

Development and implementation of DSS tools in the Mediterranean

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What is Nostrum-DSS?

It is a Co-ordination Action, funded by the EC FP6, which aims to improve governance and planning in the field of sustainable water management in the Mediterranean area:

- by establishing a network between the science, policy, and civil society spheres,
- by fostering active involvement of the relevant stakeholders,
- through the development and dissemination of Best Practices Guidelines for the design and implementation of DSS tools for IWRM.

What are the Nostrum-DSS Leaflet Series?

These brief documents summarise the main output of the project and represent an **entry door** to the wide range of products and resources available on the project's web site. They are composed of three kind of leaflets:

- Case studies leaflets
- Policy leaflet
- Technical leaflet

To whom this leaflet is addressed?

As part of the Technical leaflet series, this document is mainly addressed to **researchers and practitioners** interested in gaining insights on how *DSS tools and approaches* can support them in their everyday job, but may be useful to policy and decision makers too.

For further information see the NOSTRUM-DSS website:

→ <http://www.nostrum-dss.eu>

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Water management and decision making

Problems in water management all revolve around few main issues: i.e. the spatial and temporal uneven distribution of water resources as well as the bad quality of the water available. These features may furthermore be exacerbated by the growing population, the development and the climate change. The primary purpose of water resources management is, thus, to assure and improve the **allocation**, preserve **water quality**, cope with **extreme events** such as floods and mitigate droughts, and with inter-annual **variability** of water supply especially in the Mediterranean Area.

All the strategies which can be implemented have often proved to be unsustainable as they are implemented at the **local and sectoral level** and may cause the **relocation of problems**, current or future in other sectors.

New strategies and instruments have been developed to lead to a more sustainable use and allocation of water resources: for instance desalination, water re-use and harvesting (i.e. usually through small scale collection and storage systems) or via different systems of tariffs aiming to improve **efficiency in water use**.

The "best" strategy to adopt is often the **result of a long process** which involves different and competing interests. Given the complexity of the water assessment and planning/decision process, a significant role could be played by the adoption of Decision Support System (**DSS**) tools.

DSS support all phases of decision-making and may specifically support participatory approaches.

What is a DSS?

In broad sense a DSS is a **combination of the tool and the process of structuring problems**, thus, aiding decisions. In strict sense the concept refers to a wide range of computer-based tools developed to support planning and decision processes. DSS tools usually integrate 3 components:

- **Data management system** which collects, organises, and processes data and information and facilitates access and elaboration of time series of raw data.
- A variety of **models** and/or techniques and methods for decision analysis through which perform different analysis
- Customised **user interface** to facilitates the interaction with the system and support the communication and analysis of the models' outputs;

The basic functions of a DSS include:

- **Identify and structure** the problem, and define a consistent preference structure in terms of criteria, objectives, and constraints.
- **Design alternatives** that provide solutions to the problem as posed.
- **Select** preferred solutions from the set of alternatives based on the preference structure.

Experiences from the Nostrum-DSS Case Studies

Egypt

The Environmental Impact Assessment of the Southern Egypt Development Project has been supported by a DSS which evaluates all potential environmental impacts of irrigation projects.

Spain

As detailed in the Tagus river Case study, the Spanish Basin Authorities develop contingency plans for water management thanks to DSS tools.

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Glossary
 Meta-Guidelines
 DSS Tools

Why develop and use DSS?

The integration of different type of knowledge (e.g. local and expert knowledge), disciplines and perspectives in the development of effective management strategies is facilitated by the development and adoption of a DSS which **helps making basic elements** of the decision process (i.e. criteria, objectives, constraints) more **explicit**:

- DSS helps multidisciplinary team involved in the analysis of a common problem to establish a common language and **think in a structured way**. Criteria, objectives and constraints about the problem become more explicit through the whole process of development and application of a decision support system.
- The graphical features of a DSS **support communication** between stakeholders with different backgrounds. Visual aids help in fostering public participation and are particularly enhanced features of Deliberation Support Tools while web-based Group Decision Support Systems support collaborative decision making;
- Optimisation and simulation models help in the **analysis of possible trade-offs** and conflict situation for the identification of the most suitable within a set of alternative options. While the integration of multi-criteria evaluation techniques help in the selection of the benchmarking and ranking of the different options identified. The application of a DSS leads to a choice process more open, rational, free of contradictions, eliminate or at least indicate dominated alternatives, make trade-off obvious and thus negotiable, etc
- Geographic Information System (GIS) components help in the spatial **visualisation of measures and impacts** and facilitate the problem assessment by providing important information, for instance, for the allocation of water management infrastructures.
- In general, a DSS helps at least in **documenting the decision process** that leads to the choice of a particular option thus contributes to its increasing transparency and fairness.

DSS implementation

In general, the development of a DSS is framed within a methodological framework which: helps structuring the decision making process, forms the analysis of the problem, and facilitates the participation of key stakeholders in the various phases

A DSS is designed to offer a sufficiently rich **set of alternatives** to choose from: only if the set is large enough, we can expect it to include some sufficiently good and desirable alternatives.

The DSS is therefore primarily a **vehicle for communication**, as the related background of many participants, actors, and stakeholders always differ widely. It is a **tool for education and empowerment by information**, as much as a tool to structure decision processes: it provides a common language, easy to understand and to use, enables dialog and any compromise solution.

To see examples of methodological frameworks see the **NOSTRUM-DSS final products**

→ | <http://www.nostrum-dss.eu>

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To see examples of successful applications see the **NOSTRUM-DSS Meta-guidelines**

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