Computational Methods in Water Resources XXII Conference 2018 – Saint-Malo

Session 53: S03-1: Application of Advanced Software Engineering Tools and Methods in the Environmental Sciences

Simulating the hydrologic cycle in a GIS environment: present and future of the free and open source FREEWAT platform

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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 digital capacity at agencies and governing authorities

Water and data

Many countries are now producing water related data:

- in EU Countries case:

>>>>>> *massive amount of data*

- in developing Countries

>>>>> *less data are available*

Actions		idsgw_1	date	time	level	temperature	ph	ces
Edit	Delete	4968	2015-04-22	09:26:24	8.01714	9.68442	1	489.071
Edit	Delete	4969	2015-04-22	09:41:25	8.02453	9.74725	1	478.441
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Edit	Delete	4971	2015-04-22	10:11:26	7.96673	9.76323	1	484.021
Edit	Delete	4972	2015-04-22	10:26:27	8.06777	9.70175	1	492.287
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Edit	Delete	4975	2015-04-22	11:11:29	7.94177	9.75494	1	483.606
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Edit	Delete	4979	2015-04-22	12:11:31	8.05931	9.7782	1	484.018
Edit	Delete	4980	2015-04-22	12:26:31	8.00855	9.718	1	477.45
Edit	Delete	4981	2015-04-22	12:41:33	7.99031	9.69059	1	483.874

Information CONTENT of this data not fully exploited as today ICT tools would allow
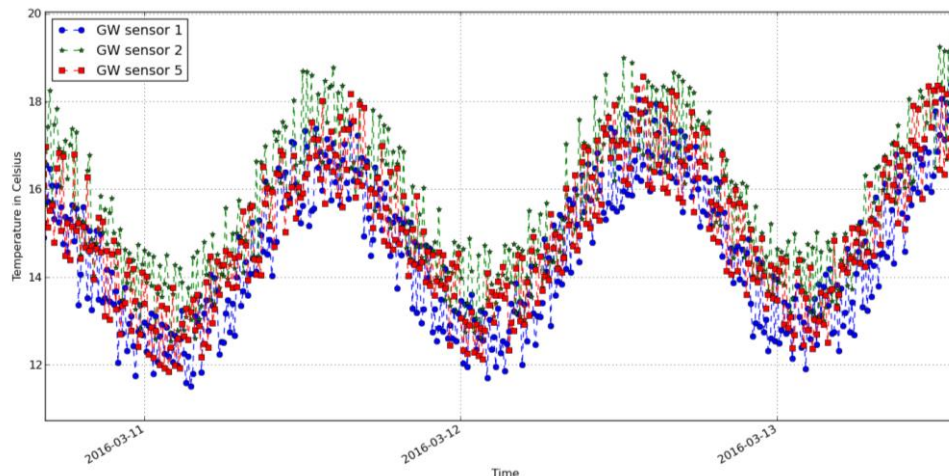
The H2020 FREEWAT project

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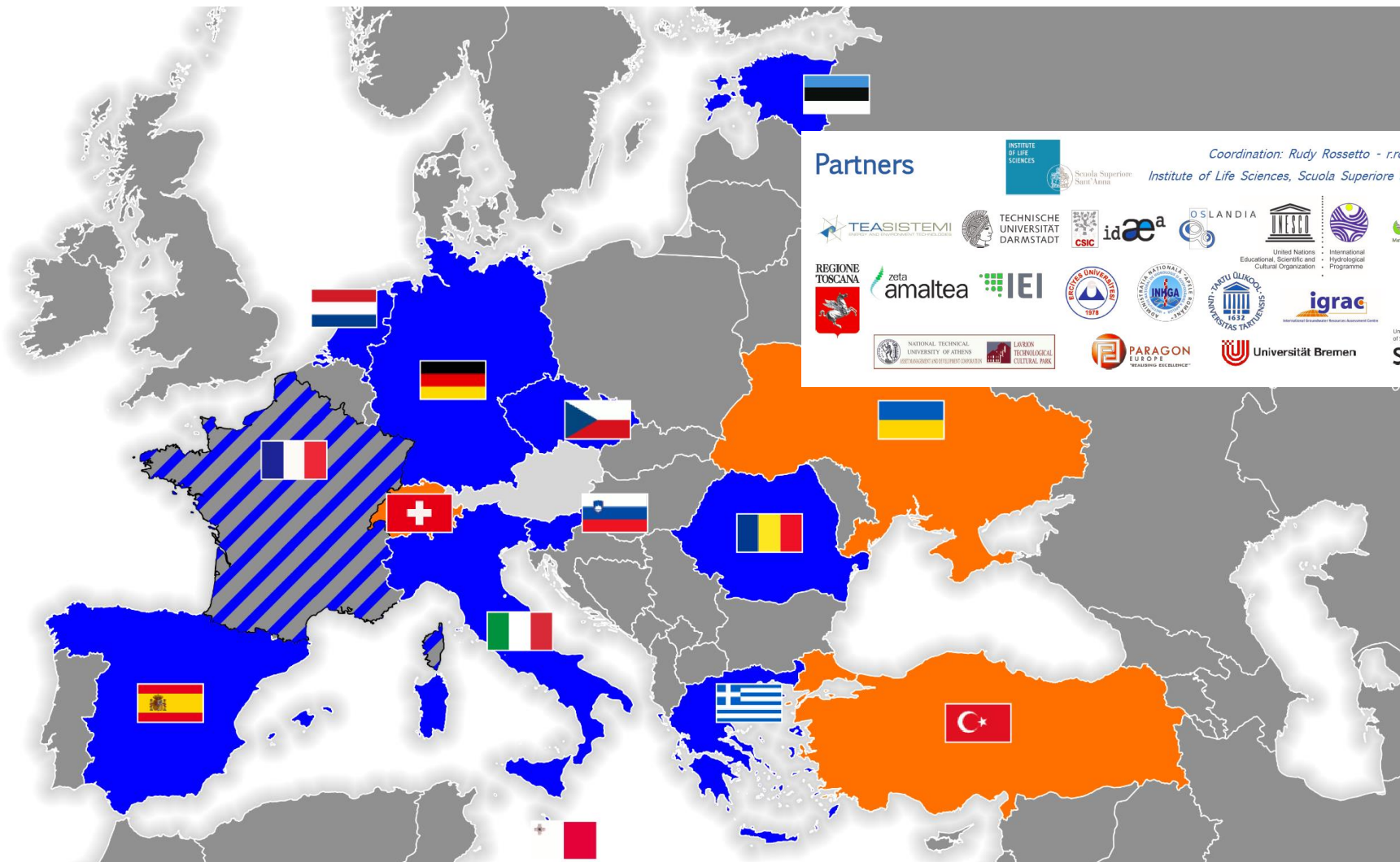
MAIN EXPECTED RESULT

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 :
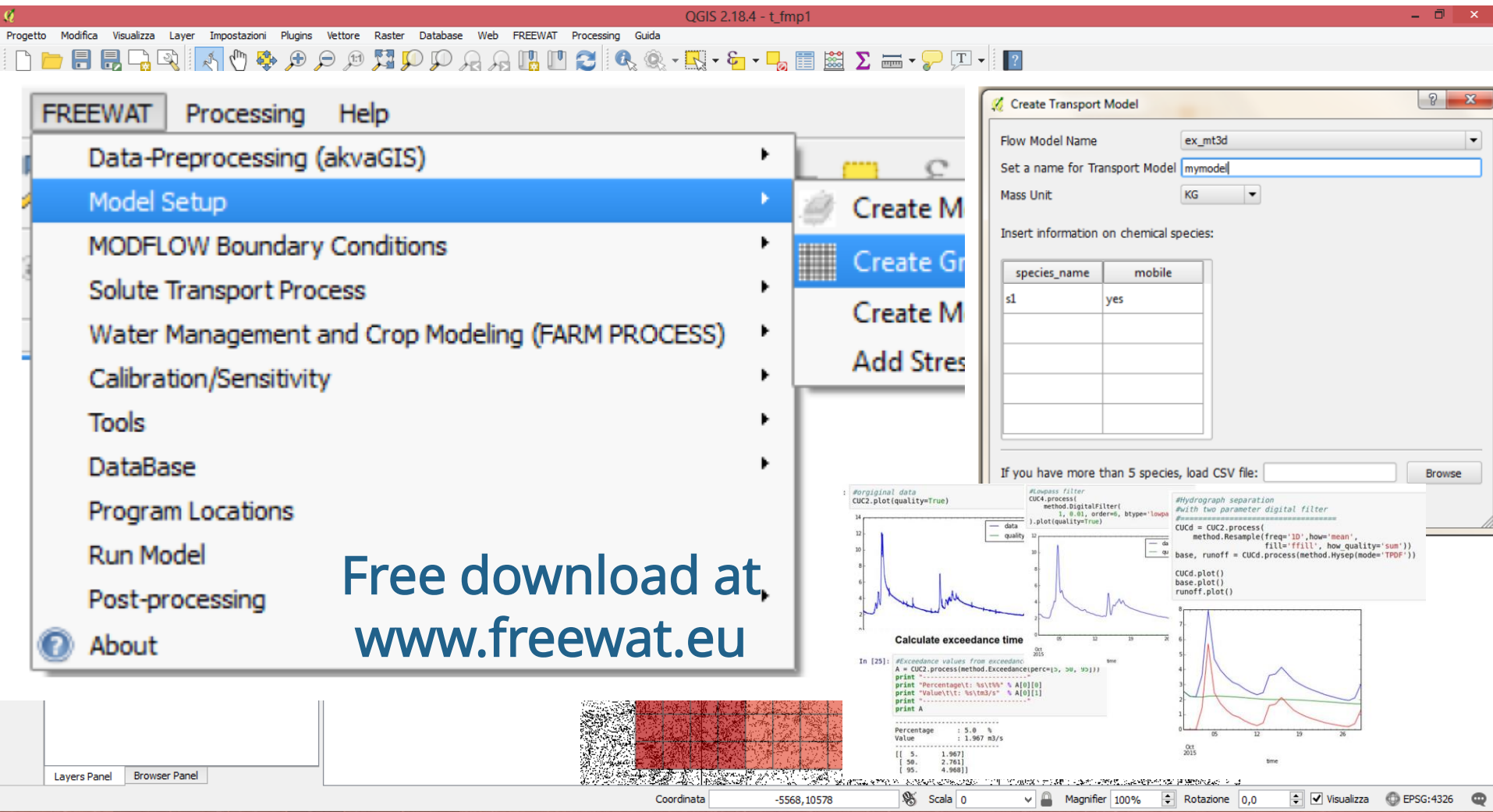
- data and innovative data analysis tools and

- including participatory approach

FREEWAT Consortium

WHAT IS FREEWAT TODAY?

A QGIS integrated modelling environment in its v.1.0.2 age along with User Manuals and tutorials

Free download at www.freewat.eu

FREEWAT architecture

SPACE AND TIME DISTRIBUTED DATA
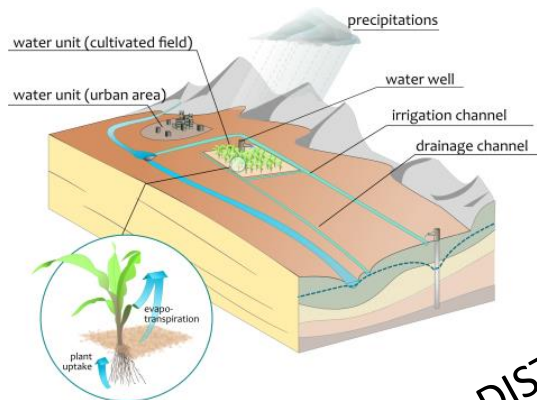
MODFLOW and Related Programs (MT3DMS, SEWAT, UCODE, etc.)

UPSCALING from cell results

WATER MANAGEMENT AND PLANNING MODULE

Surface and Groundwater Flow Simulation

Water quality issues

simulation and analysis tools

Rural water management module

Calibration

Sensitivity Analysis

Parameter estimation

Observation Analysis Tool

GIS AND SPATIAL DATABASE
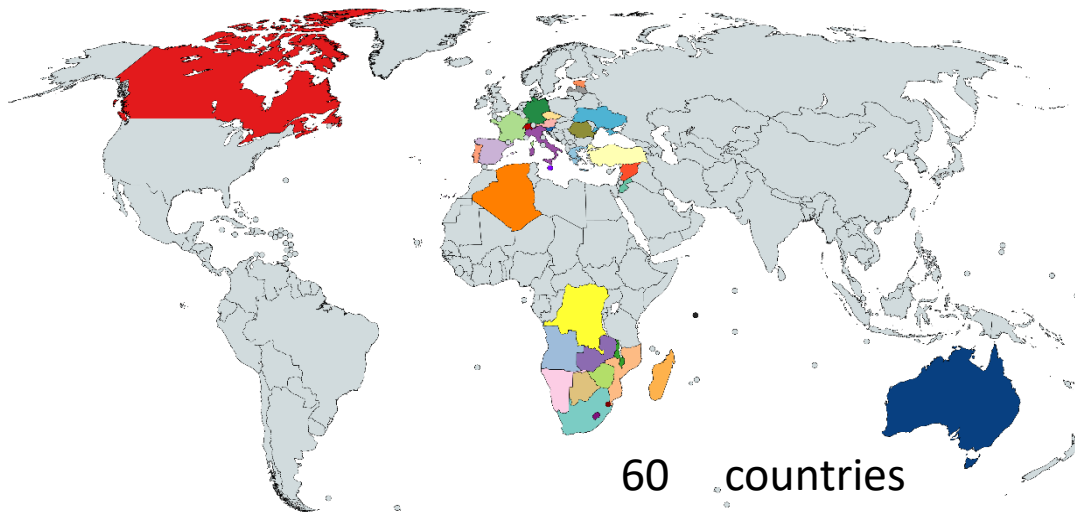
FREEWAT capacity building
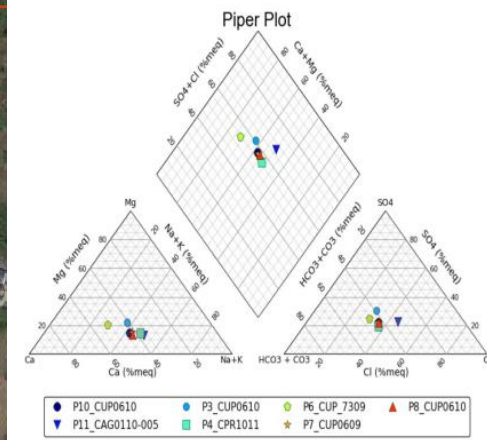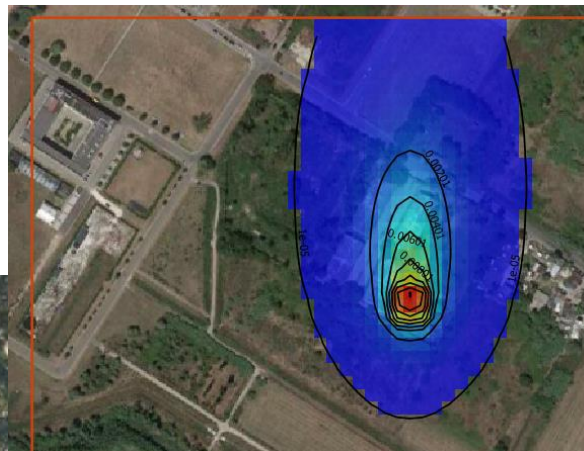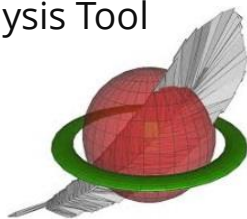
Large stakeholders involvement (>>>500 stakes involved)

Growing web social and professional networks

(linkedin group >700 followers EU H2020 FREEWAT – twitter >1000 followers @H2020Freewat – facebook >200 followers @FREEWAT)
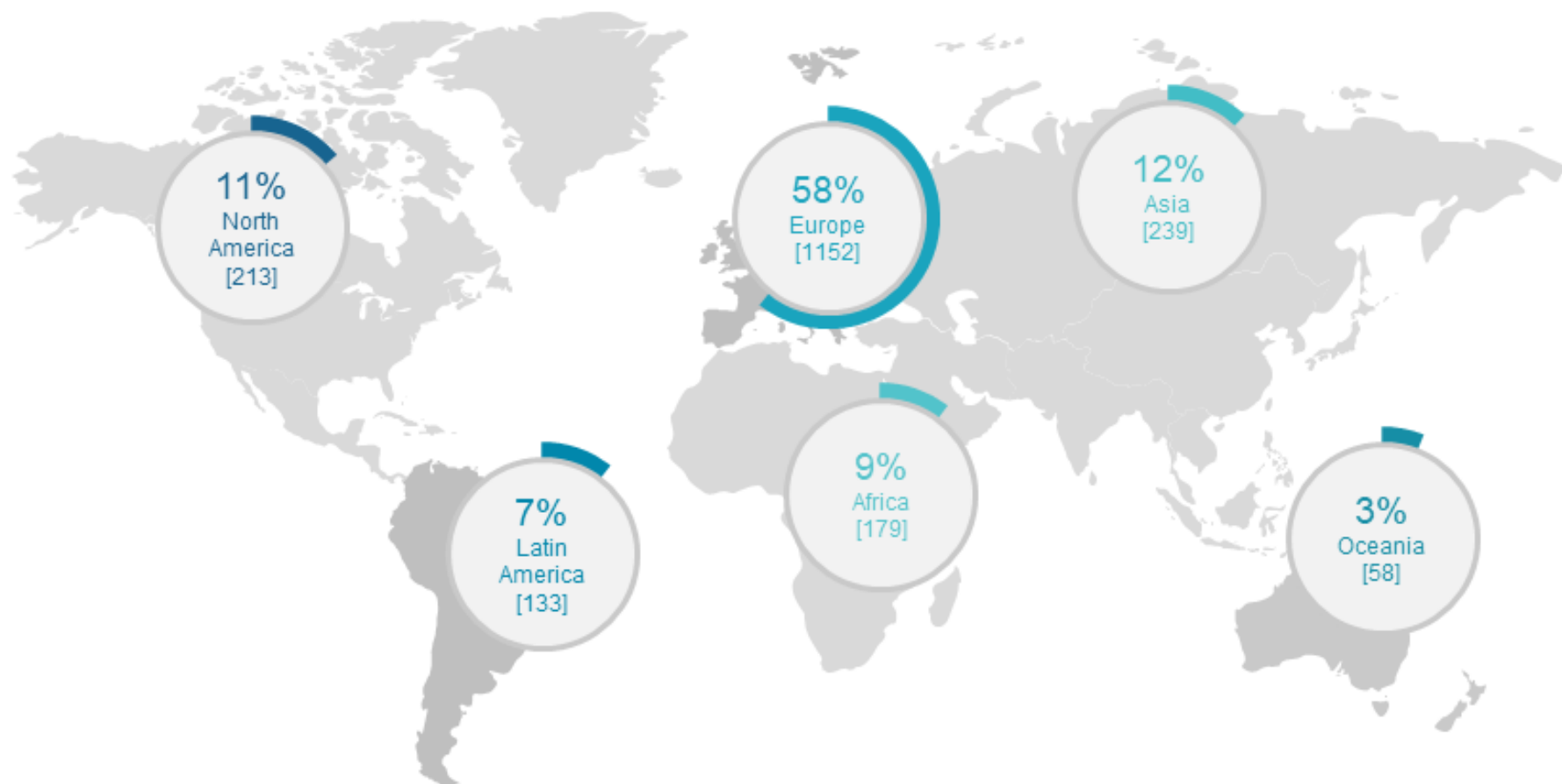
More than 5000 downloads so far (from 15th april 2017)

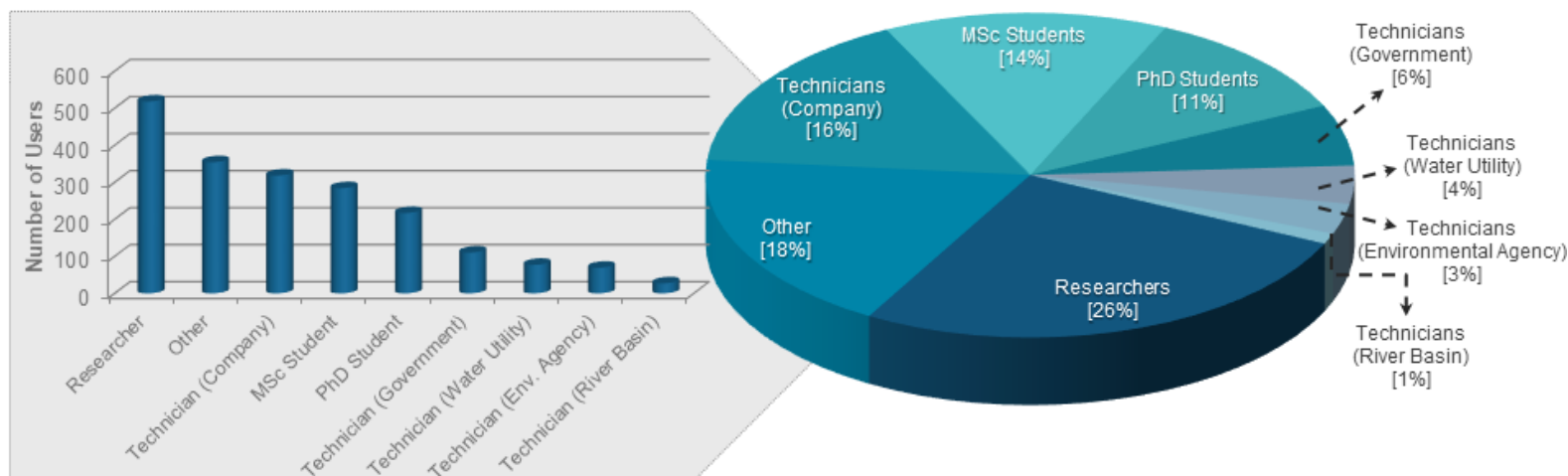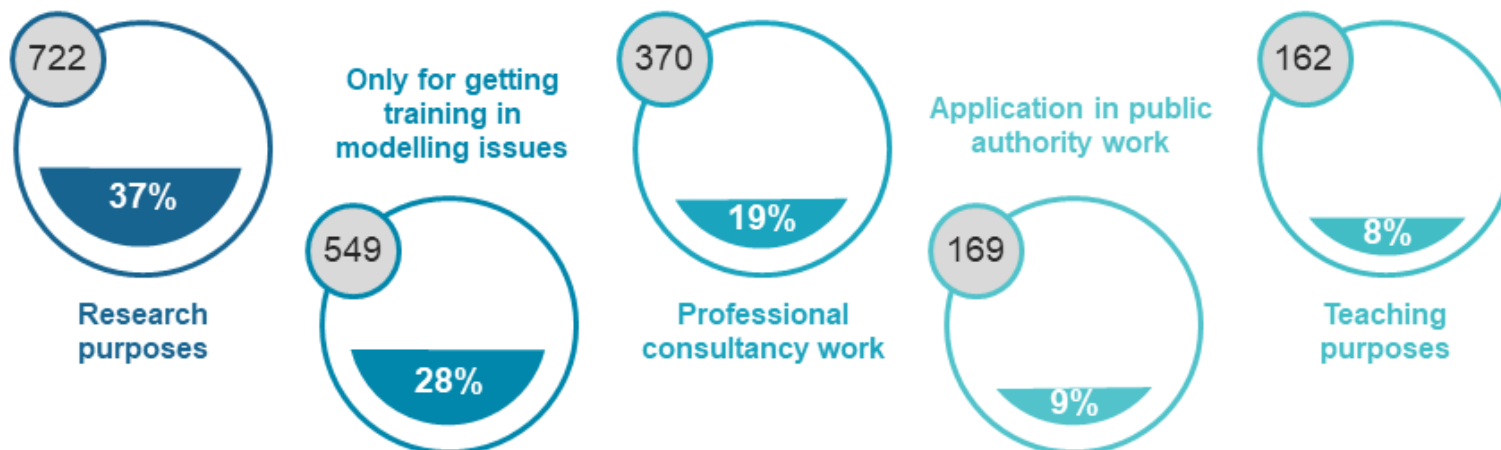60   countries
1200 directly trained
400   institutions

The state of the play/1

Downloads per continent

- 11% North America [213]
- 58% Europe [1152]
- 12% Asia [239]
- 7% Latin America [133]
- 9% Africa [179]
- 3% Oceania [58]

The state of the play/2

Role of FREEWAT Users

Download purposes

- **722** — 37% — Research purposes
- Only for getting training in modelling issues — **549** — 28%
- **370** — 19% — Professional consultancy work
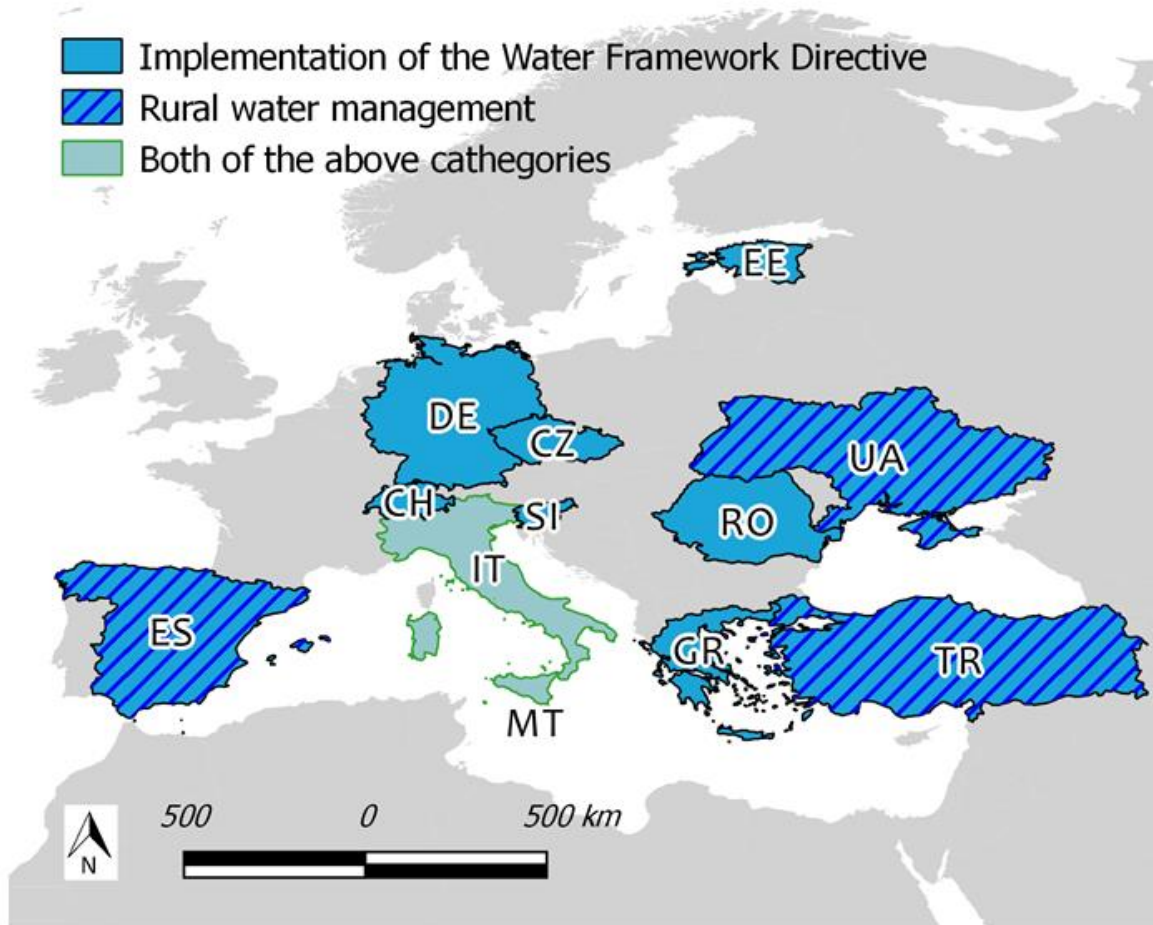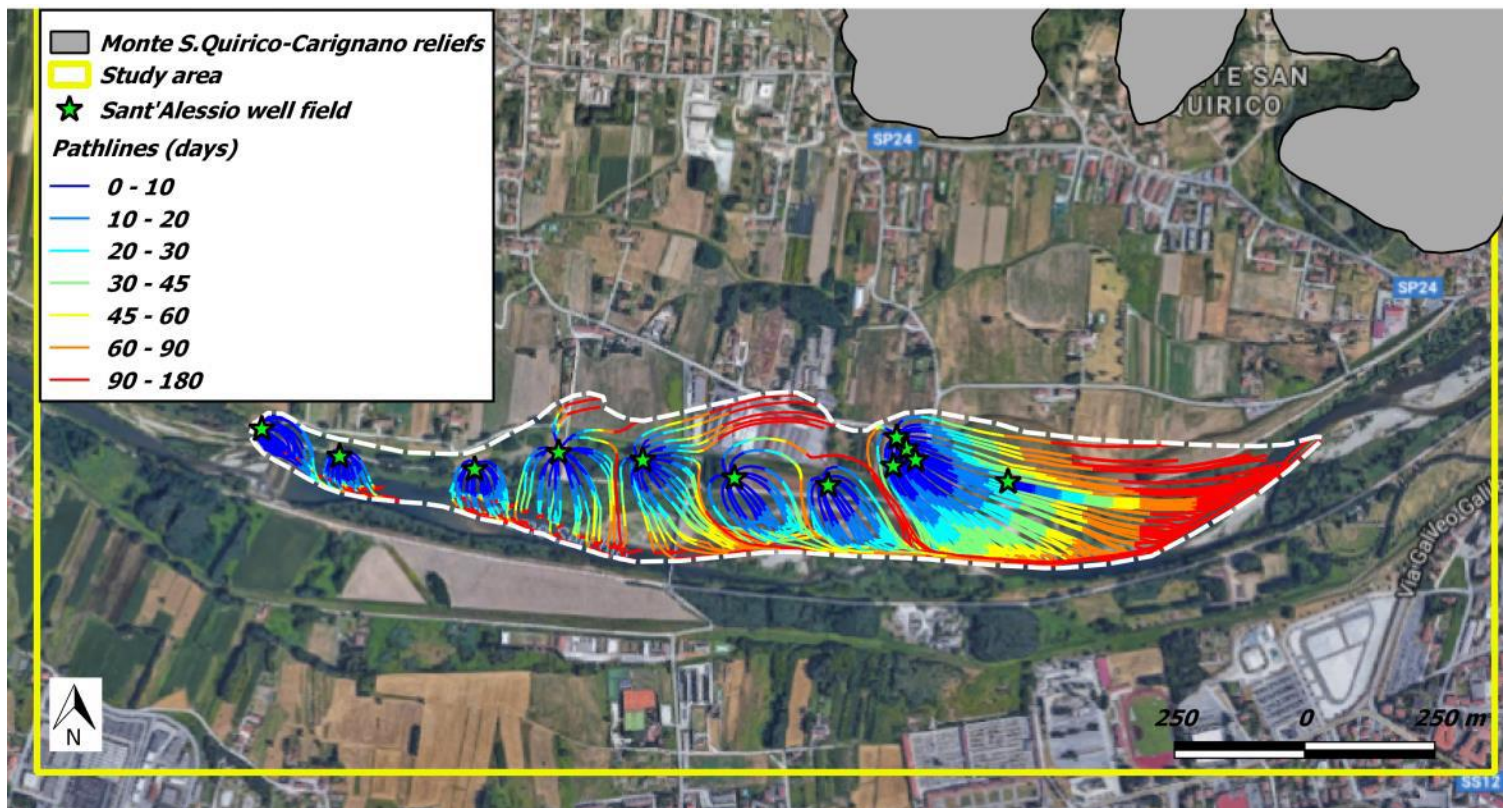- Application in public authority work — **169** — 9%
- **162** — 8% — Teaching purposes
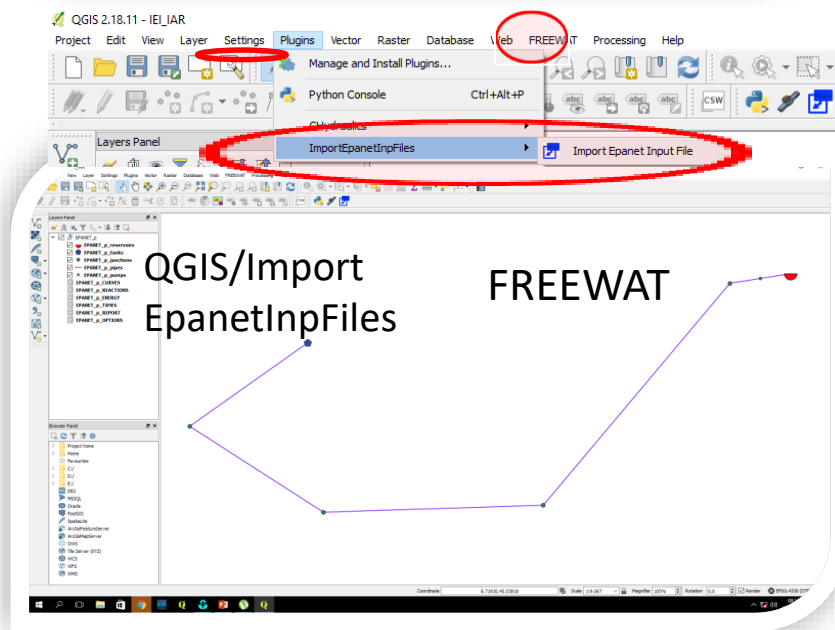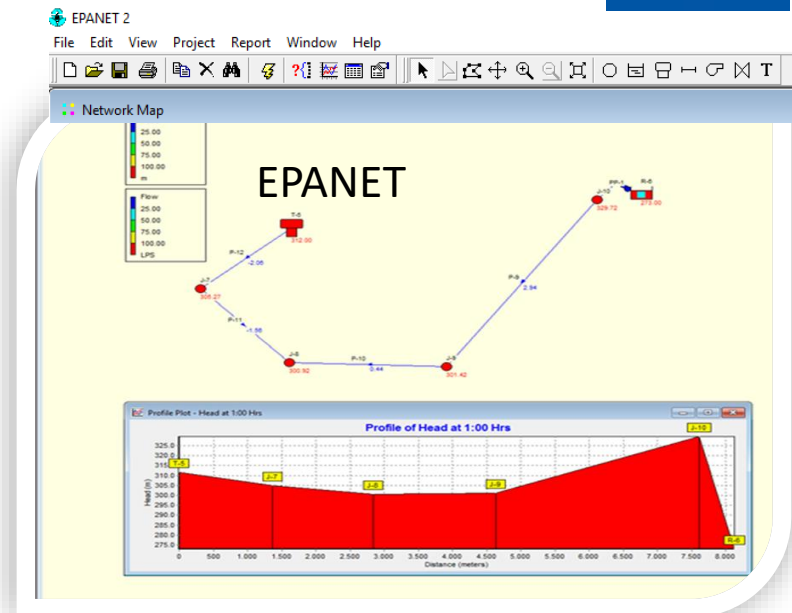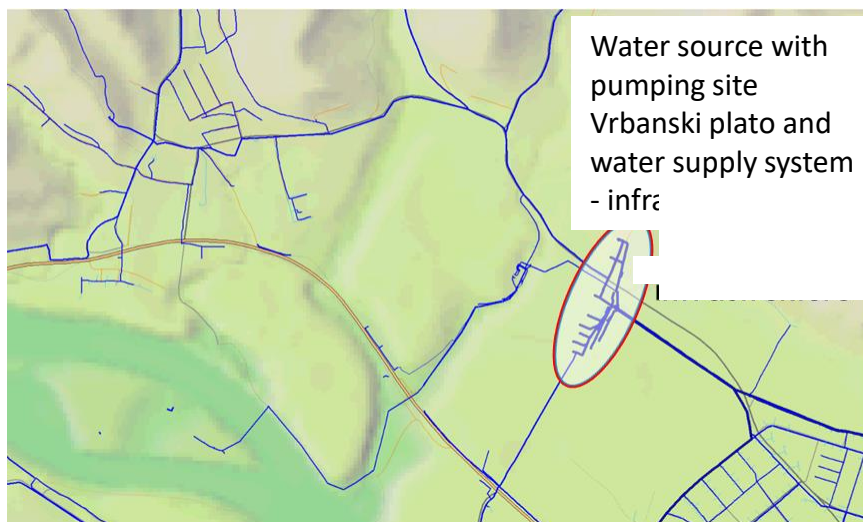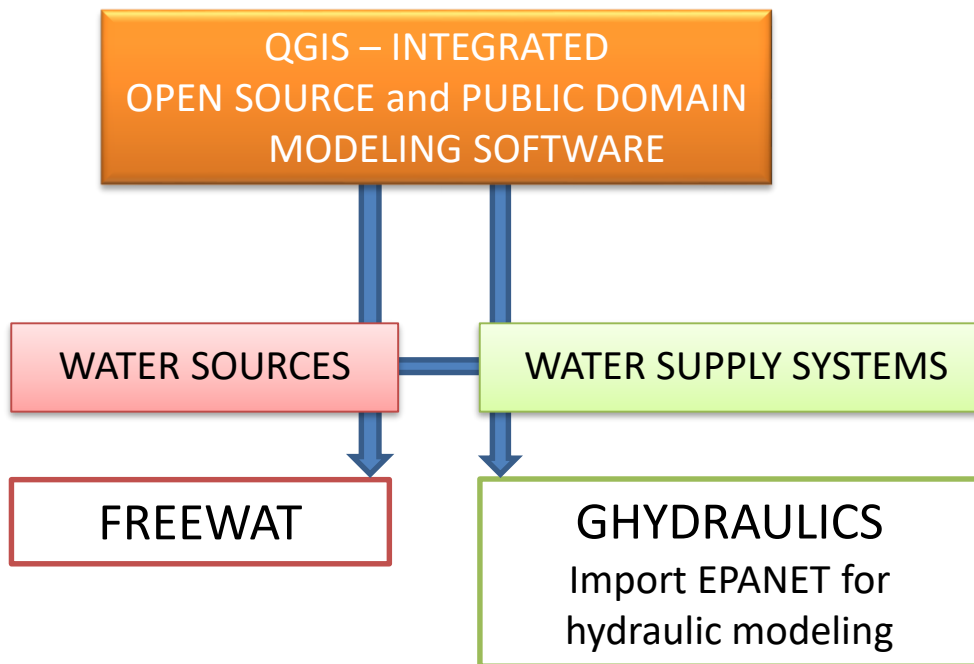
FREEWAT case studies within a participatory approach

Implementation of the Water Framework Directive
Rural water management
Both of the above cathegories

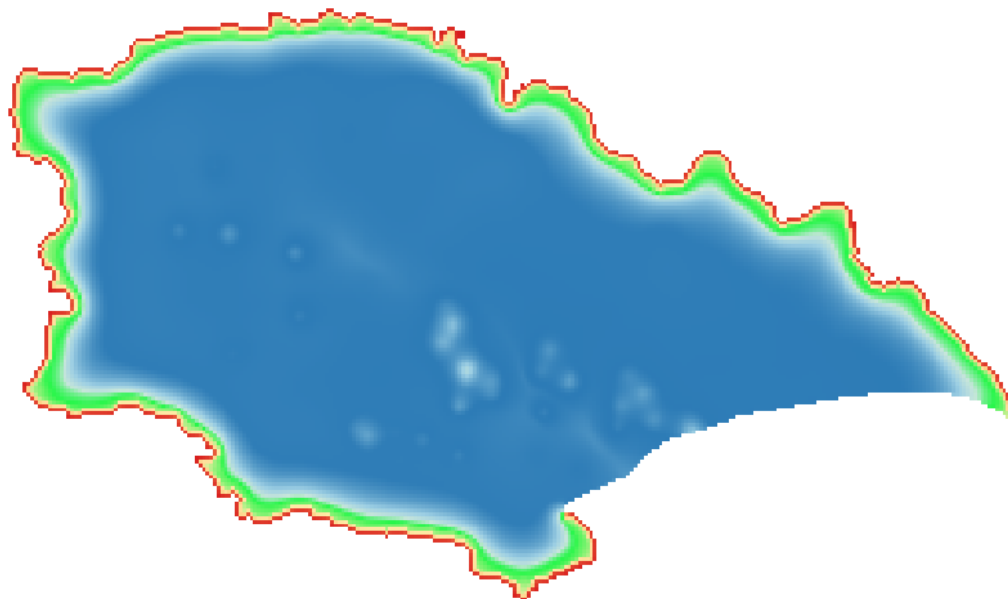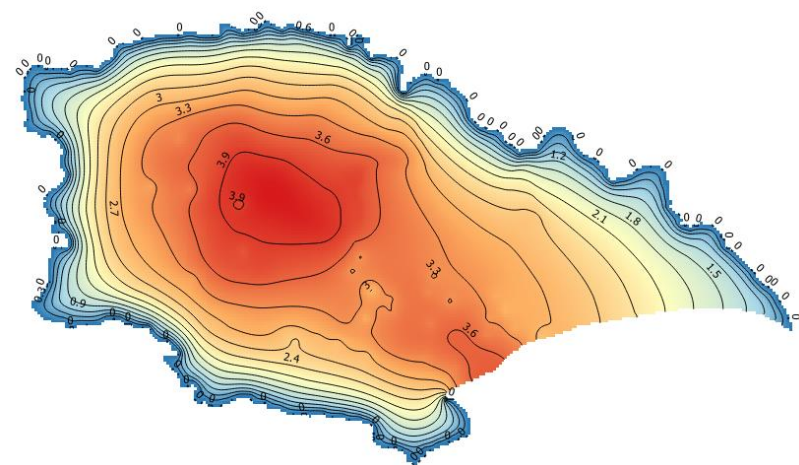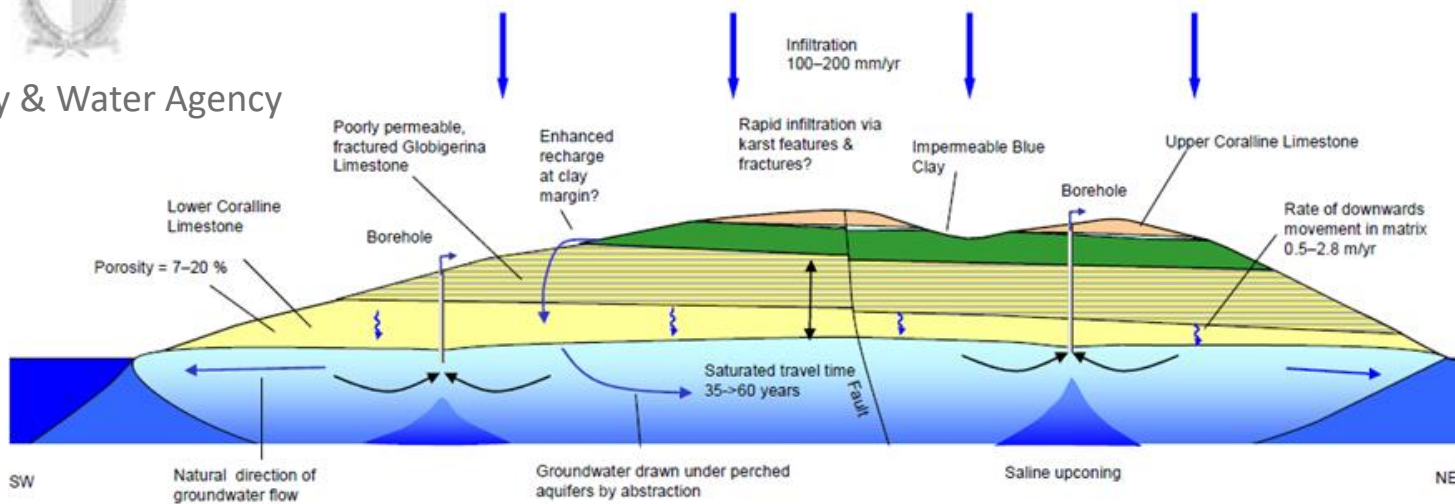# Analysing water supply issues

QGIS – INTEGRATED OPEN SOURCE and PUBLIC DOMAIN MODELING SOFTWARE

WATER SOURCES

WATER SUPPLY SYSTEMS

FREEWAT

GHYDRAULICS
Import EPANET for hydraulic modeling

EPANET

Water source with pumping site Vrbanski plato and water supply system - infra

QGIS/Import EpanetInpFiles

FREEWAT

GOZO mean sea level aquifer

Conclusions

- Unite the power of GIS geo-processing and post-processing tools in spatial data analysis to that of simulation software

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

- No cost for licences (money can be moved to development of client tailored applications>>>> new companies and jobs>>>SDG8)

Thanks!