

# Selection of evolutionary multicriteria strategies: Application in designing a regional water restoration management plan

Udías A.

Redchuk A.

Cano J.

Galbiati L.

Sustainability of water resources has become a challenging problem worldwide, as the pollution levels of natural water resources (particularly of rivers) have increased drastically in the last decades. Nowadays, there are many Waste Water Treatment Plant (WWTP) technologies that provide different levels of efficiency in the removal of water pollutants, leading to a great number of combinations of different measures (PoM) or strategies. The management problem, then, involves finding which of these combinations are efficient, regarding the desired objectives (cost and quality). Therefore, decisions affecting water resources require the application of multi-objective optimization techniques which will lead to a set of tradeoff solutions, none of which is better or worse than the others, but, rather, the final decision must be one particular PoM including representative features of the whole set of solutions. Besides, there is not a universally accepted standard way to assess the water quality of a river. In order to consider simultaneously all these issues, we present in this work a hydroinformatics management tool, designed to help decision makers with the selection of a PoM that satisfies the WFD objectives. Our approach combines: 1) a Water Quality Model (WQM), devised to simulate the effects of each PoM used to reduce pollution pressures on the hydrologic network; 2) a Multi-Objective Evolutionary Algorithm (MOEA), used to identify efficient tradeoffs between PoMs' costs and water quality; and 3) visualization of the Pareto optimal set, in order to extract knowledge from optimal decisions in a usable form. We have applied our methodology in a real scenario, the inner Catalan watersheds with promising results. © Springer-Verlag Berlin Heidelberg 2014.