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University of Malta (Valletta Campus)

Towards a Zero Carbon Economy Beyond 2030 Sustainable Urban Centres

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FREEWAT (*FREE and open source tools for WATer resource management*) is a **HORIZON 2020** project financed by the EU Commission under the call **WATER INNOVATION: BOOSTING ITS VALUE FOR EUROPE**.

FREEWAT's main result is an open source and public domain GIS integrated modelling environment (the FREEWAT platform) for the simulation of water quantity and quality in surface water and groundwater with an integrated water management and planning module.

www.freewat.eu









FREEWAT: The Project in Brief (1)

Lead Partner: Sant'Anna School of Advanced Studies, Pisa (SSSA)

Consortium: 17

Duration: April 2015- September 2017 (30 months)

Total cost of the project: EUR 1.411.162

EU contribution: EUR 1.411.162





FREEWAT: The Project in Brief (2)

Simplifying the application of the **Water Framework Directive** and other EU water related Directives;

Coordinating previous EU and national funded research to **integrate existing software** modules for water **management in a single environment** into the GIS based FREEWAT;

Innovative participatory approach gathering technical staff and relevant stakeholders (e.g. policy and decision makers) in designing scenarios for the proper application of water policies.





FREEWAT in Numbers





Numerical Model of the Gozo Mean Sea Level Aquifer System:

A tool which

- will facilitate the assessment of the aquifer system's quantitative status conditions;
- will permit the development of future groundwater exploitation scenarios and the evaluation of their impact on the long-term quantitative status of the aquifer system; and
- will enable a reliable evaluation of the long-term impacts on the aquifer system arising due to climate change.





Model development:

Considers the characteristics of the island of Gozo:

- Geological and Hydro-geological Characteristics
- Natural and Artificial Recharge
- Groundwater use by the public and private sectors







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Model Characteristics:

Boundary conditions

- Constant head boundary conditions at the coast
- No flow boundary condition along the Ghajnsielem-Qala fault

Hydro-geological Characteristics

- Resistance to flow where the Globigerina Limestone occurs at and below sea-level









Model Domain:

Horizontal Dimension

Discretization into a mesh of 173 rows by 288 columns square cells each of size 50×50 m; active and inactive cells.

Vertical Dimension

22 horizontal layers of constant thickness starting from 150m amsl down to 200m bmsl.

Increased discretization beneath sea-level to permit an improved representation of the freshwater-seawater interface.





Initial Results:

Model run under transient conditions over 12-stress periods.

Groundwater level is primarily regulated by public groundwater abstraction sources – localized impacts.

Impact of private abstraction is of a more regional nature – contributes to a general uplift of the freshwater-saltwater interface.





THANK YOU!

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