

Parallel session 8:

3. Suitability Mapping to Site Selection

8. GUIDING PRINCIPLES FOR GEOSPATIAL MAR FEASIBILITY MAPPING

C. Stefan¹, T.N. Martins², A. Chkirbene³, K. Khemiri³, C.F. Panagiotou⁴, S. Ghannem⁵, R. Bergillos⁵, G.Y. Ebrahim⁶

¹Research Group INOWAS, Institute of Groundwater Management, Technische Universität Dresden, Germany; email: catalin.stefan@tu-dresden.de

²Laboratório Nacional de Engenharia Civil, Lisbon, Portugal; email: tmartins@lnec.pt;

³Institut National Agronomique de Tunisie, Carthage University, Tunis, Tunisia; email: anis.chkirbene@inat.ucar.tn; khaoula.khemiri@inat.ucar.tn

⁴Department of Resilient Society, Eratosthenes Centre of Excellence, Limassol, Cyprus; email: constantinos.panagiotou@eratosthenes.org.cy

⁵Research Institute of Water and Environmental Engineering (IIAMA), Universitat Politècnica de València, Valencia, Spain; email: sghanne@upv.es; rbermec@upv.es

⁶International Water Management Institute, Addis Ababa, Ethiopia; email: g.ebrahim@cgiar.org

Abstract

An abundance of studies is published on regular basis on mapping the spatial suitability of managed aquifer recharge (MAR) using a GIS-based multi-criteria decision analysis (MCDA). Such studies are apparently easy to conduct since they are based on easily-accessible datasets and the outcomes are presented in form of overview maps showing the regional MAR suitability potential. A recent review revealed major gaps in the methodological approach, which could explain the extremely scarce reporting on the practical usability of these maps. This includes: a) the use of generic terminology of “MAR suitability” without consideration of specific objectives and technology involved, b) selection of only readily available datasets, c) confusing MAR with natural groundwater recharge, d) reproducing previous studies that are conducted in completely different socio-environmental contexts, e) introducing a strong bias in criteria standardization and weighting, etc. To increase the reliability, acceptance and usability of MAR suitability maps, a set of guiding principles are proposed and validated at different case studies: 1) the MCDA process must consider not only the capacity of an aquifer to get recharged but also the availability of water for storage and the sector-specific demand for MAR; 2) selection of suitability criteria must reflect the site-specific conditions (project objectives, infiltration method, water source, etc.); 3) non-physical criteria (economic, social, legal etc.) shall be integrated in the geospatial analysis and the criteria selected shall appropriately describe the relevant MAR processes; 4) the methodology can be used to reproduce and discuss multiple scenarios, including seasonal variability of demand and water resources, future climate and human development, alignment of MAR to IWRM principles (economic efficiency, environmental sustainability and social equity), etc.; 5) (and the most important) the entire study must be conducted in a participative manner with permanent consultations with key stakeholders. The direct involvement of stakeholders is crucial as it will create a sense of shared responsibility for the feasibility maps and their future use, which can further increase the acceptance of MAR implementation.