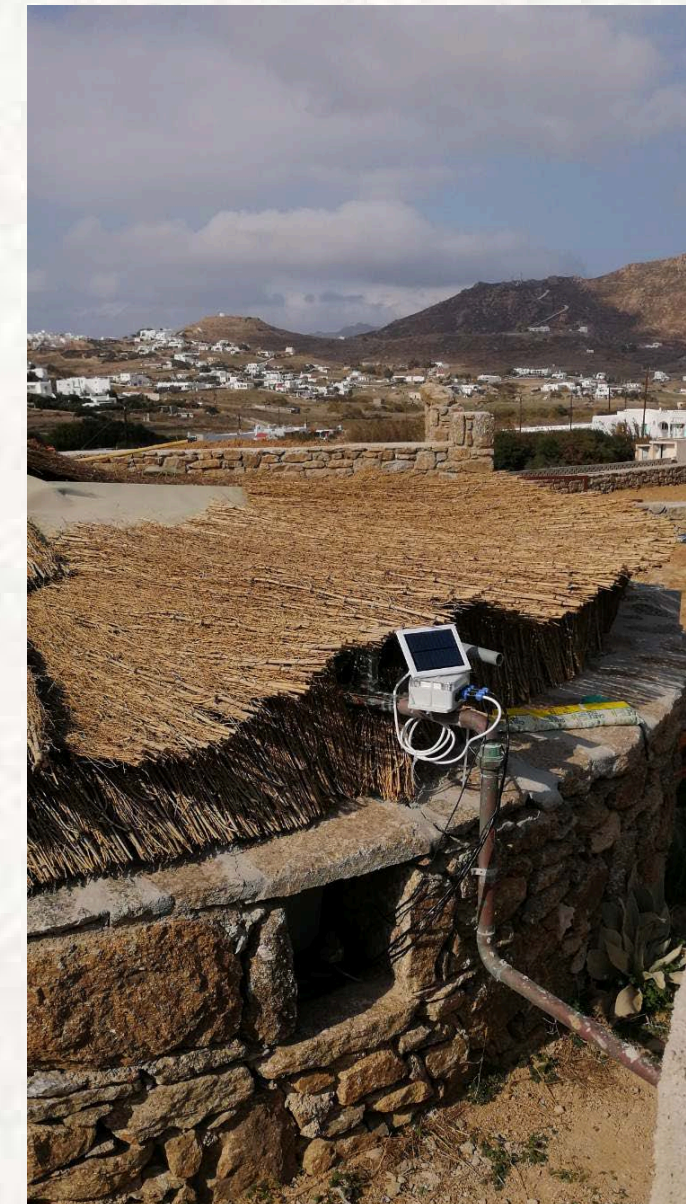




HYDROUSA Products and Solutions on the Market and in New Projects



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 776643



AccelWater, Accelerating Water Circularity in Food and Beverage Industrial Areas around Europe, EC H2020 EC



CIRC4Food, A circular economy inspired food production system, GSRT Greek National Funds



FIT4REUSE

FIT4REUSE, Safe and sustainable solutions for the integrated use of non-conventional water resources in the Mediterranean agricultural sector, EC PRIMA





Key Issues with HYDROUSA tackles




This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 776643

 Water scarcity by valorizing non-conventional water sources

 Protection against floods through bioswales

 Addressing Desertification by restoring barren land

 Promoting biodiversity through multi-cropping practices (agroforestry, permaculture) and the implementation of nature-based solutions

 Social perception for water scarcity issues





REGENERATIVE & NATURE - BASED WATER SOLUTIONS

www.hydrousa.org
[@HydrousaProject](https://twitter.com/HydrousaProject)



Follow us online!

