Decision Support System (DSS)

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Decision Support System

It is an interactive computer-based system intended to help decision makers utilize data and models to identify and solve problems and make decisions.

Pressure – State – Response Framework

The **Drivers** are typically Socio-economic (e.g. driving water demand) and Climatic (driving the availability of water resources). The Socio-economic driver reflects the objectives of water resources development/management, and any external forces/controls. The **Climatic** driver reflects the impact of climatic variability/change.

- The Socio-economic driver is controlled by **Hydro-political** forces.

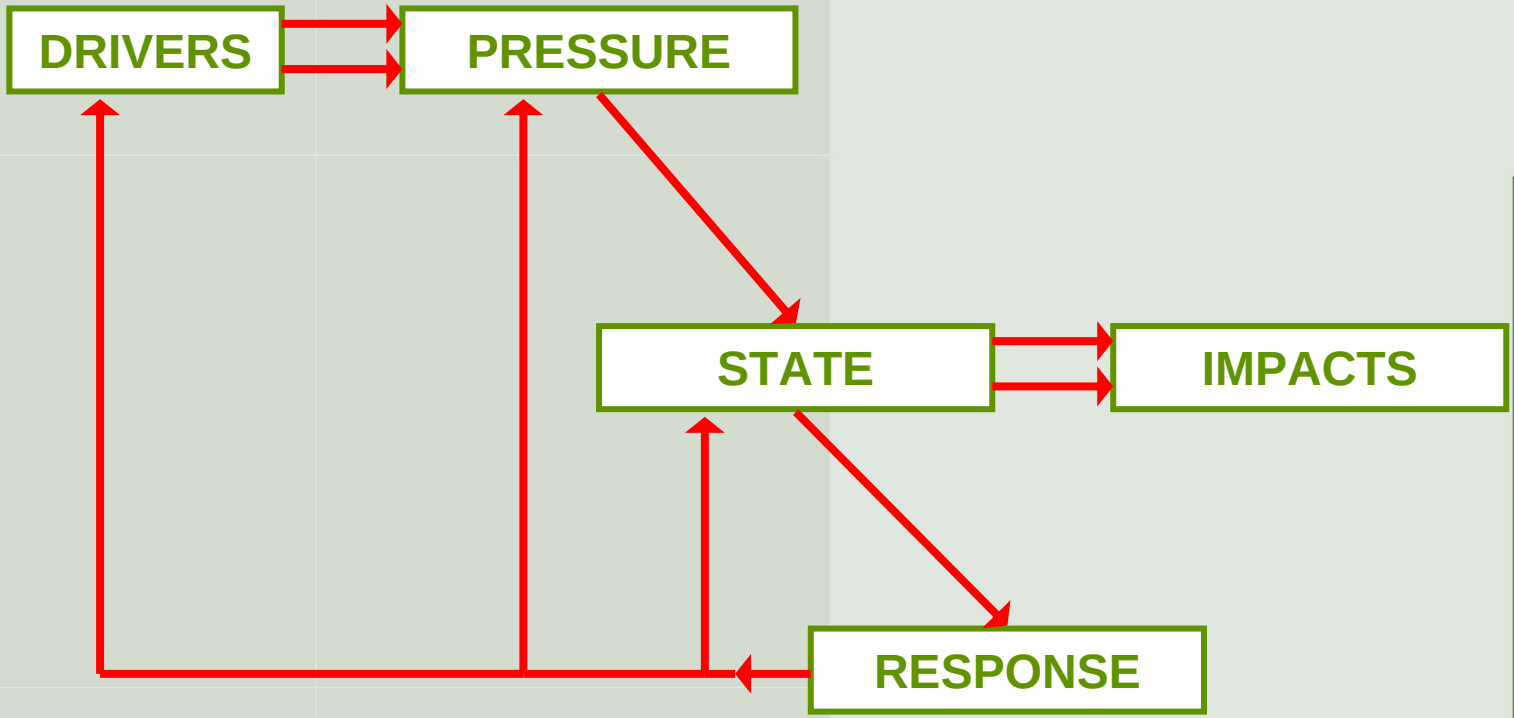
Pressure – State – Response Framework

- The Drivers are described by Scenarios which specify alternative Climatic, Socio-economic and Hydro-political futures.
- The future is uncertain, and cannot be predicted accurately. Scenarios can be used to express alternative representations of the future e.g. different Socio-economic / Hydro-political and Climatic futures.

Pressure – State – Response Framework

- The **Drivers** create the **Pressures**: Climatic, Hydro-political, Socio-economic
- The **Pressures** change the **State** of the system, resulting in Environmental, Social and Economic **Impacts**.
- The **Response(s)** represent the actions taken to improve the **State** of the system. In SUSMAQ terms, the responses are the **Management Options**.

Pressure – State – Response Framework

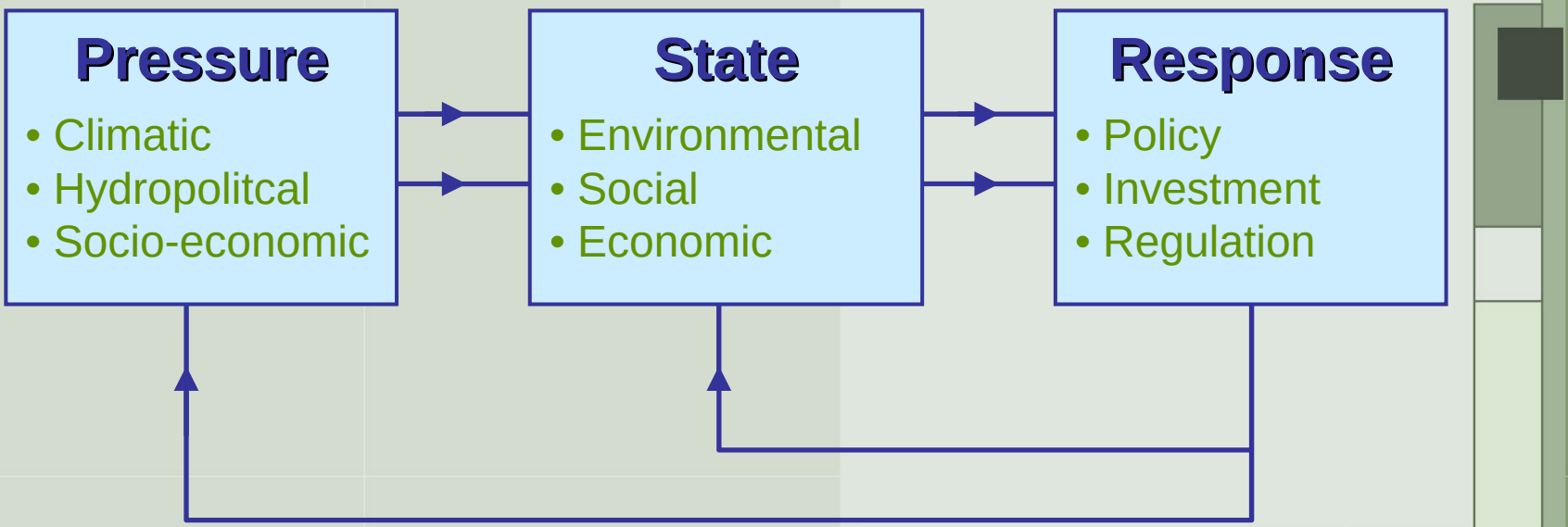


- Used by OECD, EU, National Governments

Pressure – State – Response Framework

- The Responses (MO's) include structural (e.g. capital investment) and non-structural (e.g. regulation, legislation) measures.
- The Responses (MO's) need to be evaluated to determine those that lead to sustainable outcomes, in environmental, social and economic terms. This evaluation process informs Policy-making.
- There are feedbacks from the Responses to the Drivers e.g. influences the SE drivers to modify water demand, the Pressures and the State(s).

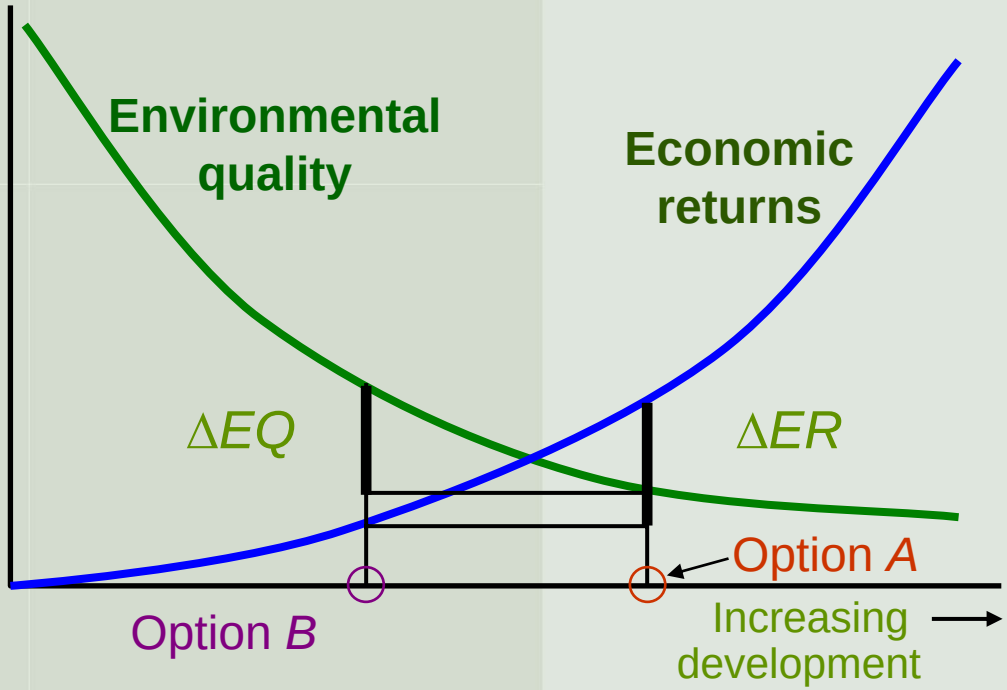
Pressure – State – Response Framework with Feedbacks



Objectives of DSS:

- To choose between alternative responses (MO's), Objectives are needed to measure the levels of achievement of alternative responses.
- The objectives of water resources development / management reflect overall National objectives:
  - Economic: support economic development
  - (agricultural / commercial / industrial)
  - Social: support social wellbeing and quality of life
  - Environmental: preserve an acceptable level of environmental quality
- Balancing conflicting objectives is a major challenge: involves trade-offs.

Trade-Offs between Environmental and Economic Objectives



Suppose a decision maker (DM) has to choose between **Options** ***A*** and ***B***. If the DM is willing to choose **Option *B*** rather than ***A***, then the DM is willing to forego Δ*ER* to prevent a decrease in environmental quality Δ*EQ*.

This is known as a **tradeoff**.

Management Options

- Management Options provide the means of bridging the Supply - Demand Gap; the order in which the options are implemented will reflect the prioratization of the objectives (e.g. water for health/life first etc.): determined using Multi-Criteria Analysis.

- Bridging the Gap can be achieved by supply options (e.g. new sources) or demand management options (e.g. leakage control) or a mixture of both.

Indicators

- Indicators are needed to measure the changes in the State resulting from the Responses (MO's) in the PSR framework. These indicators focus on describing the State of the system in Economic, Social and Environmental terms.
- The indicators also measure the levels of achievement of the objectives i.e. the changes in State must be driven by the achievement of the objectives.
- An Environmental Indicator could measure the extent to which over-abstraction has depleted the resources of the aquifer.

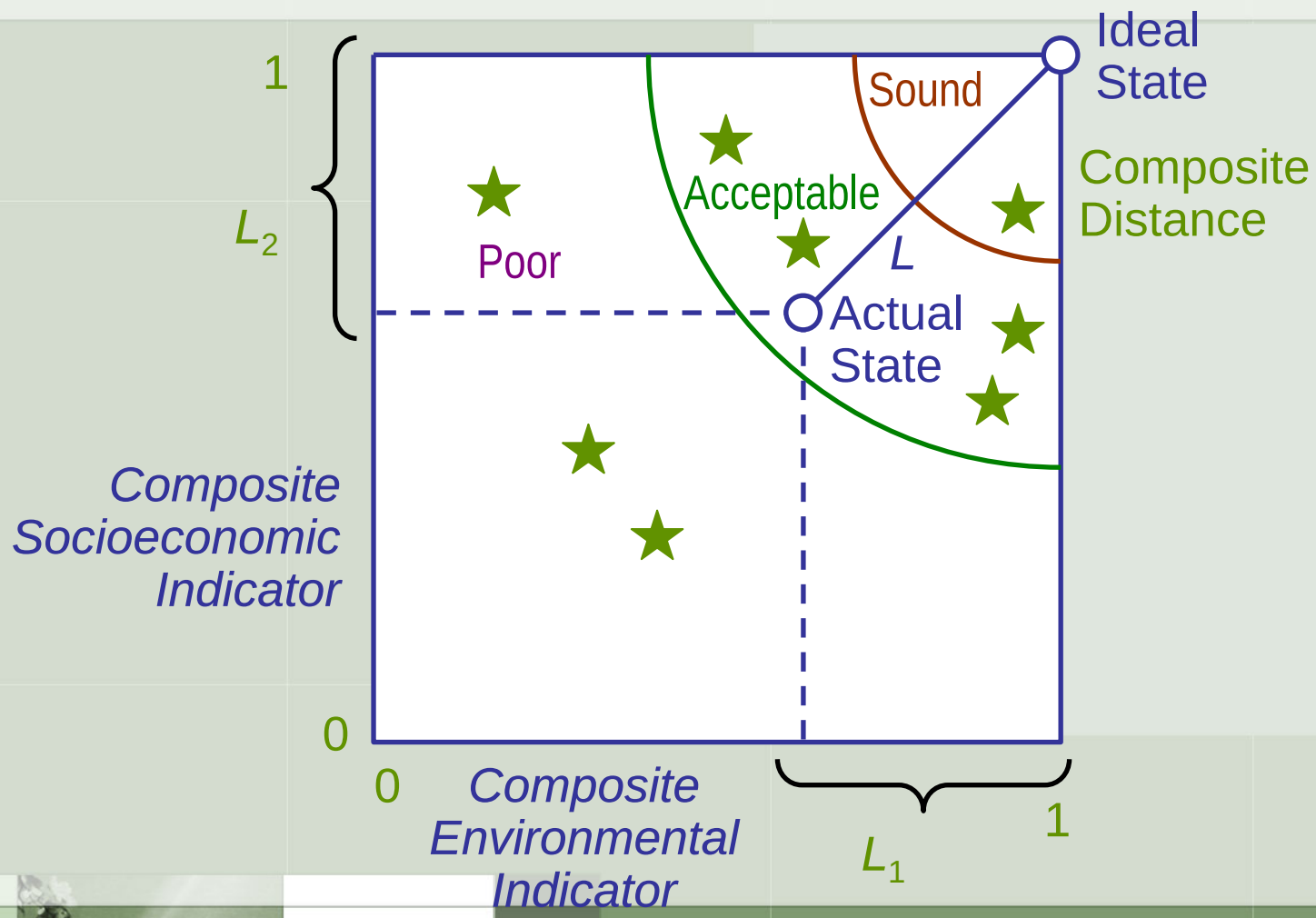
Indicators

- An Economic Indicator could be based on Internal Rate of Return (IRR).
- A Social Indicator could measure the link between poverty and access to water
- In the Multi-Criteria Analysis (MCA) Framework, the indicators provide the criteria for evaluating the Management Options against the objectives.

Multi-Criteria Assessment of Management Options

- UNESCO Multi-Criteria Decision Analysis Method for the integrated environmental evaluation of water resources development projects (management Option).

Graphical Representation of Ranked Management Options



IWRM Case study

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