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Distretto delle Alpi Orientali

FREEWAT
Free and Open Source Software Tools for Water Resource Management
EU HORIZON 2020 Project

European Commission

Promoting the application of ICT tools by means of an innovative participatory approach for water resource management

Giovanna De Filippis

EIP Water Online Market Place
Matchmaking for water Innovation
MAR Solutions - Managed Aquifer Recharge Strategies and Actions (AG128)

ict4water.eu

WIRE
Water & Irrigated agriculture Resilient Europe
EIP Water Action Group
Pooling resources – Innovating water

Water resource management and planning

Although a lot of science is produced on Water Resource Management (WRM), especially in the ICT sector, **WRM is still today poorly addressed via scientific means**

REASONS

- underrated importance is given at political and decision-maker level
- low-capacity of the research environment to transfer the results to the real world
- missing capacities in using advanced digital tools at agencies and governing authorities

Why stakeholders participation?

- ICT are complex tools, as high level of knowledge and computing skills are often required
- Often treated as “tricky games”
- Barriers to:
  - the uptake of existing and state-of—the-art technologies for water management
  - full data exploitation which at present often end up in…

    … data on paper or excel spreadsheet …

    … so diminishing data values
- They have to be understood also by a non-technical audience
- Open ICT can then be a tool for shared WRM

The H2020 FREEWAT project

FREEWAT (FREE and open source software tools for WATer resource management) is an ICT project for improving Water Resource Management (WRM)

MAIN RESULT

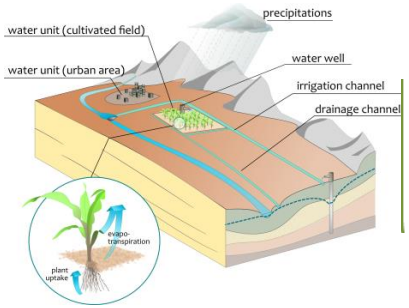
Open source and **public domain**, **GIS-integrated modelling platform** for promoting WRM by simplifying and strengthening the application of WFD, GWD and other water related Directives

FREEWAT main impact →

help producing scientifically and technically sounding decision and policy making based on :

- data and innovative data analysis tools and
- including participatory approach

What's FREEWAT



USGS science for a changing world

MODFLOW and Related Programs (MT3DMS, SEWAT, UCODE, etc.)

SPACE AND TIME DISTRIBUTED DATA

Surface and Groundwater Flow Simulation

Water quality issues

simulation and analysis tools

Rural water management module

Calibration

Sensitivity Analysis

Parameter estimation

UPSCALING from cell results

WATER MANAGEMENT AND PLANNING MODULE

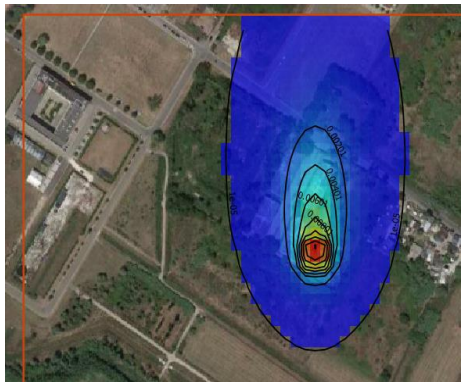
python

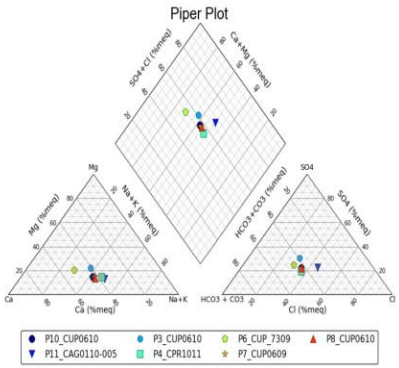
FloPy3

Observation Analysis Tool

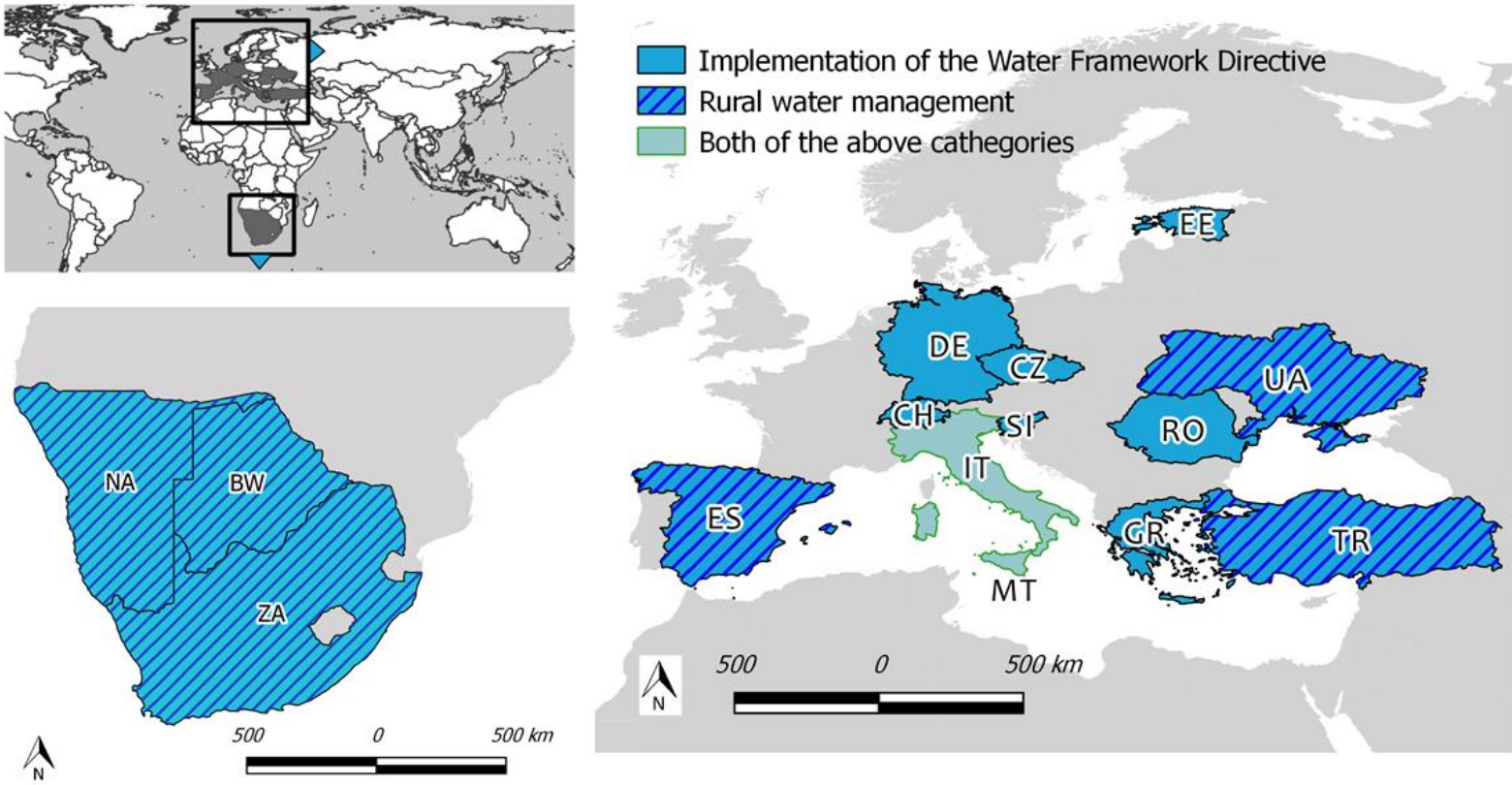
GIS AND SPATIAL DATABASE

FREEWAT v.1.0.2
Free download at
www.freewat.eu



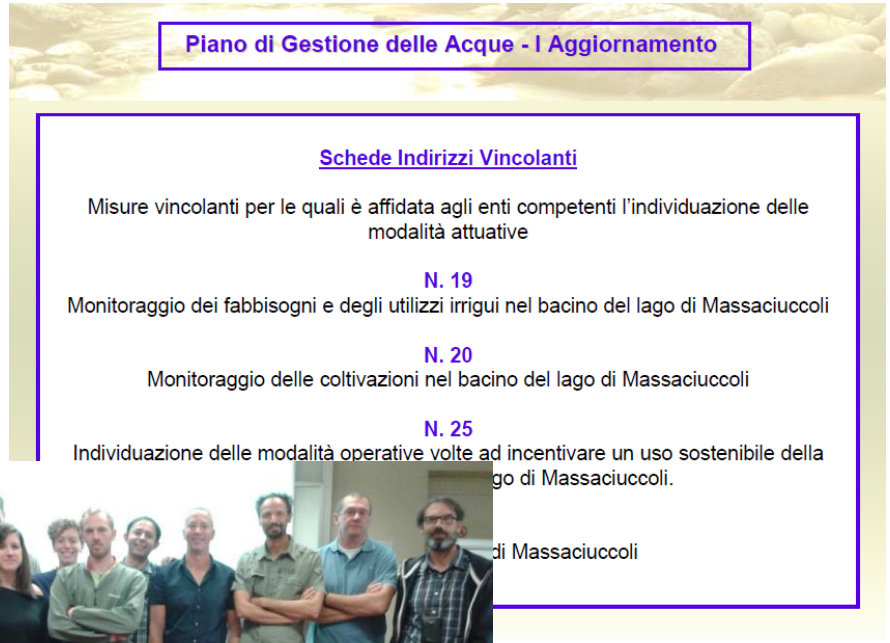


FREEWAT case studies within a participatory approach/1



Running Focus Groups on ICT in water management

Type of stakeholder	*Name of stakeholder*
Local /governemnt	Regione Toscana
River Basin authority	Autorità di Bacino del Fiume Serchio
River Basin authority	Autorità di Bacino del Fiume Arno
Environmental Protection Agency	Agenzia Regionale di Protezione Ambientale Toscana
Land managers	Consorzio di Bonifica Toscana Nord
Municipality	Comune di Vecchiano
Water utility	ASA spa
Water utility	GAIA spa
	Ingegnerie Toscane
	Servizio idrologico Regionale
Natural area/protected area	Parco Naturale Regionale Migliarino San Rossore Massaciuccoli
Farmer association	Confagricoltura
Farmer association	CIA
Farmer association	Coldiretti
Industrial association/Commerce Chamber	Camera di Commercio di Pisa, Camera di Commercio di Lucca
Environmental protection association	WWF
Environmental protection association	LIPU
Environmental protection association	Legambiente
Research	University of Pisa



FREEWAT case studies within a participatory approach/2

identifying the case study objectives

targeting water management issues

FG1 FG2 FG3 FG4 FG5 FG6 FG7

Project introduction

conceptual model and data collection

from conceptual model to numerical model

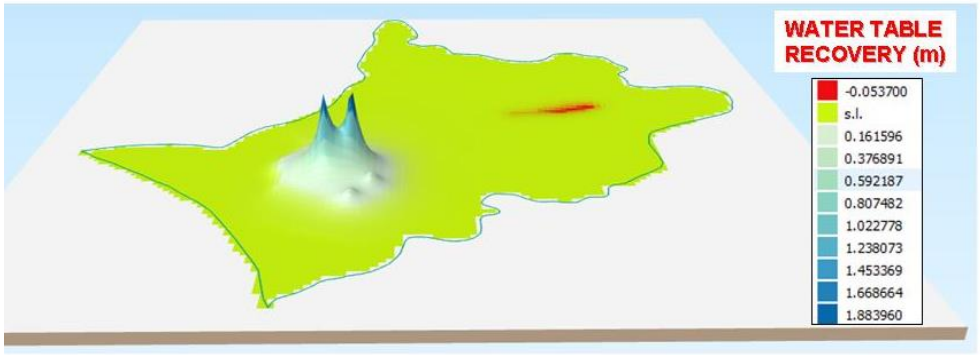
discussion on scenarios to be simulated

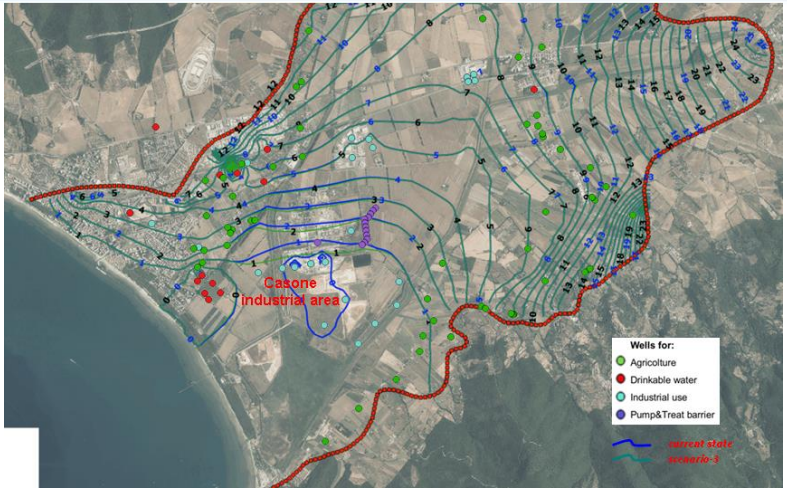
implementation and results of scenarios

implementation and results of scenarios

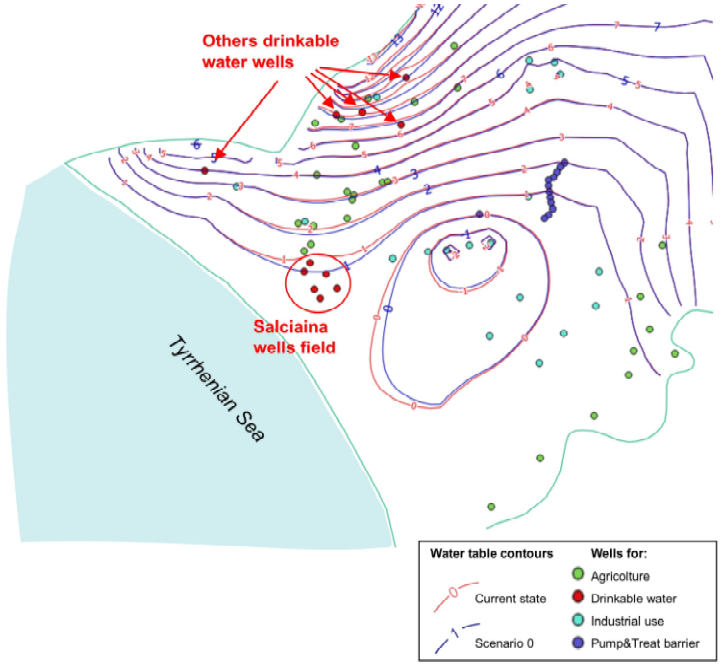
results and conclusions

Over-exploitation of the Follonica-Scarlino aquifer (Italy)





Top – Water table recovery for the second scenario;
Bottom - Comparison: current scenario vs re-use of Gavorrano mine drainage water



Comparison: current scenario vs construction of a desalination plant

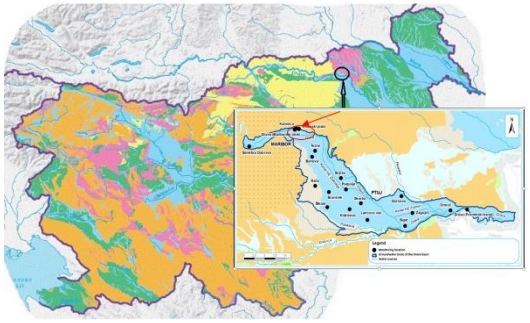
The role of local stakeholders

Origin	helpful	harmful
internal	**Strenghts** - …	**Weaknesses** - …
external	**Opportunities** - …	**Threats** - …

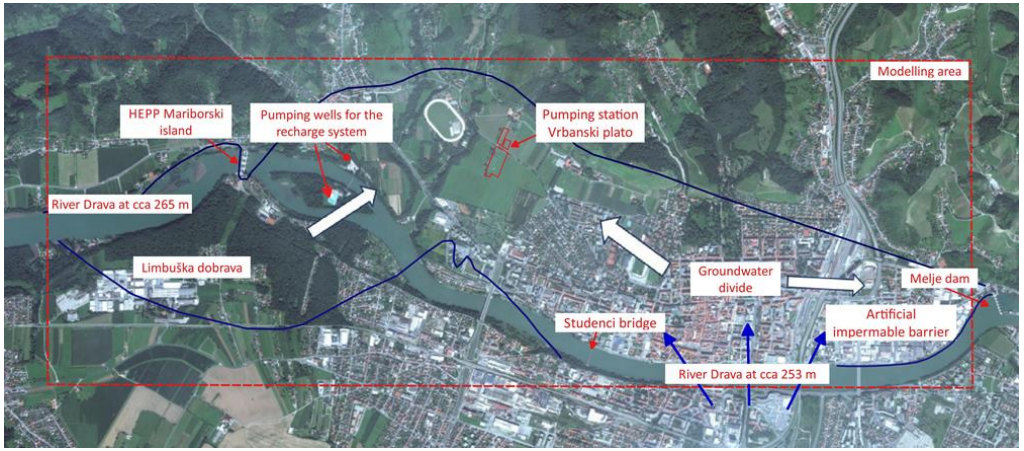
Impact

- The 2nd scenario is a starting point to increase opportunities for productive activities in a very responsible manner for the society and the environment
- FREEWAT is a useful tool to improve the knowledge of a study area or a problem and to organize and share data
- The participatory approach was useful to grow up the awareness of water resource management and planning

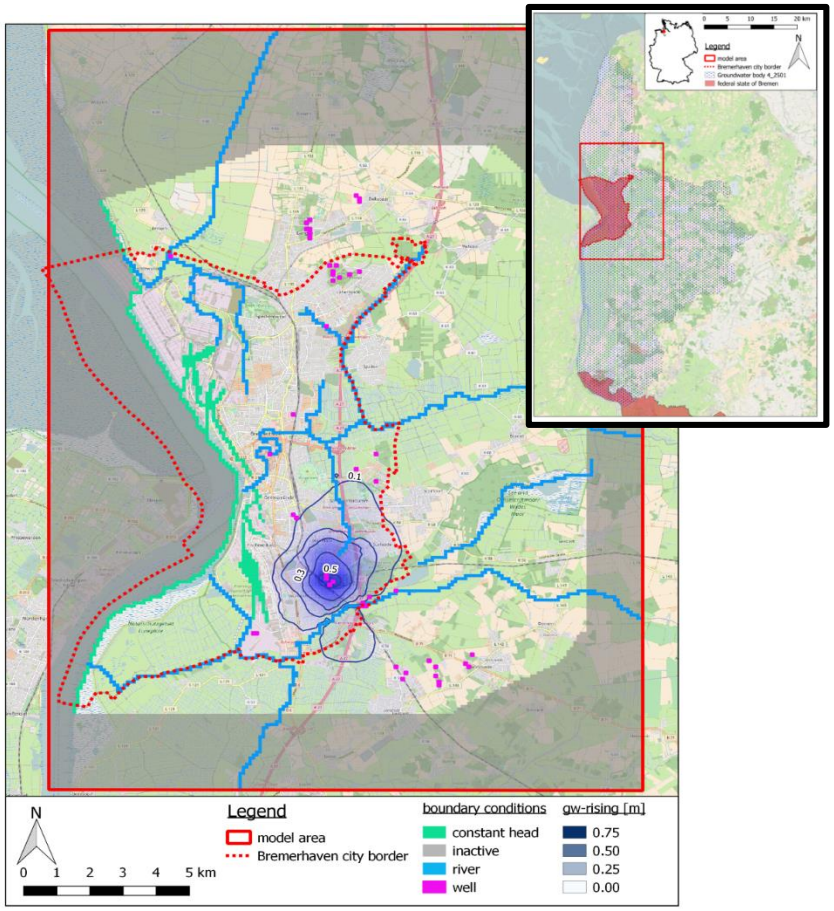
Management of a MAR plant at Vrbansky plato (Slovenia) and impacts of climate change at Bremerhaven (Germany)



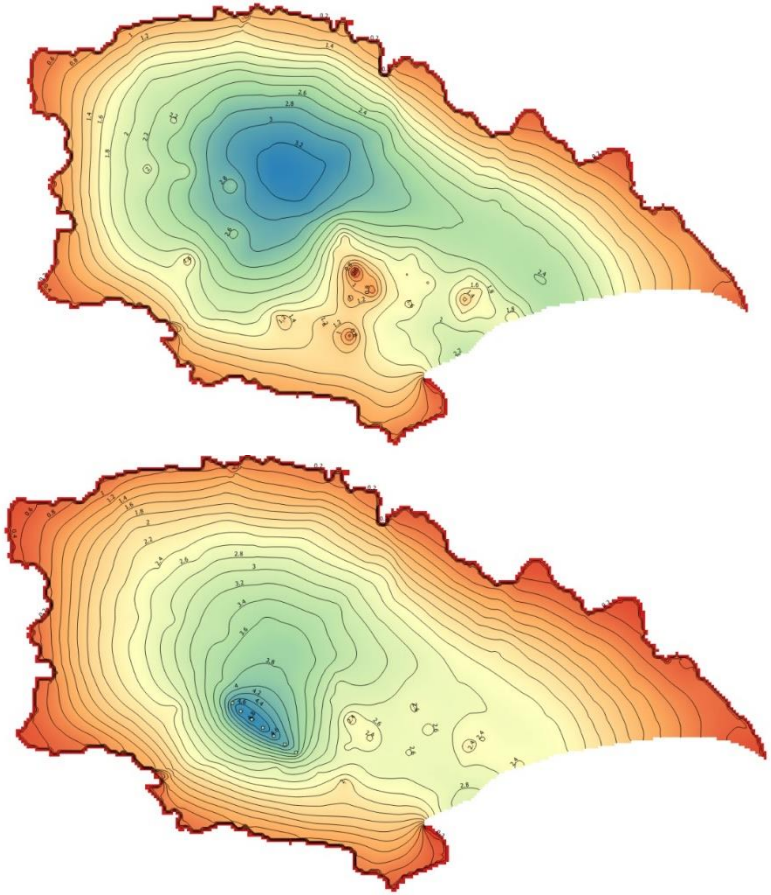
Induced Riverbank Filtration plant at Vrbansky plato

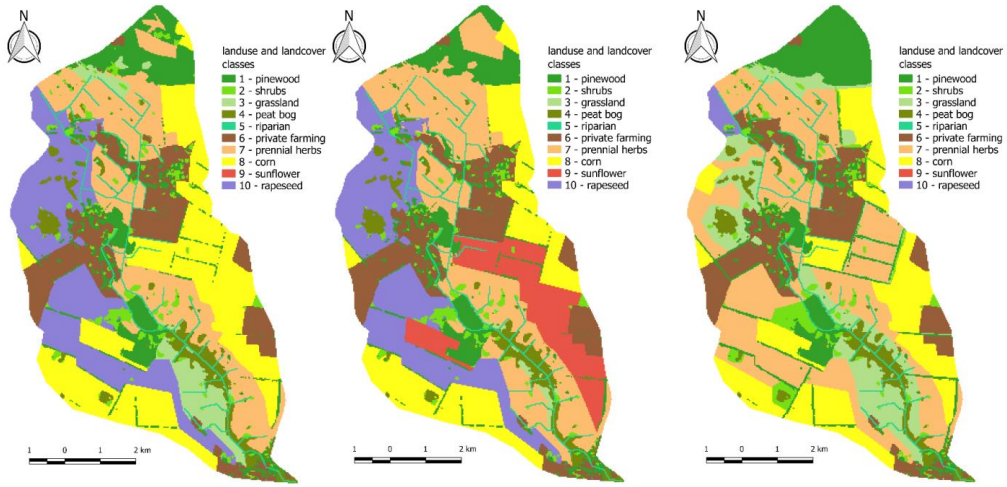


Water level increase after shifting the waterworks of "Bremerhaven Wulsdorf"



Management of the mean sea level aquifer of the Gozo island (Malta) and optimizing water use at the Bakumivka river basin (Ukraine)





Landcover configurations for three scenarios simulated within the Bakumivka area

Top - Simulated hydraulic head at the Gozo island under current conditions
Bottom - Simulated hydraulic head at the Gozo island after setting in place a MAR plant

Conclusions/1

- Combining technical work and stakeholder involvement in River Basin Management Plan is fundamental for successful WRM

- OPEN and FREE ICT tools may offer relevant opportunities in running these combined activities for this purpose

- Public authorities have the chance to build high informative and dynamically growing SHARED representation of hydrologic systems where performing planning analysis

Conclusions/2

- Demonstration of FREEWAT capabilities to a range of water-related problems to address requirements of EU Directives and National regulations for water resource management
- Positive and successful methodology based on the participatory approach
- Increased understanding in water management issues, creating a common space to generate a shared knowledge on the value of water

Thank you for your attention

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Matchmaking for water Innovation
MAR Solutions - Managed Aquifer Recharge Strategies and Actions (AG128)

WIRE
Water & Irrigated agriculture Resilient Europe
EIP Water Action Group
Pooling resources – Innovating water

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