ICT TOOLS FOR ENHANCING SUSTAINABLE WATER MANAGEMENT IN RURAL ENVIRONMENT

FREEWAT
Free and Open Source Software Tools for Water Resource Management

ict4water.eu

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

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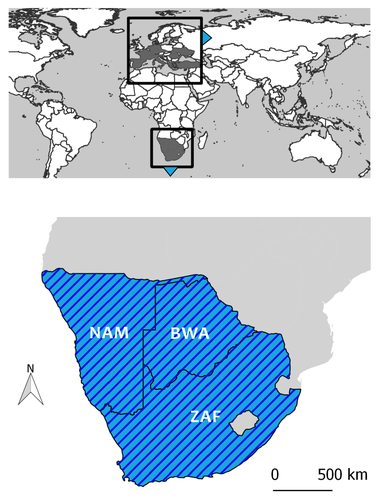
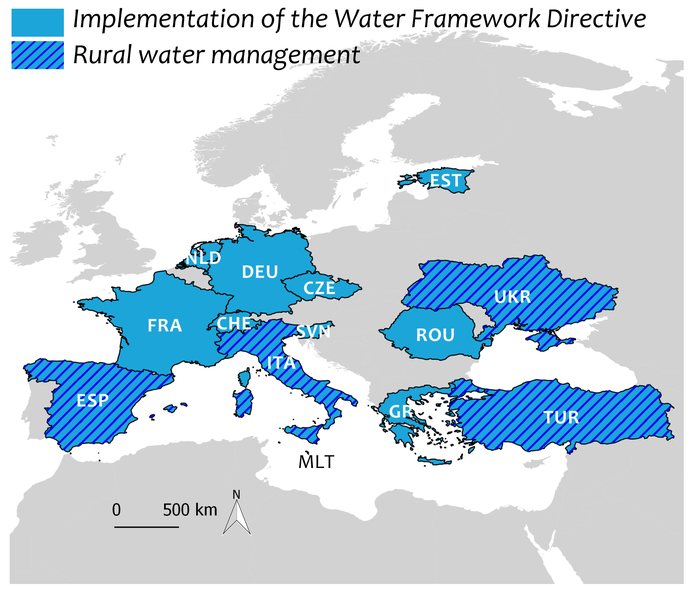
PROJECT INFO

Start: 04 2015 | **End:** 09 2017
Coordinator: Rudy Rossetto
Sant'Anna School of Advanced Studies
19 partners from EU and non-EU countries involved in the platform development and its application to 14 case studies.

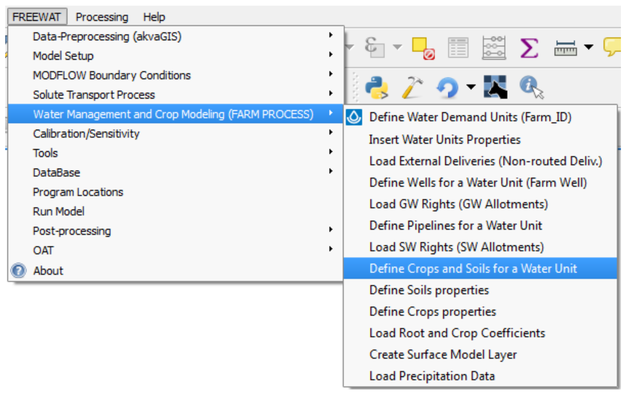
FREEWAT is an ongoing H2020 project financed by the EU Commission, aimed at producing a **free and open source** modeling platform to simplify the application of EU water-related Directives (Rossetto et al. 2015).

14 case studies





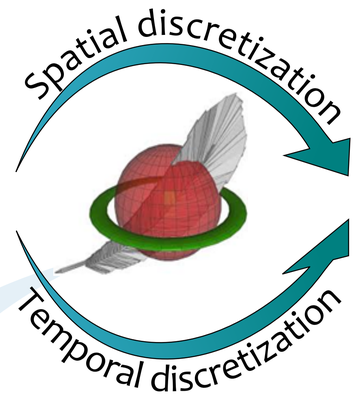
QGIS plugin



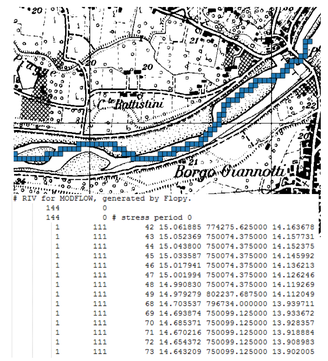
FREEWAT platform is implemented as a composite plugin in QGIS and takes advantage of Spatialite as a geodatabase management system and FloPy as reference python library to connect with hydrological codes, particularly MODFLOW-OWHM.

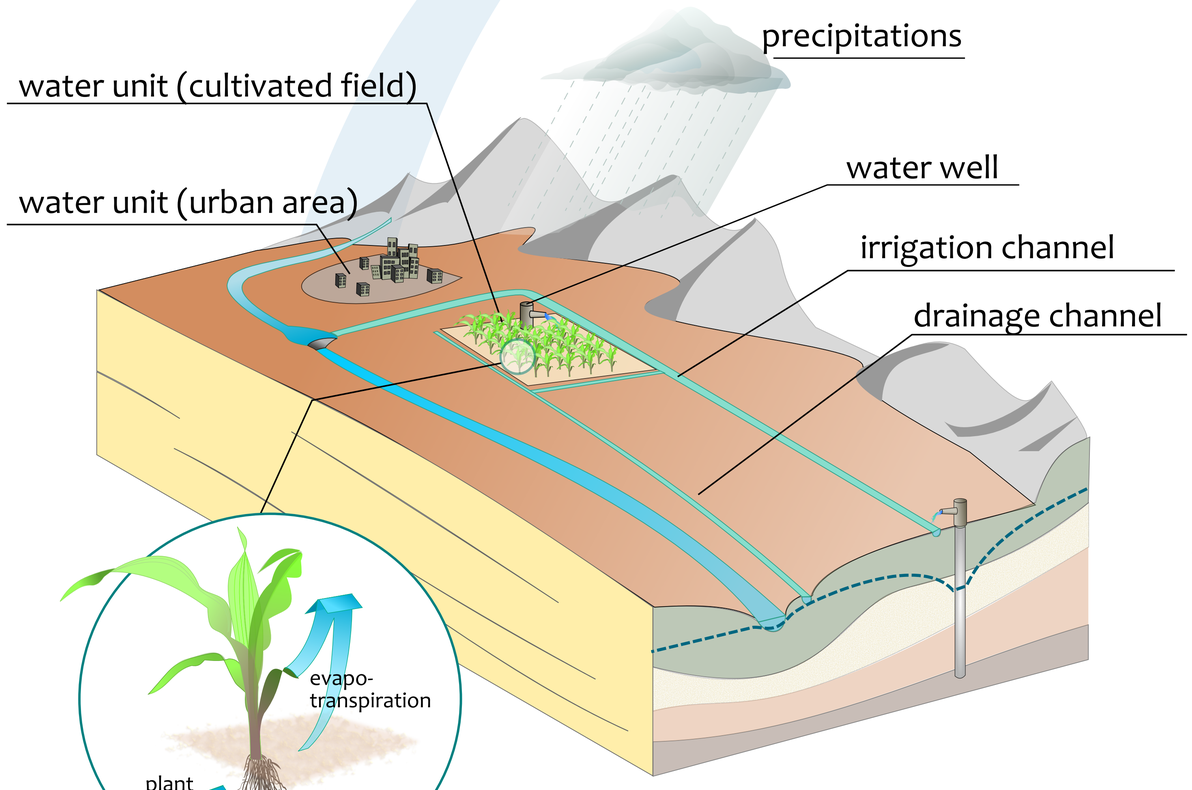
GIS layers → Model Data Objects → Input files
for simulation codes

study area boundaries, hydrostratigraphy, surface water bodies, source/ sink terms , water management scenarios (farms size, crop types,...)



user defined **model grid** and intra-annual time-steps (**stress periods**)





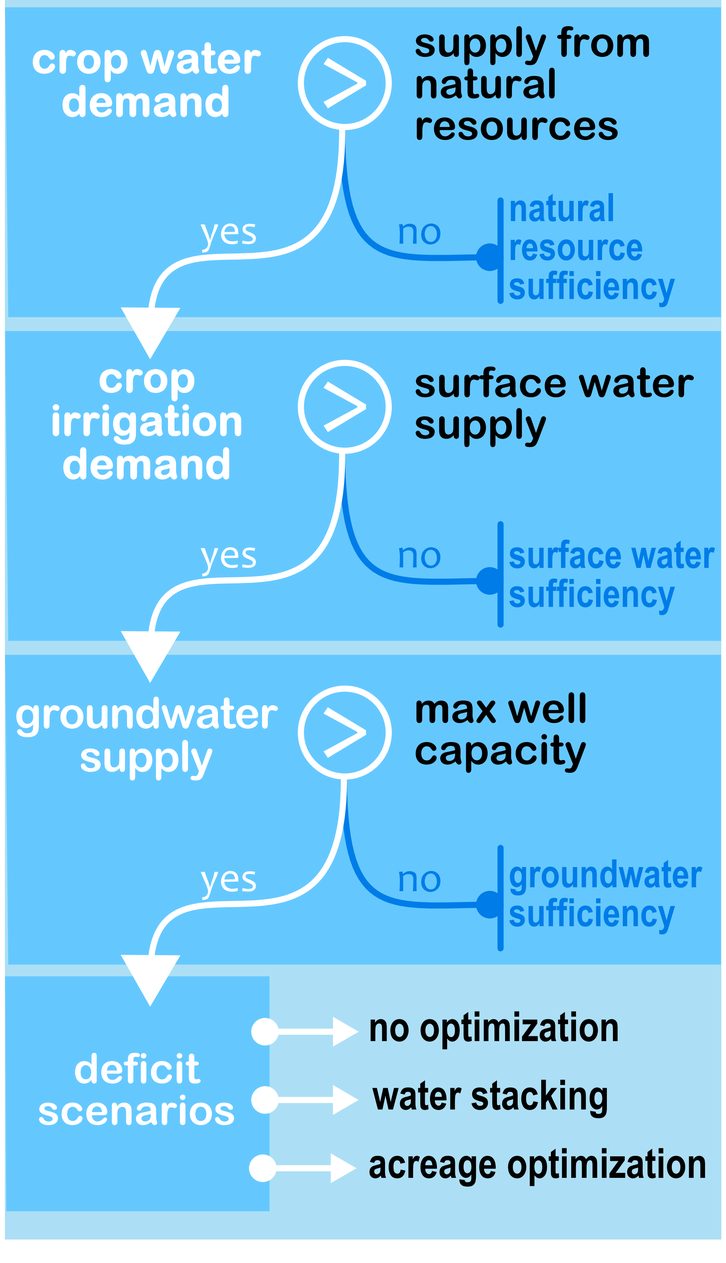
All the necessary pre- and post-processing procedures can be run within QGIS, so it turns out a **simple and intuitive user interface** to manage the simulation of complex problems in which the mutual interaction among surface water, groundwater and anthropic water demand/ supply terms can be handled.

REFERENCES

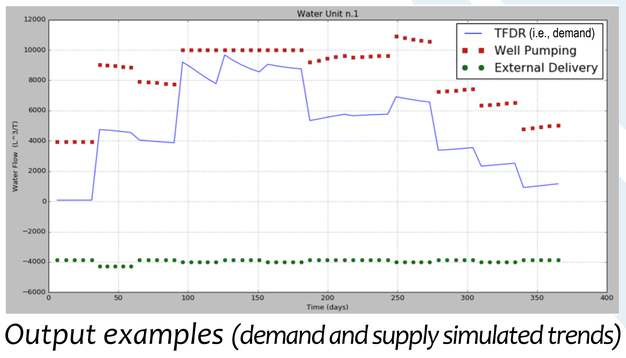
Hanson RT, Boyce SE, Schmid W, Hughes JD, Mehl SM, Leake SA, Maddock T, Niswonger RG, 2014. One-Water Hydrologic Flow Model (MODFLOW-OWHM). *U.S. Geological Survey*, Reston, Virginia.

Rossetto R, Borsi I, Foglia L, 2015. FREEWAT: FREE and open source software tools for WATer resource management. *Rendiconti Online Societa Geologica Italiana*, 35:252-255. DOI: 10.3301/ROL.2015.113

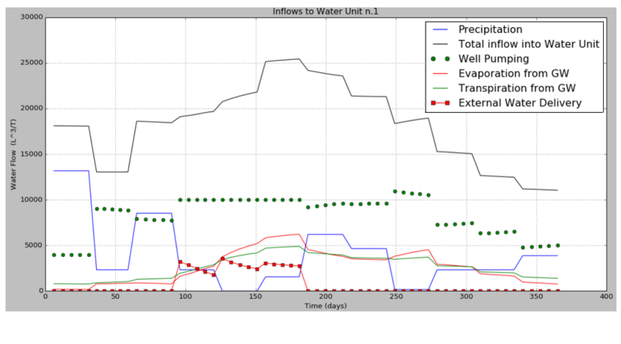
FMP (decision tree workflow)



FARM PROCESS (**FMP**, Hanson et al. 2014) is designed to simulate the **balance between demand** (crop irrigation and on-farm inefficiency losses) **and supply** (surface-water deliveries, groudwater pumpage, etc.)



Output examples (demand and supply simulated trends)



Conclusions

FREEWAT is achieving the integration between Geographic Information System (GIS) and modelling tools, by simplifying (1) the storage, analysis and representation of geographic data; (2) the generation of simulation scenarios and guidelines to address water management activities.

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