



FREEWAT

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



SMAqua

Smart ICT tools per l'utilizzo efficiente dell'Acqua



La piattaforma EU H2020 FREEWAT per la gestione della risorsa idrica: esempi di applicazione

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EIP Water Online Market Place
Matchmaking for water Innovation

MAR Solutions - Managed Aquifer Recharge Strategies and Actions (AG128)





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

Do you believe in models?

- 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 often end up in...
 - ... excel spreadsheet ... so diminishing data values



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)

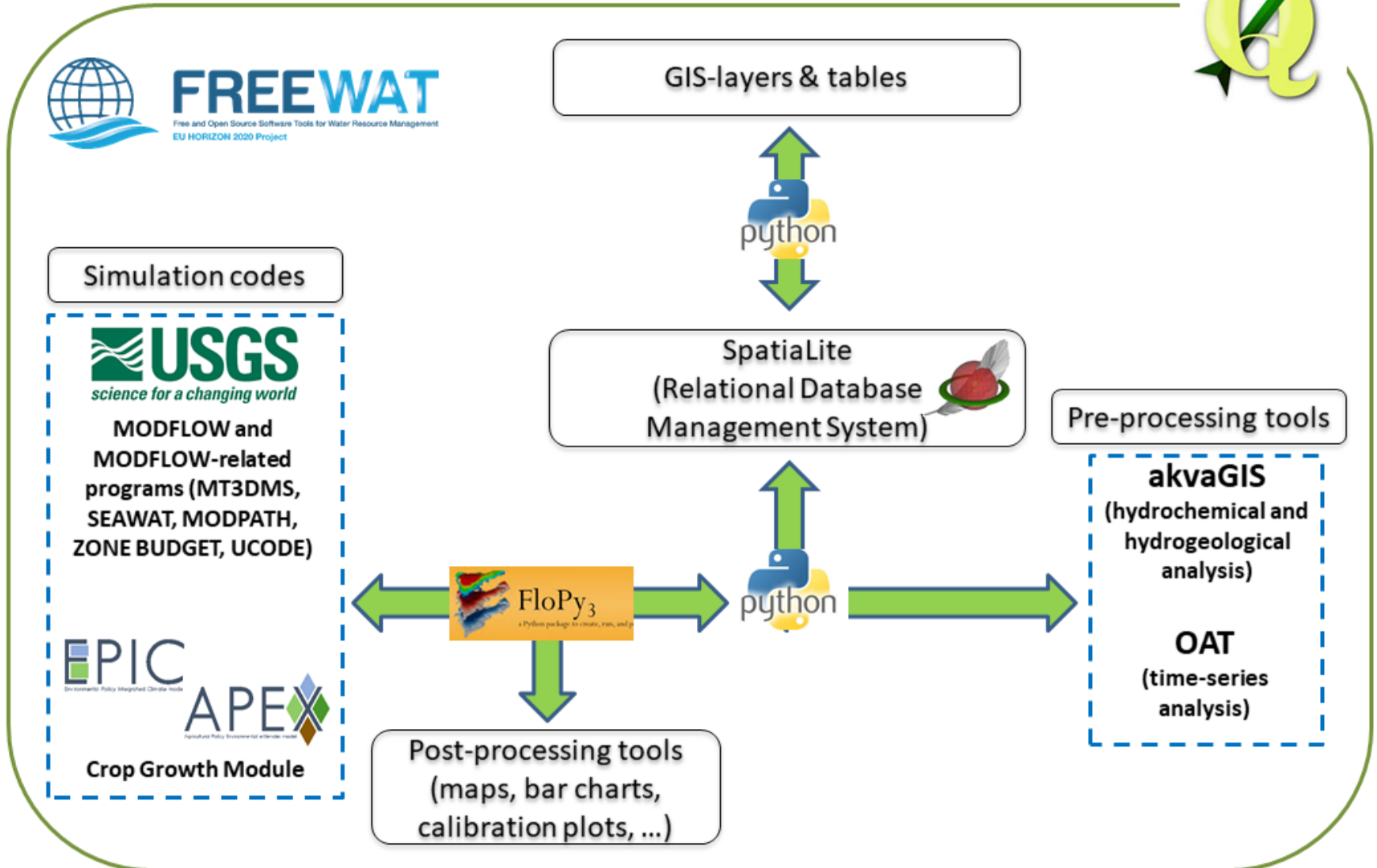
MAIN EXPECTED RESULT

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

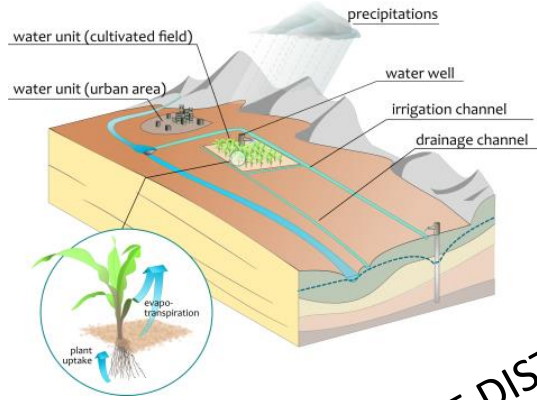
FREEWAT expected main impact →

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

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



FREEWAT capabilities



USGS
science for a changing world

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

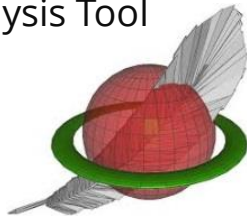
SPACE AND TIME DISTRIBUTED DATA

UPSCALING from cell results

WATER MANAGEMENT AND PLANNING MODULE



GIS AND SPATIAL DATABASE



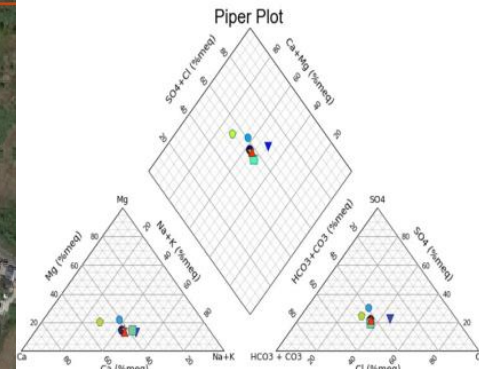
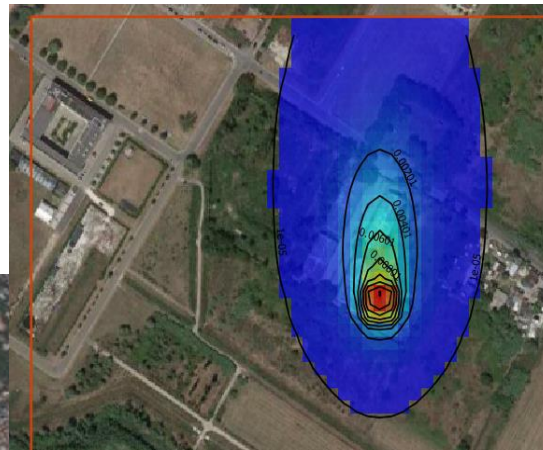
Observation Analysis Tool

Surface and Groundwater Flow Simulation

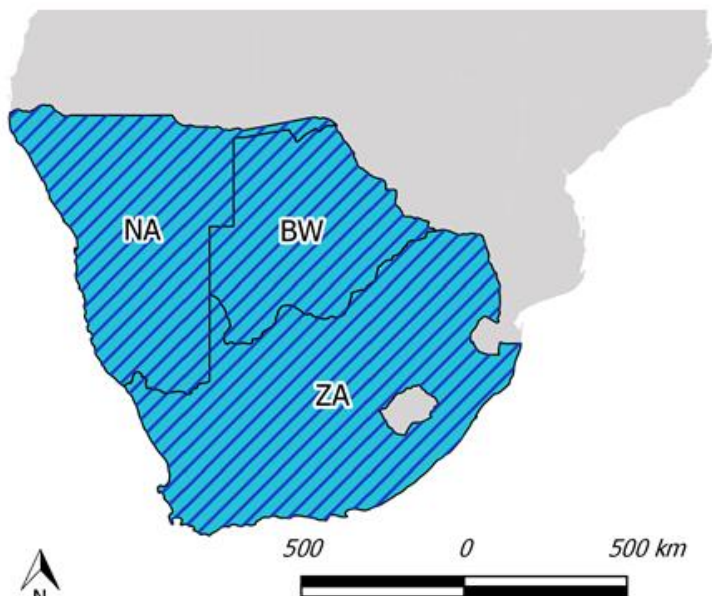
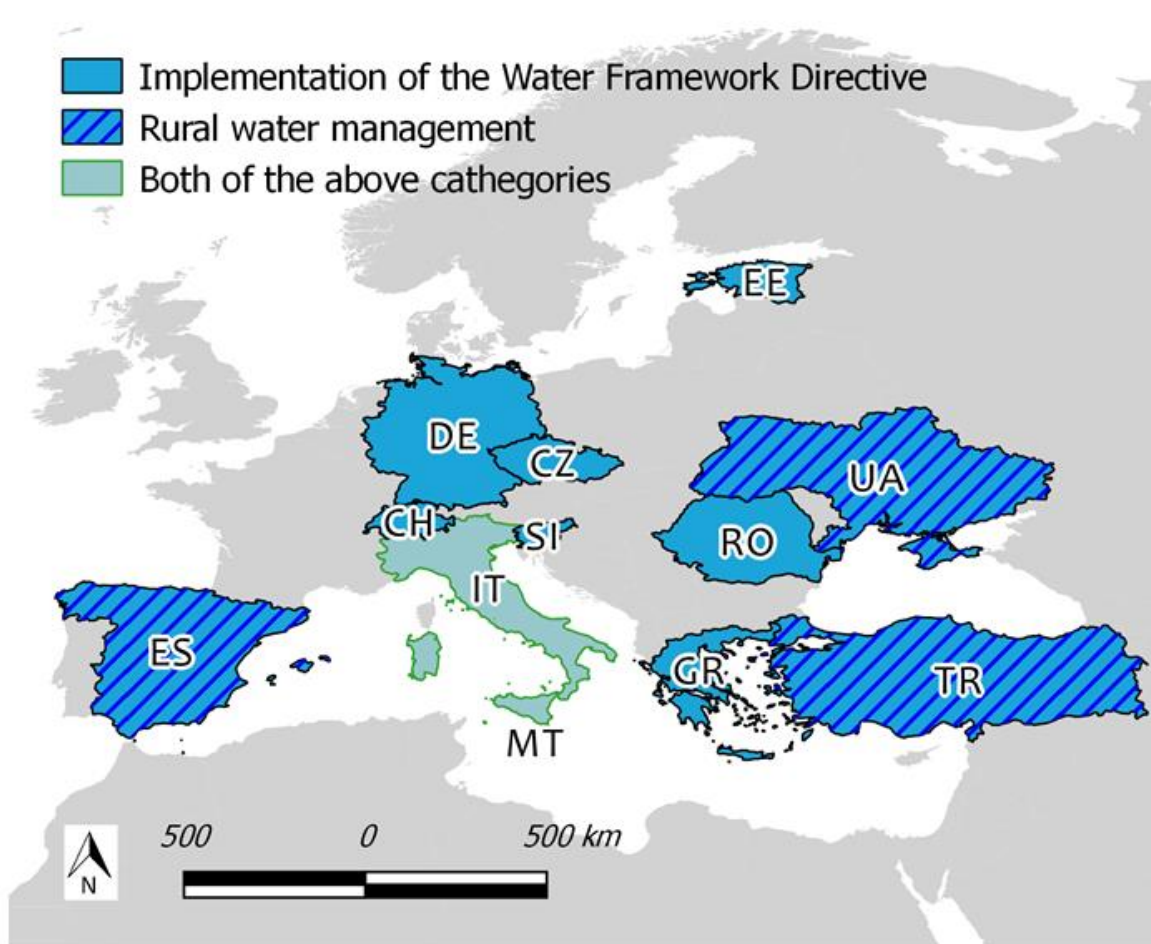
Water quality simulation and analysis tools

Rural water management module

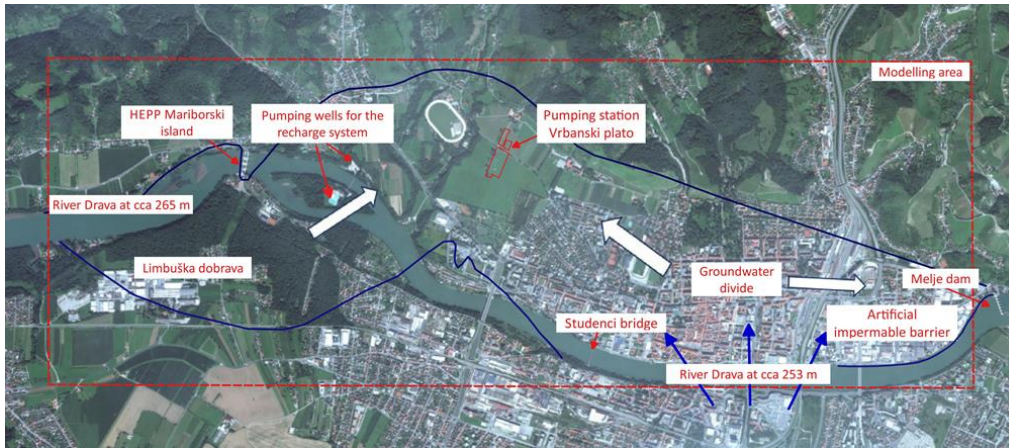
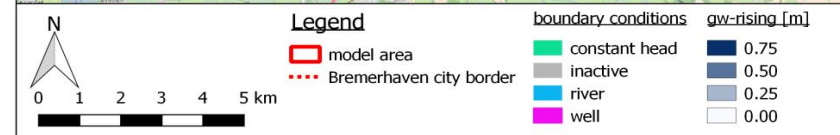
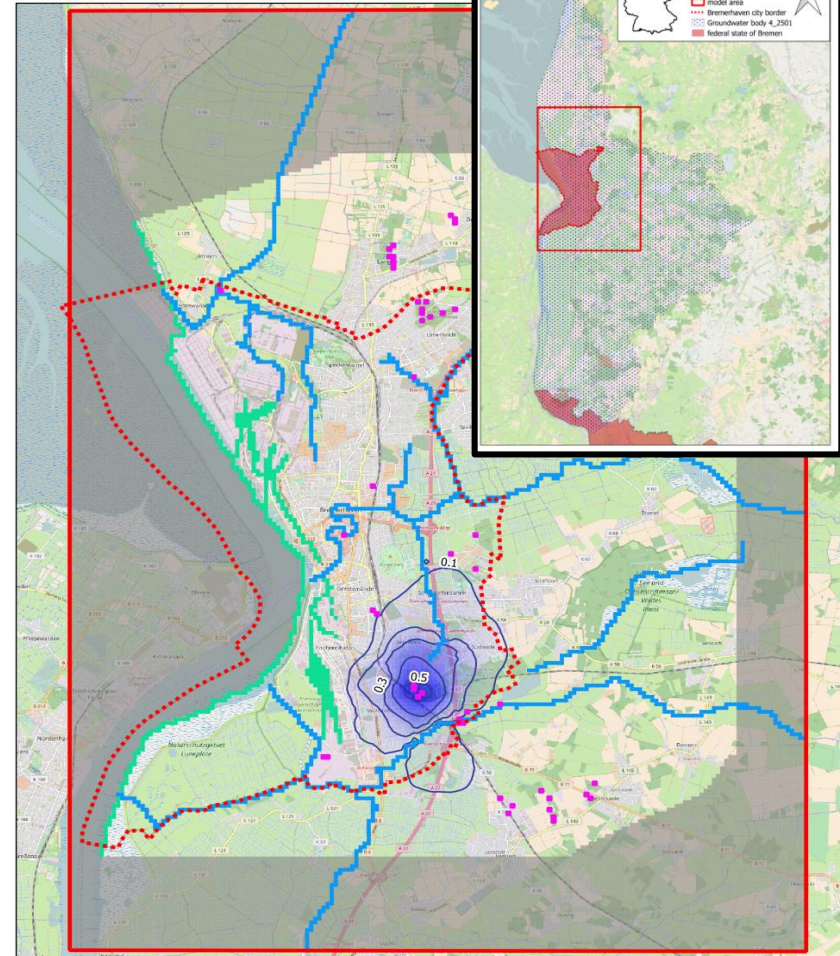
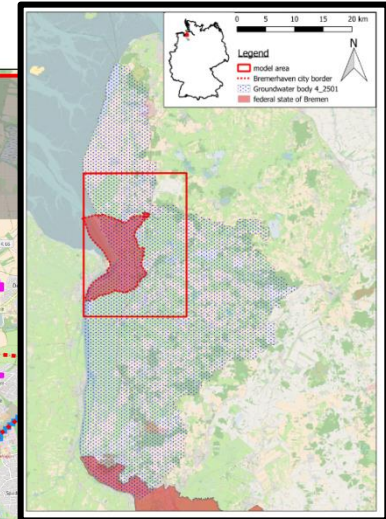
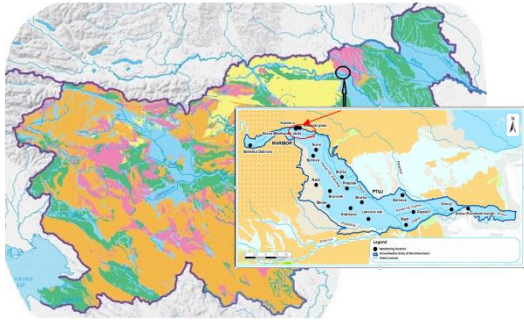
Calibration Sensitivity Analysis
Parameter estimation



● P10_CUP0610 ● P3_CUP0610 ● P6_CUP_7309 ▲ P8_CUP0610
▼ P11_CAG0110-005 ■ P4_CPR1011 ★ P7_CUP0609



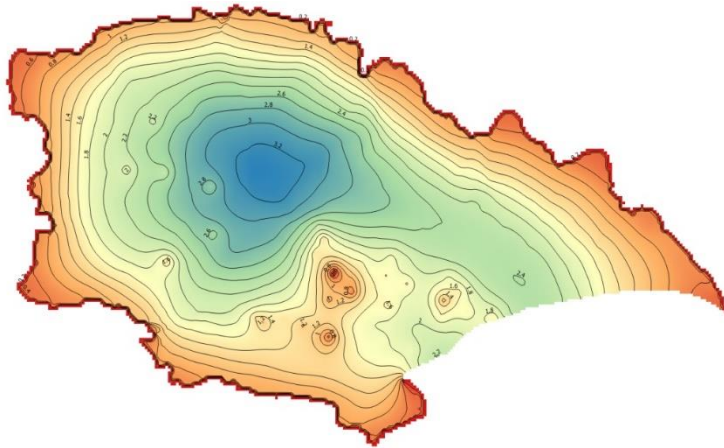
Management of a MAR plant at Vrbansky plato (Slovenia) and impacts of climate change at Bremerhaven (Germany)



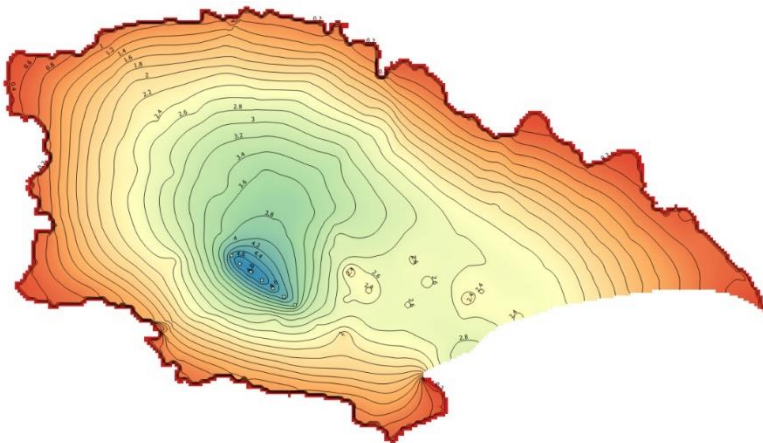
Induced Riverbank Filtration plant at Vrbansky plato

Water level increase after shifting the waterworks of “Bremerhaven Wulsdorf” →

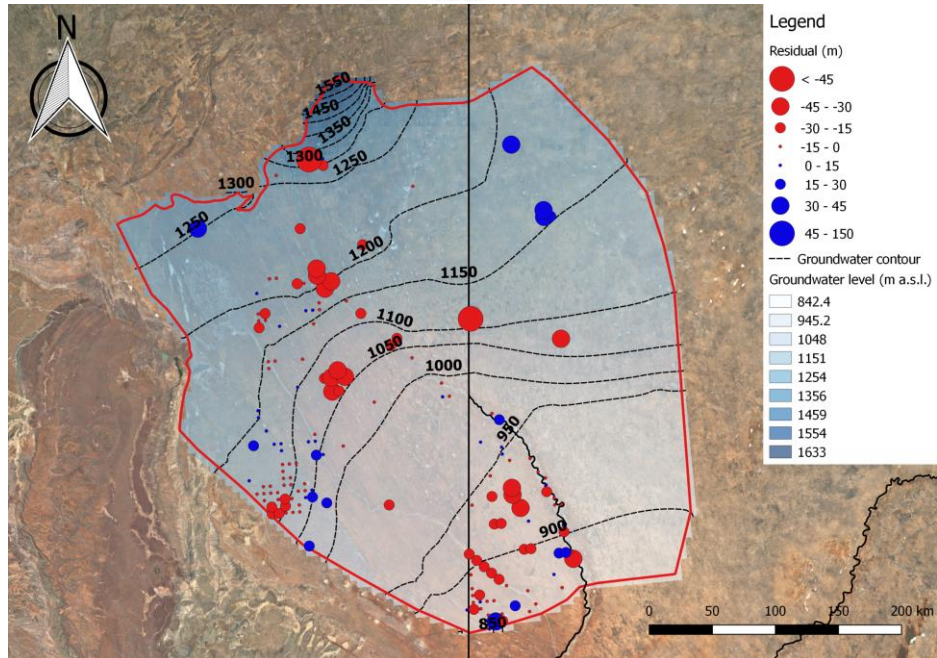
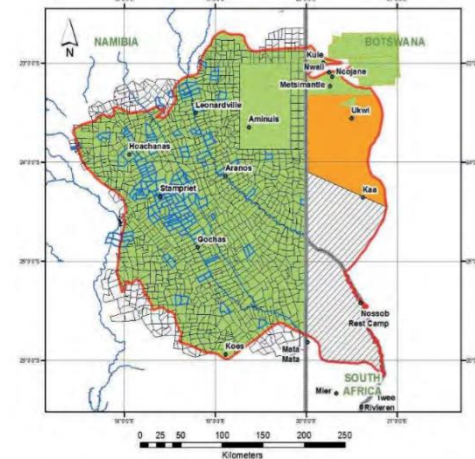
Management of the mean sea level aquifer of the Gozo island (Malta) and optimizing water use in the STAS area (southern Africa)



Simulated hydraulic head at the Gozo island under current conditions

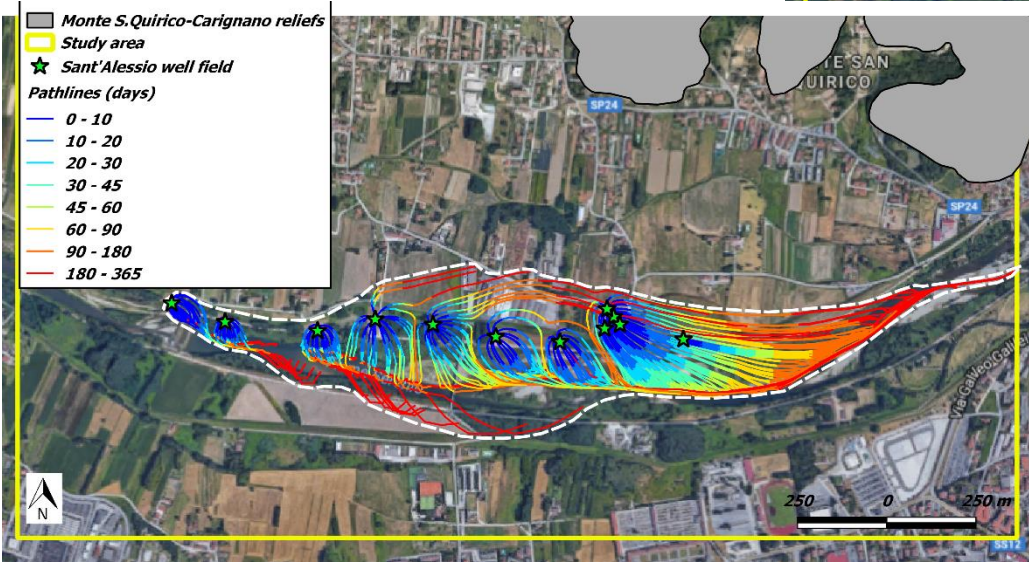
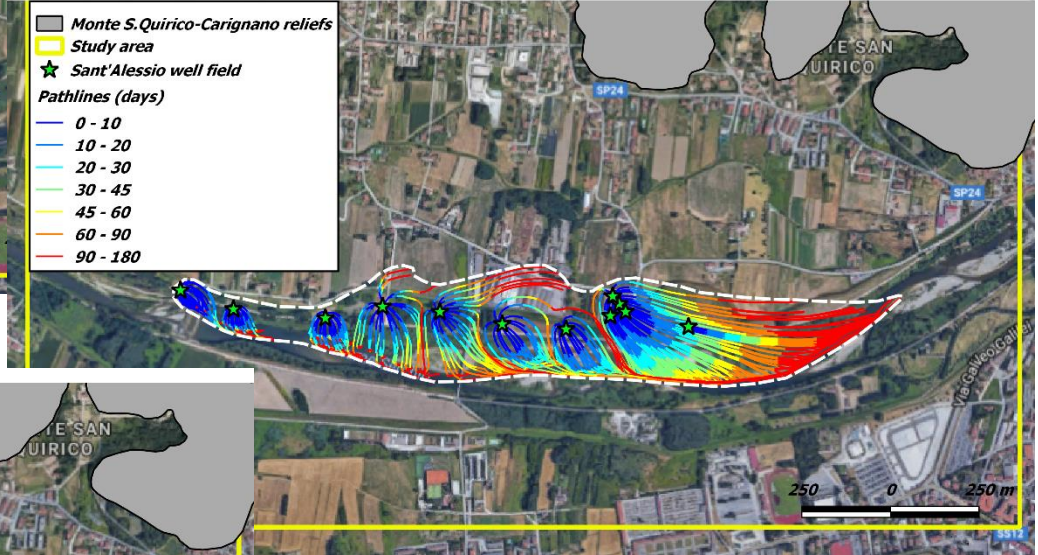
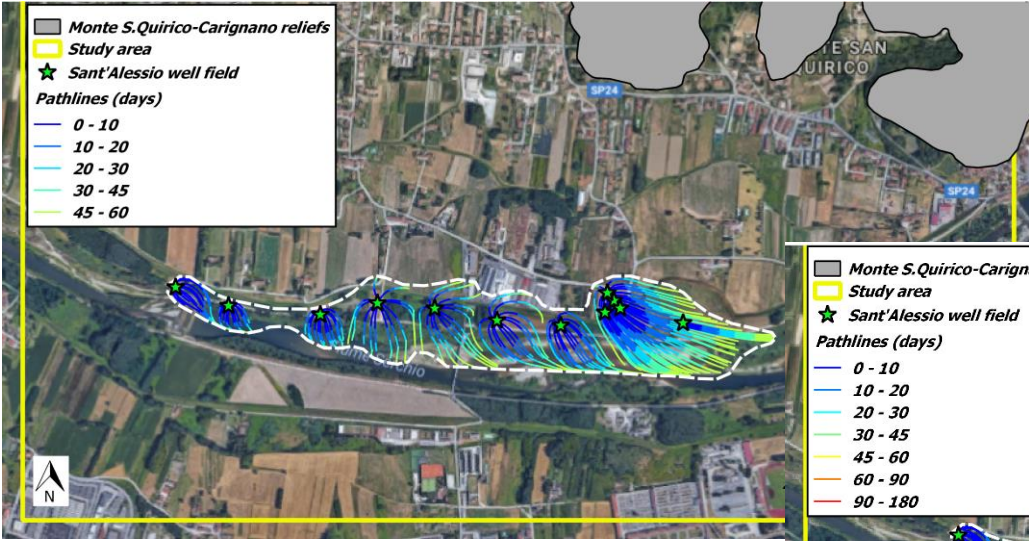


Simulated hydraulic head at the Gozo island after setting in place a MAR plant

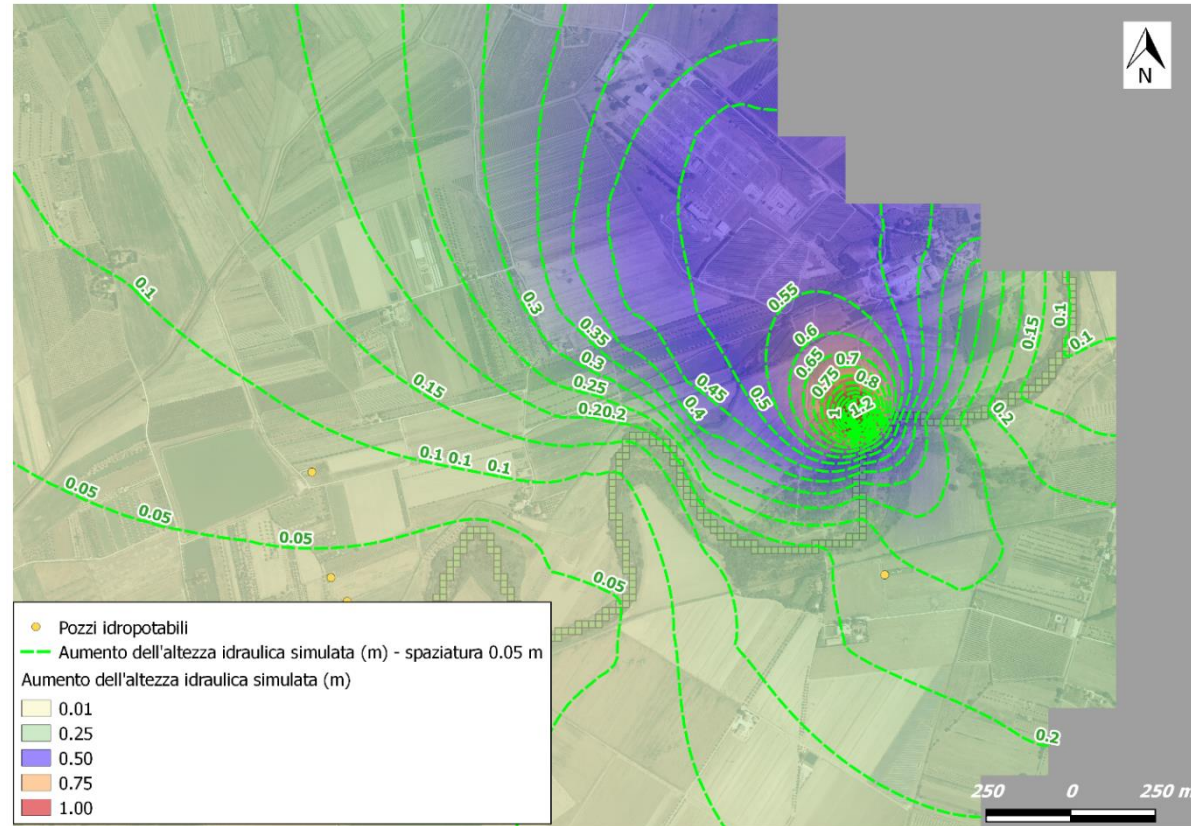


Calibration of the STAS model

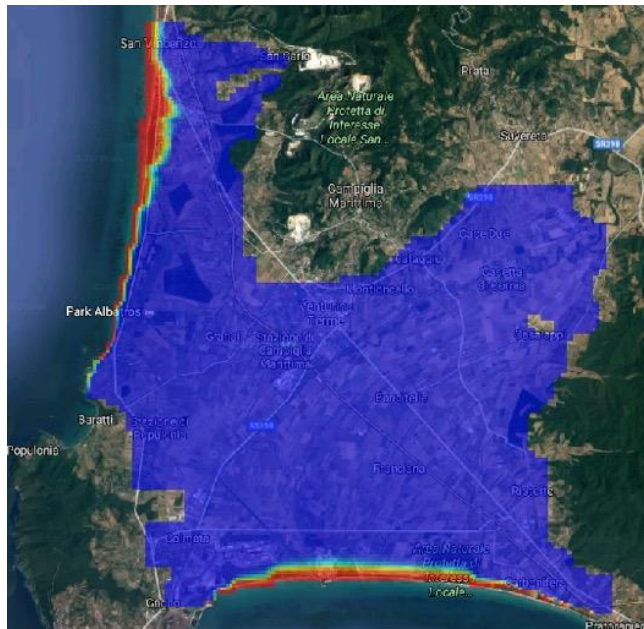
Wellhead protection areas at Sant'Alessio well field



Water management in the lower Cornia valley



Simulation of the effects of an infiltration basin MAR scheme



Simulated of saltwater intrusion at Val di Cornia

After 200 days
0.05 m³/s recharge
(about 900k m³)

- Unite the power of GIS geo-processing and post-processing tools in spatial data analysis to that of simulation software
- OPEN and FREE ICT tools may offer relevant opportunities in running this combined activities (i.e., from the point of view that models can be easily shared)
- No cost for licences (money can be moved to development of client tailored applications)



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





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REWAT

sustainable water management
in the lower Cornia Valley



SMAQua

SMart ICT tools per l'utilizzo
efficiente dell'AcQua



Thanks!



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 **ict4water.eu**