

# The Role of Systems Analysis in Sustainable Water Resources Management: Lessons Learned in Serbia - Abstract

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## Summary

Systems analysis in national water resources management has not been widely used in Serbia, even though sustainable development philosophy recognizes the need for evaluating engineering and management of water-related issues in many directions at different spatial and temporal scales. It is well known by national scientists and professionals that systems analysis offers a complex of concepts and methods capable to attack almost any problem related to water. Advances in information technologies and the provision of global transparency raised the significance of systems analysis in water resources, the use of its techniques and tools such as simulation and optimization, heuristic and meta-heuristic algorithms, river-basin simulation models, databases, accessible software, etc. Friendly communication facilities enabled by the internet advanced use of systems analysis methods, techniques, and tools, but their potential in real-life management of Serbian water and related resources are not recognized as would be expected. The reason is probably the multi-disciplines structure of the systems analysis approach and, to some extent, the inherent nature of multimedia art. Because in reality its use for water resources planning and especially management (mainly strategic) may look complicated, as a consequence commonly other disciplines of science and engineering exploit its achievements as their own, and the 'flavor' of systems analysis is not visible.

The paper stresses the importance of using advanced systems analysis techniques in water-related studies, particularly in searching for 'best solutions' in complex water resource systems. For instance, recently completed studies showed that weak optimization and multi-criteria analysis, as opposed to rigorous (true) optimization, may help decision-makers to easily formulate, develop and judge alternative solutions and actions, perform risk analyses and produce a wide range of unbiased soft solutions, easy to handle and evaluate before application. Participation of stakeholders from different sectors involved or related to water management was essential in decision-making and deriving group solutions. Discussions about aggregated and especially consensus-based solutions enabled the motivation of participants to search for better management scenarios. In addition, sensitivity analyses helped to identify impacts brought by different preferences of water users and other stakeholder groups, establishing methods for water quality control, enhancing organization and use of facilities, etc. Different concepts and methods of systems analysis are discussed in the paper, based on experience gained in Serbia. Selected examples of using river-basin simulation models and group decision-making sessions are briefly described to present what was learned while exploring the sustainability of water management plans, evaluating preferential water allocation schemes, and assessing possible consequences of water distribution scenarios on the regional scale in multiyear periods.

## Keywords

Systems analysis, water management, Serbia

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