

Promoting water resource management through the use of ICT tools and participatory approach

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ABSTRACT

Even if several efforts is being spent to address Water Resource Management (WRM) issues, this is still an underrated topic at decision-making level. This is also due to the poor capacity by researchers to properly communicate problems and results about WRM.

ICT (Information and Communication Technology) tools may help in dealing with WRM. Among these, integrating modelling tools in GIS (Geographic Information System) environments is a valuable methodology to represent the hydrologic systems and their response to anthropic and climate stresses.

Within the H2020 FREEWAT (FREE and open source software tools for WATER resource management; www.freewat.eu) project, the application of ICT tools was combined with an innovative participatory approach and capacity building activities to promote the use of ICT tools for WRM. This contribution aims at presenting the most relevant results of the FREEWAT project, showing some application examples to real-world case studies.

Keywords: participatory approach, FREEWAT, GIS, ICT, technological transfer

METHODS

The FREEWAT project aimed at simplifying the application of EU water-related directives through the application of a free and open source, GIS-integrated platform for the simulation of several

processes involved in the hydrologic cycle (i.e., groundwater dynamics, interaction with surface water bodies, solute transport processes, etc.). This was accomplished within the framework of an innovative participatory approach, aimed at combining the scientific approach and the decision-making process for WRM, thus creating a shared environment among stakeholders, providing results for supporting the application of management and planning policies.

The FREEWAT platform was applied to several case studies involving stakeholders during the whole phase of technical characterization and modelling of the investigated groundwater body. This participatory approach allowed to test the effectiveness of strategies and measures foreseen within the RBMP and designed by EU Member States for achieving the good quantitative and qualitative status of groundwater bodies. At each case study, a Focus Group made of local stakeholders and technicians from river basin authorities, municipalities, research institutes, environmental protection agencies, environmental associations, etc., was set. Periodic meetings were organized to involve the participants during the technical phase of data collection, conceptual model definition, numerical model implementation and scenarios design, in order to test the effectiveness of measures foreseen within the RBMP.

RESULTS

Some of these above-mentioned experiences will be presented.

At Vrbansky plato (Slovenia), FREEWAT was applied to manage a Managed Aquifer Recharge facility within an alluvial plain near Maribor. The local water authority is intended to use the model developed to monitor the effects of polluting activities occurring at Maribor.

A groundwater flow model was developed to test the effects of sea level rise and rainfall scarcity up to 2100 in the Bremerhaven district (Germany). This was aimed at setting a strategy for climate change adaptation involving the local water authority.

Regarding the case study of Scarlino-Follonica (Italy), the FREEWAT model will be used by the regional authority to test groundwater remediation strategies in a large contaminated industrial site.

The density-dependent flow model developed for the aquifer system of the Gozo island (Malta) will allow assessing the qualitative and quantitative status of groundwater, currently classified as "poor" within the Water Framework Directive.

Within the Bakumivka river basin (Ukraine), three groundwater management scenarios were simulated in a rural environment, to compare different spatial patterns of land use and use of water resources.

CONCLUSIONS

Within the H2020 FREEWAT project, the application of ICT tools was combined with an innovative participatory approach and capacity building activities. During the technical phase of FREEWAT application to real-world case studies in EU and non-EU Countries, local stakeholders were involved and their perspective about the importance of using ICT tools for WRM was discussed. As a result of this approach, public authorities have the chance to build a dynamic representation of the hydrological systems, and to share it with decision-makers involved in WRM.

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