Joining participatory approach and spatially-based modelling tools for groundwater resource management

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Although a lot of science has been produced on Water Resource Management (WRM) in the Information and Communication Technology (ICT) sector, WRM is still poorly addressed via scientific means. Some reasons for this may be: the underrated importance given to this topic at political and decision-making level; the low-capacity of the research environment to transfer results; and missing numerical modelling capacities at agencies and governing authorities.

ICT may provide tools for water planning and management, as discussed within the ICT4WATER cluster initiative. Among these, GIS-integrated numerical modeling is a robust method to represent hydrological systems and to provide answers to problems of protection of groundwater resources. Because these tools require a high level of knowledge pertaining to various disciplines, they are often disregarded as complex "tricky games" providing unrealistic results. This is a barrier to the uptake of technologies for water management.

To overcome this issue, the application of ICT tools has been combined with an innovative participatory approach, and large capacity building activities, in the framework of the H2020 FREEWAT project (FREE and open source software tools for WATer resource management; www.freewat.eu). The major result of the project consists in an open source and public domain, QGIS-integrated modeling platform for promoting WRM.

FREEWAT capabilities have been demonstrated at 14 case studies in EU and non-EU Countries, where the effectiveness of few measures foreseen in River Basin Management Plans for achieving good status of water bodies was tested.

At each case study, a Focus Group (FG) participated by local stakeholders (e.g., river basin authorities, research institutions, environmental protection agencies, environmental associations) was formed and seven meetings were organized. During these meetings, the objective of each case study, the methodology to be adopted, including definition of the conceptual model and of data needed, were discussed. The FG also took decisions on scenarios to be simulated for testing the feasibility of the foreseen measures. FGs aimed at demonstrating that WRM may be performed with open source and public domain software and participants' perception on using ICT tools for WRM was discussed.

Some of the implemented models are now being used for operational purposes: Vrbansky plato (Slovenia), where FREEWAT is used to monitor remediation of heating oil spillage and the water supply company intends to maintain and use developed groundwater flow model for managed groundwater recharge with induced riverbank filtration; the Bremerhaven case study (Germany), where the local water authority intends to use the developed groundwater flow model for predictions; the Scarlino-Follonica case study (Italy), where the model will be used by the regional authority to manage private groundwater remediation projects in a large industrial contaminated site; the Gozo case study (Malta), where the model is being developed to support the assessment of good groundwater quantitative status as part of the implementation of the Water Framework Directive.