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MULINO

MULINO-DSS Demo

The MULINO Demo

- This demo consists of a slide show presenting the methodological approach developed by the MULINO Project for supporting the implementation of the Water Framework Directive
- The focus is in particular on the capabilities of the MULINO DSS software, described through its application in one of the case studies carried out during the 3-year project
- The estimated time to go through the whole demo is around 25 minutes

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Originale disponibile al sito http://siti.feem.it/mulino/

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1. the MULINO Project

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The MULINO Project

MULINO

MULtisectoral, Integrated and Operational
Decision Support System
for sustainable use of water resource
at the catchment scale"

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Funded by the EC-5FP-EESD programme
Sustainable Management and Quality of Water

The MULINO Consortium

FEEM -
Fondazione ENI Enrico Mattei
Italy

UATLA
Universidade Atlântica
Portugal

UCL
Université Catholique de Louvain
Belgium

SRI
Silsoe Research Institute
UK

CEC-JRC
European Commission Joint Research Centre
Italy

CRS4
Centre for Advanced Studies, Research and Development in Sardinia
Italy

RISSA
Research Institute of Soil Science and Agrochemistry of Bucharest
Romania

TIAMASG
Fundatia Pentru Tehnologia Informatiei Aplicate in Mediu, Agricultura si Schimbari Globale
Romania

IWE
Institute of Water and Environment– Cranfield University
UK

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Preamble

- Decision making for sustainable management of natural resources is a complex process.
- In this field Decision Support Systems can help decision makers by providing them with efficient and friendly tools for analysing and managing decisional problems and the underlying phenomena…

  …, but the intrinsic complexity of the process cannot be neglected. It should instead be managed and efficiently implemented in the software tool.

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Main objectives of the MULINO Project

- Design and implement an operational DSS tool to support decisions based on hydrologic modelling, multi-disciplinary indicators and a spatial multi-criteria evaluation procedure for catchment-based management of water resources.
- Test the multilingual tool in representative case studies (in It, Be, Pt, Ro and the Uk), in co-operation with local end users and stakeholders.
- Demonstrate the potential of the tool in assisting the sustainable management of water resources, targeting:
  - local water management administrations in implementing the new European water policy framework (WFD);
  - the EC, through its competent JRC, in the assessment of the evolution of water resource management at the local level and the development of new policy tools.

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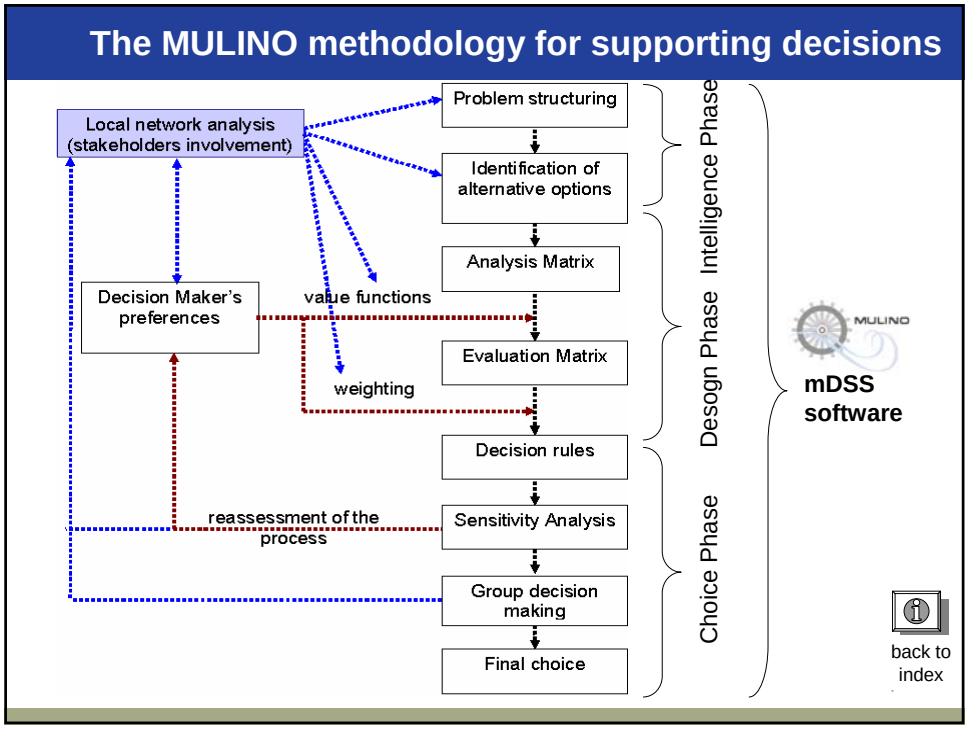

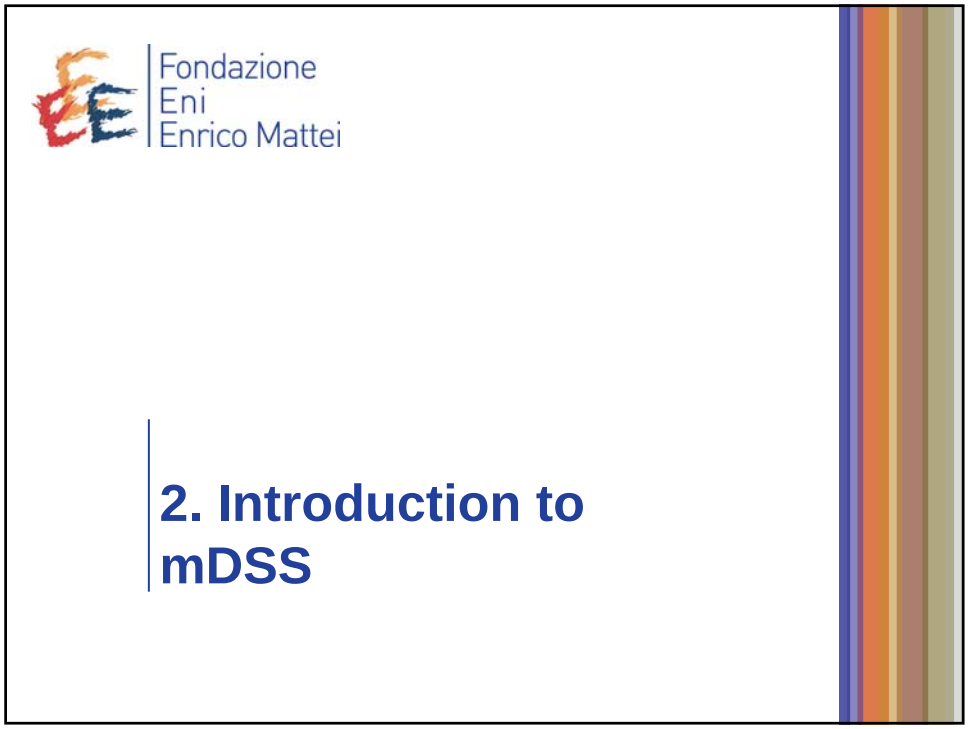

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mDSS design and application context

- *mDSS has been designed targeting the needs of the potential **end users**, in particular water administrations involved in the local implementation of the WFD;*
- *mDSS is specifically targeted to support the development of **RBMPs** and, in particular for:*
  - *the identification of **Pressures***
  - *the assessment of **Impacts**, and*
  - *the **identification of best options for the Programmes of Measures***
  - *the **involvement of stakeholders** in the planning process*

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The mDSS approach

- mDSS implements Mulit-Criteria Analysis (MCA) decision methods within a conceptual and communication framework developed upon the DPSIR approach (Drive-Pressure-State-Impact-Response).
- MCA comprise a set of methods for identification, assessment and aggregation of preferences among alternative choices, widely used in operational research and decision making.
- DPSIR is a system for organising information that emphasises cause-effect relationships designed for environmental problem solving. A methodological framework (or guideline) for decision-makers that summarises key information (indicators) from different sectors.

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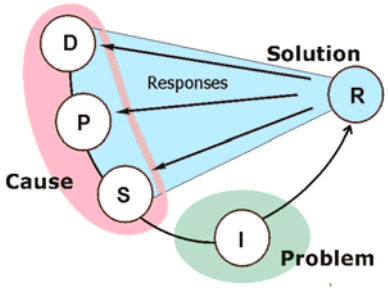
The DPSIR approach

- Driving forces = Underlying causes and origins of pressure on the environment
- Pressures = The variables which directly cause environmental problems
- State = The current condition of the environment
- Impact = The ultimate effects of changes of state, damage caused
- Response = Decisional option
  = Effort to solve the problem
  caused by the specific impact



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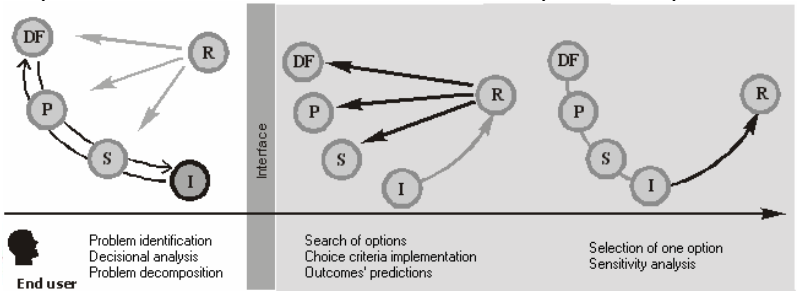
mDSS application by End Users

1 (Intelligence Phase) after the 1st involvement of stakeholders, the decision maker investigates the decisional context in mDSS and passes his conceptual vision of the problem to his technical staff;

2 (Design Phase) the technical staff implements the decisional problem, collect indicator data, defining the details and finding practical solutions to the decisional criteria previously identified;

3 (Choice Phase) the decision maker and his staff involve stakeholders and work with the system to investigate the decision, evaluate the responses and their outcomes and select the preferred option.



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3. The Vela case study

The Vela catchment

The Vela Catchment (106 km^2)

Vela is one of the sub-basins that drain into the Lagoon of Venice, therefore contributing to the overall pollution budget of the Lagoon.

The Venice Lagoon Watershed

The Vela case study

- The Veneto Regional Administration (VRA) made funds available to local Districts for projects aimed at improving the **ecological status** of surface waters of the Venice Lagoon Watershed;
- Admitted **measures** were: planting of buffer strips, supports/barriers on water courses, diversions, constructed wetlands, etc.
- The Administration of the Destra Piave District (DPD), developed a list of possible projects, and the MULINO methodology was used for selecting the **best set of measures**;

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Alternative options for decision

3 projects were selected out of the 12 options examined for this Demo:

- EXCAV_MEO: excavation of a tributary, the Meolo river, in order to increase the water retention time and as a consequence the potential self-purification effects for nutrient (N and P) discharges.
- DIV_CANDE: redirection of the discharge of an area (153 ha) from the Vallio river into the Candellara canal that drains outside the lagoon.
- BUF_VALLIO: plantation of a wooden buffer strip along one of the main rivers of the catchment, the Vallio river, to improve the phyto-remediation effect.

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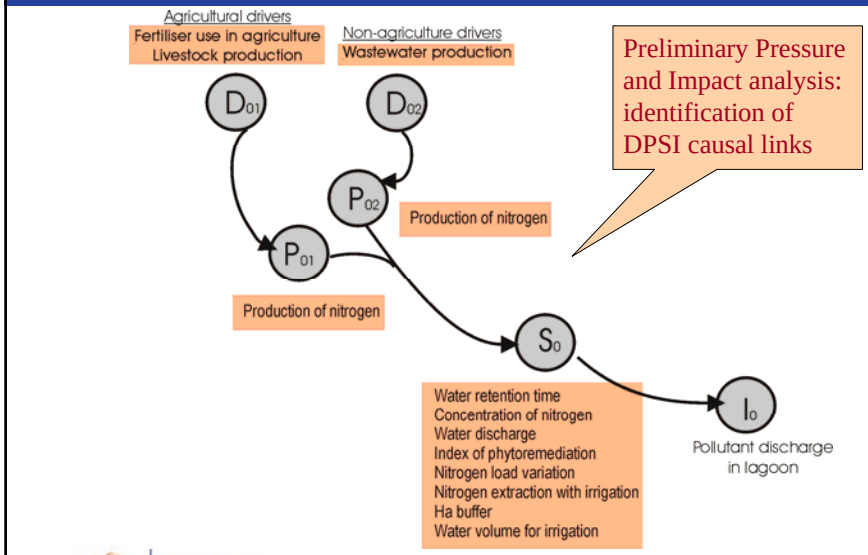
4. Formalisation of the case study with the MULINO approach

Conceptualisation of the environmental issue



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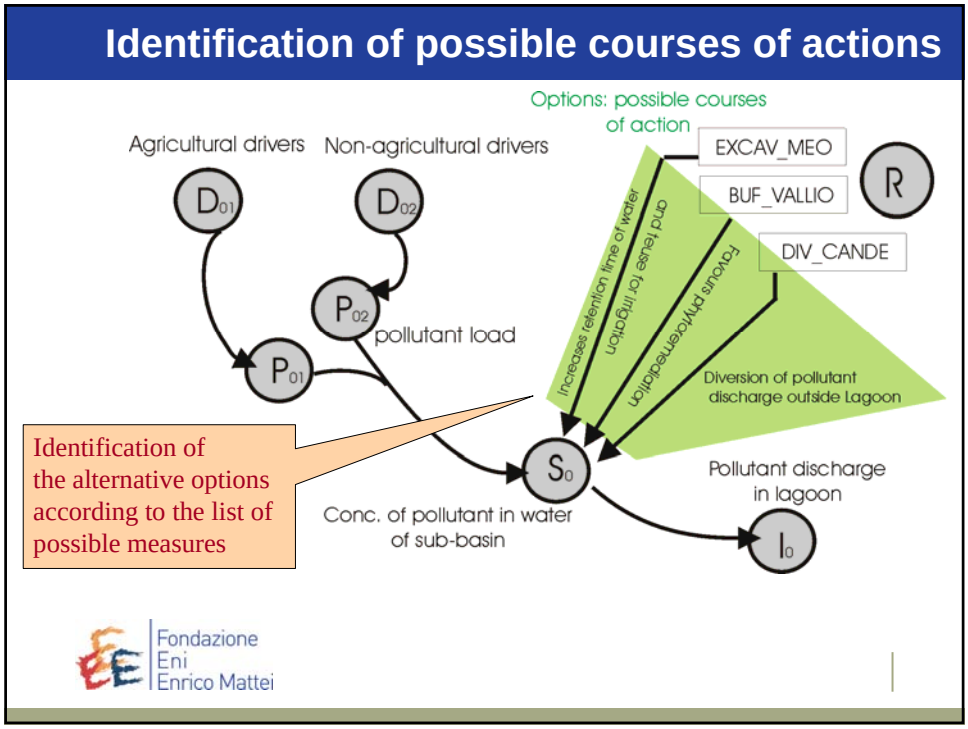

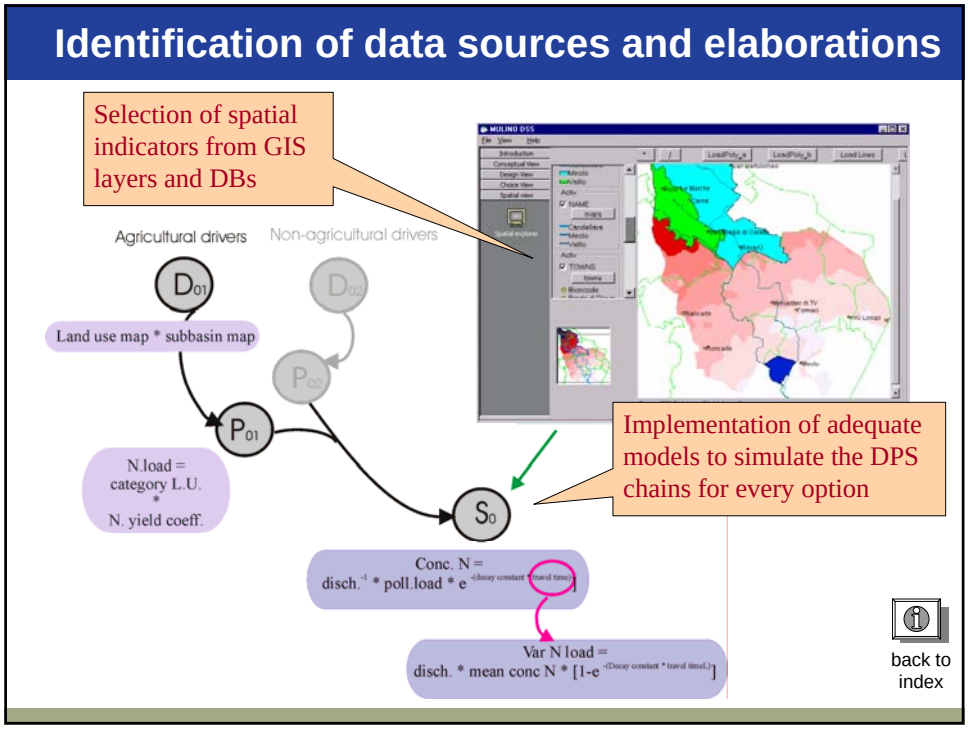

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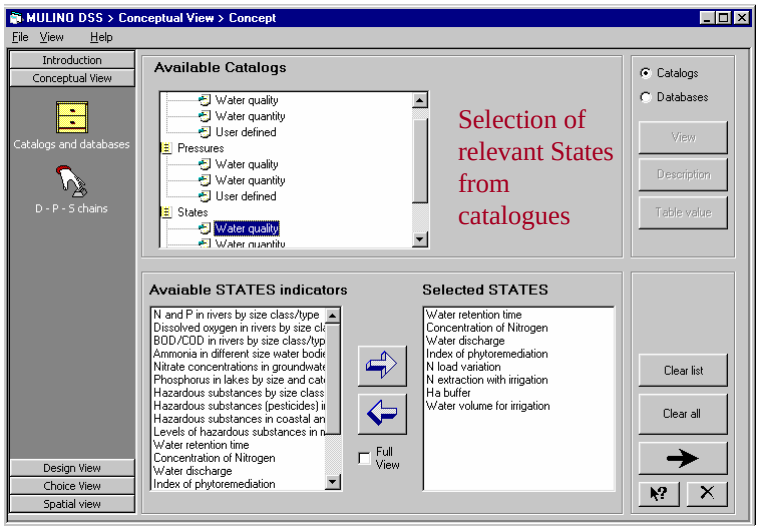
5. Implementation of the Vela case study in mDSS

Identification of DPS indicators



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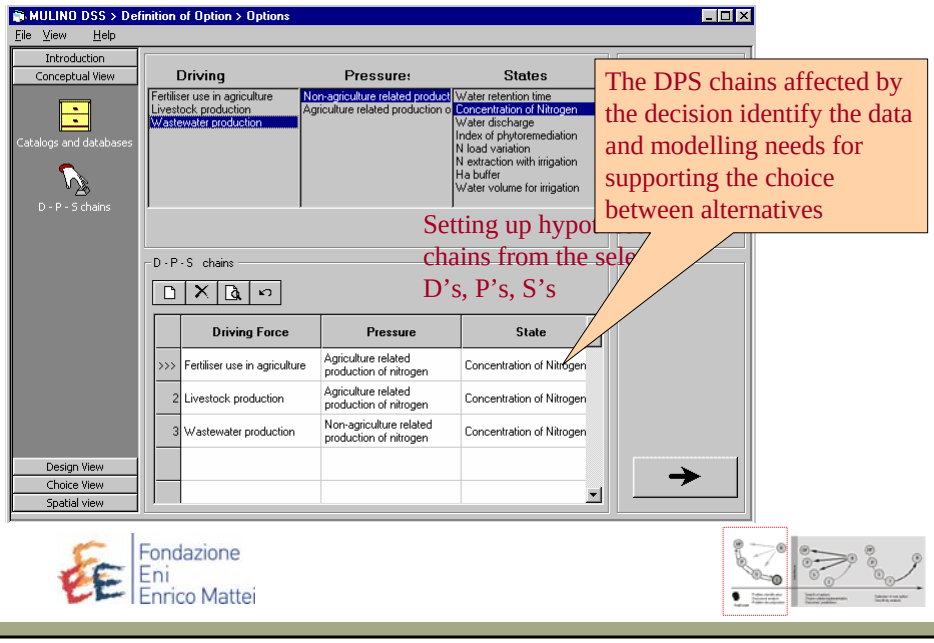
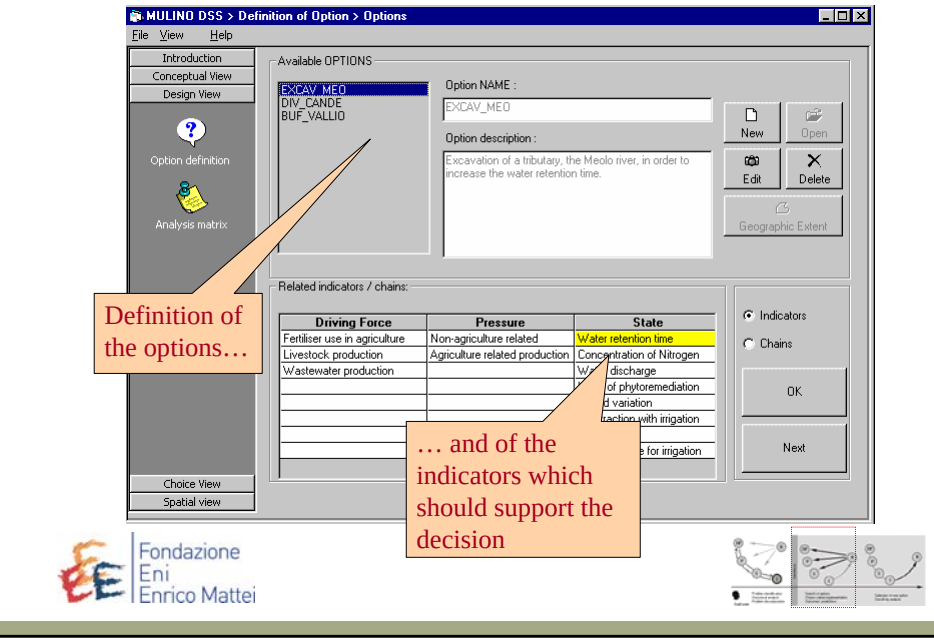
Causal links: DPS chains



Options and decisional criteria



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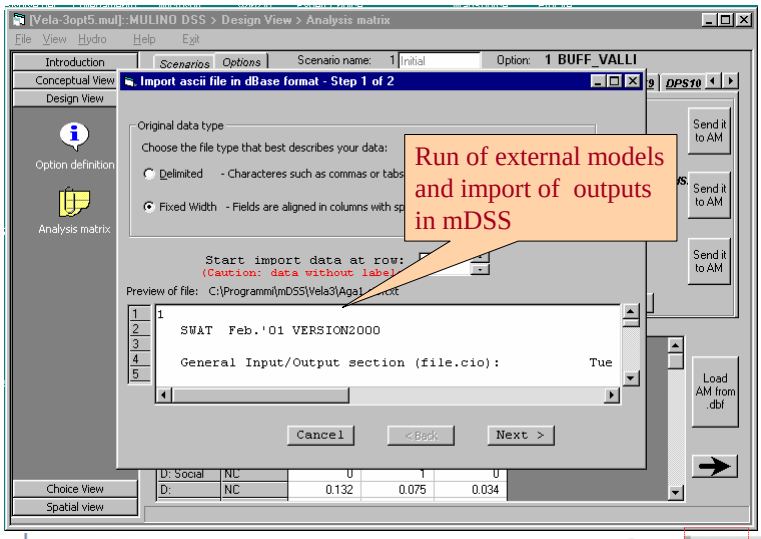
Loose or full coupling of models



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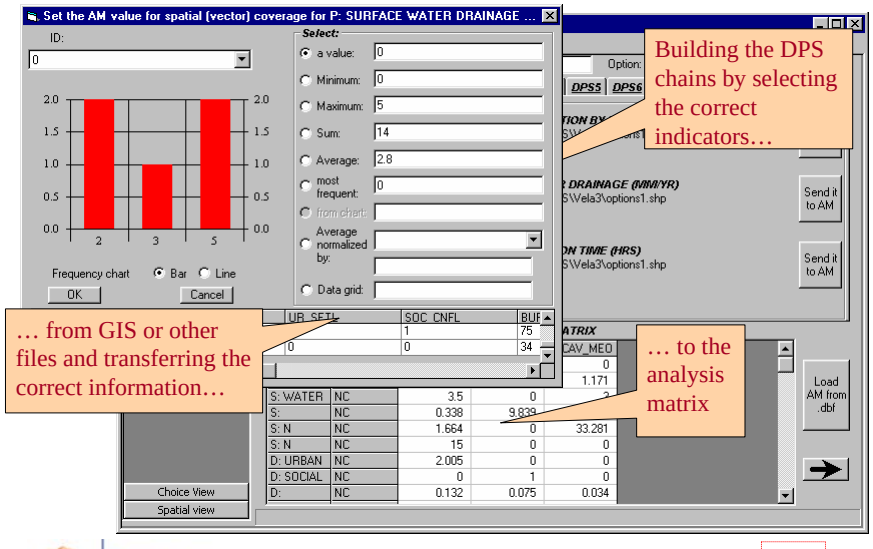
The analysis matrix



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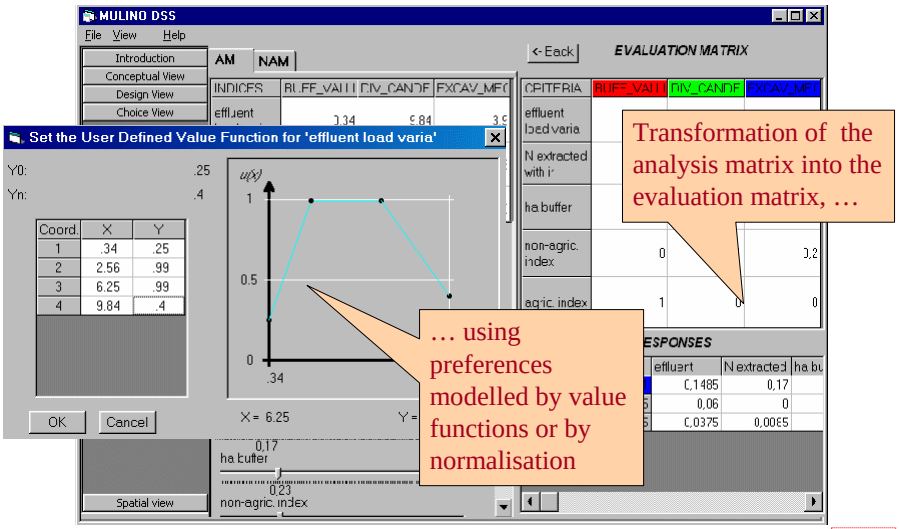
Value functions and evaluation matrix



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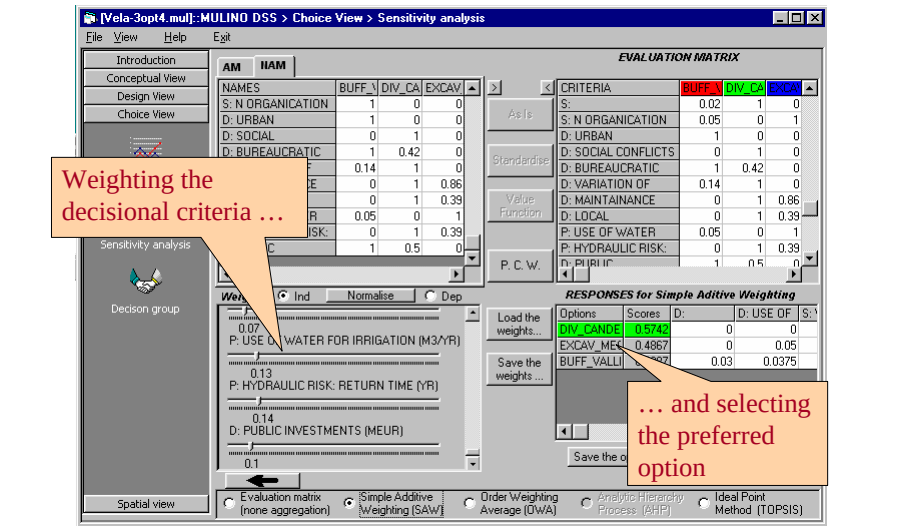
Weights and final scores of options



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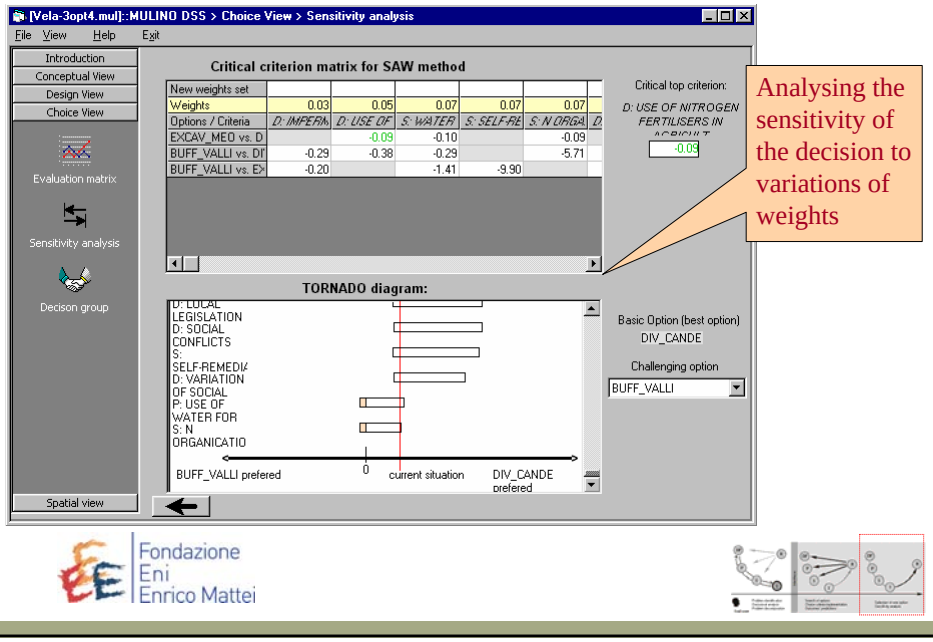
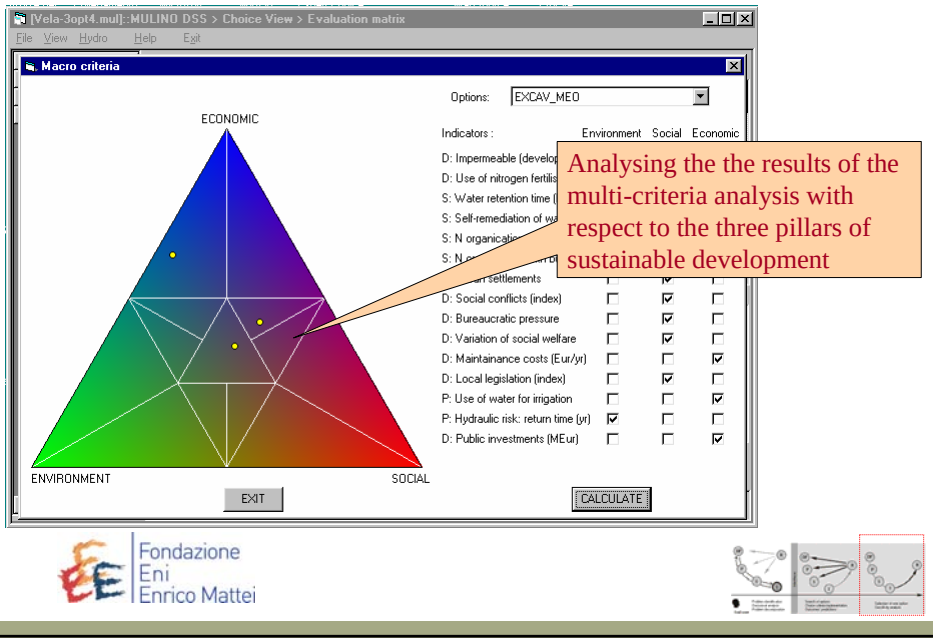
Sensitivity analysis



Sustainability analysis



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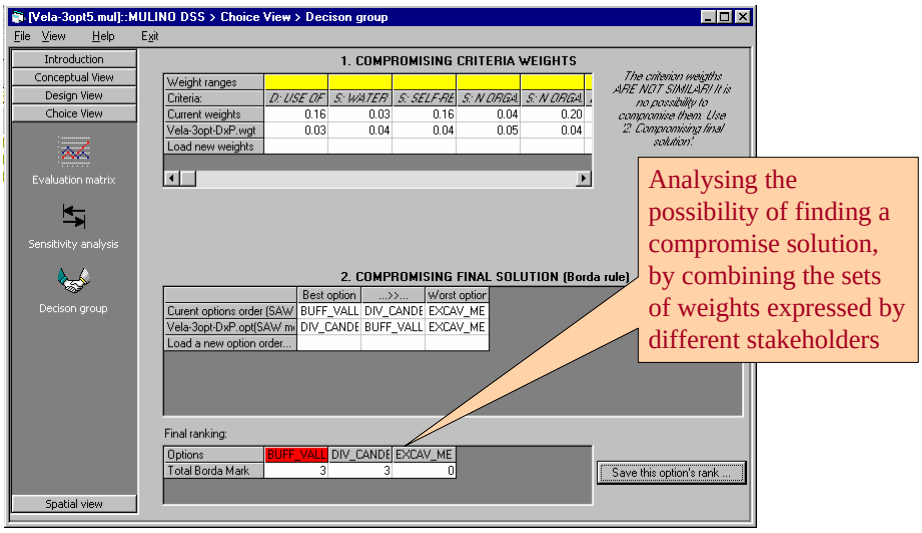
Group decision analysis



Analysing the possibility of finding a compromise solution, by combining the sets of weights expressed by different stakeholders

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The MULINO web page and CdRom

MULTI-SECTORAL INTEGRATED AND OPERATIONAL DECISION SUPPORT SYSTEM FOR SUSTAINABLE USE OF WATER RESOURCES AT THE CATCHMENT SCALE

All the project results (including mDSS) can be downloaded at **http://www.feem.it/web/loc/mulino/index.html**

MULINO

or requested at **mulino@feem.it**

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