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# Decision Support Systems in Water Resources Planning and Management: Stakeholder Participation and the Sustainable Path to Science-Based Decision Making

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## Description / Abstract

This chapter of the volume "Efficient Decision Support Systems" focuses on decision support systems (DSS) as they relate to water resources management and planning. Water is a resource that touches and is interwoven with numerous human activities as well as the environment we live in. Its availability and beneficial use depend on the timing and manner of its arrival (rainfall intensity, rain or snow, duration, frequency), the physical setting of the region (climate and weather, topography, geology), the engineering structures in place, the environmental constraints (existing ecosystems), the legal regulatory context and institutional policies. In most contexts, cultural values and preferences are also very important. To make good decisions, it is clear that a detailed understanding of how the system works and behaves is necessary. It is equally important to understand the implications of these decisions - what consequences are likely to ripple through the interwoven system, and what parties will be affected as a result of a particular set of actions? Understanding the coupled human and physical system is essential.

In addition to looking at the evolution of decision support tools and methods for water resources management (Section 2), this chapter focuses on how integrative science and multi-resolution models provide the basis for a decision support system (Section 3), on the overall setting of the decision making process and ways in which a DSS for water resources should be developed (Section 4). We make the argument that for a DSS to be successful and informative, the process by which it is developed will be as important, or even more so, than the finished decision support tool itself. A description of successful participatory planning approaches and collaborative modeling methods is presented, as well as a comparison of several case studies. Section 5 presents an overview on how to deal with uncertainty. We present our vision to merge adaptive management, integrative modeling and stakeholder participation to face the water management challenges of the arriving future. A synthesis and future challenges are presented in the last section.

**Publication year**

2010

**Publisher**

[IntechOpen](#)

**Keywords**

[Decision Support Systems](#) [Decision-making](#)

**Format**

Book chapter

Language English

[View resource](#)

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**Source URL:** <https://iwrmaactionhub.org/resource/decision-support-systems-water-resources-planning-and-management-stakeholder-participation>