WATER FRAMEWORK DIRECTIVE

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THE ROLE OF ECONOMICS IN THE WFD IMPLEMENTATION PROCESS

PLOVDIV, BULGARIA - 14th Nov. 2013
Hotel Imperial

WATECO - Paving the way for the 3-step approach
Second Roundtable

- Economic Analysis for determining the most Cost Effective Combination of Measures
- Value of Ecological Services
- Principle of Cost recovery
- Sources of Funding for PoM
- Access to EU Funding (Structural and Cohesion Funds etc.)
PRELIMINARIES REGARDING ECONOMICS AND WFD

- A double role for economics in the WFD process
  - provide information in the decision-making process
  - play as a measure for the implementation
- The higher the risk of gap, the more intensive the use of economics
  - potential non-compliance with the goal: HMWB, derogations

The WATECO Guidance: a detailed road-map on how to integrate and properly use economics in WFD process
FLOW CHART OF THE USE OF ECONOMICS

Main steps

- WFD "eco procedure"

Sub-steps

2004

1. Characterisation

   1- Assess economic significance of water uses and services
   2- Project trends in key indicators and drivers up to 2015
   3- Assess current level of cost recovery

2006

1. Identification of significant water issues

   1- Identify likely gaps in water status by 2015
   2- Propose actions when a likely gap has been identified
   3- Action when no likely gap has been identified

2008

1. Identification of measures and of their economic impact

   1- Evaluate the cost-effectiveness of potential measures
   2- Construct a cost-effective programme of measures
   3- Evaluate whether costs are disproportionate
   4- Assess the financial implication of the programme of measures
FLOW CHART OF THE USE OF ECONOMICS

Main steps

WFD "eco procedure"

Sub-steps

2004

Identification of significant water issues

1- Identify likely gaps in water status by 2015

2- Propose actions when a likely gap has been identified

3- Action when no likely gap has been identified

Identification of measures and of their economic impact

1- Evaluate the cost-effectiveness of potential measures

2- Construct a cost-effective programme of measures

3- Evaluate whether costs are disproportionate

4- Assess the financial implication of the programme of measures

Characterisation

1- Assess economic significance of water uses and services

2- Project trends in key indicators and drivers up to 2015

3- Assess current level of cost recovery
MAJOR WATER USES

Urban uses
- drinking water supply
- wastewater treatment

Industrial uses
- abstraction
- discharges

Agricultural uses
- abstraction
- diffuse discharges

Recreational / ecological uses
- angling
- bathing...

Source: Ministry of the environment, Québec, Canada

2004
### Economic Significance of Water Uses and Services

**Source:** Ministry of the Environment, Québec, Canada

#### Water uses

**Technical data**
- Abstraction for drinking water production
  - Surface water: 100 Mm$^3$/yr
  - Groundwater: 576 Mm$^3$/yr
- Discharges from urban wastewater treatment plants
  - 822 treatment plants - 6.24 M EH
  - 0.32 M individual systems - 1.18 M EH
- Industry
  - Abstraction: surface water: 844 Mm$^3$/yr; groundwater: 782 Mm$^3$/yr
  - Discharges: 158 treatment plants
- Agriculture
  - Abstraction: surface water: 14 Mm$^3$/yr; groundwater: 110 Mm$^3$/yr
  - Discharges: MOX: 2.18 M EH; nitrogen: 1 M EH; phosphor: 0.29 M EH
- Recreation
  - Number of tourists
  - Number of fishermen

**Economic data**
- Cost/m³ produced depending on the type of treatment: denitrification...
- Cost/m³ of damages caused by abstraction...
- Cost/m³ of specific treatments: nitrogen, phosphor...
- Cost of damages caused by discharges...
- Cost of water/surface
- Cost of damages...
- Average daily expense
- Local income generated by these activities...

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**Aspects closely connected**

**Identification of significant uses & services:** cf. 2004 characterisation
**EXAMPLES OF USEFUL DATA FOR THE DESCRIPTION OF THE DOMESTIC SECTOR**

<table>
<thead>
<tr>
<th>Water uses</th>
<th>Technical data</th>
<th>Economic data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drinking water supply</td>
<td>- volume of raw water abstracted: surface / groundwater</td>
<td>- cost/m³, global and detailed (operating costs, financial costs, etc.)</td>
</tr>
<tr>
<td></td>
<td>- volume of drinking water distributed</td>
<td>- cost/m³ produced depending on the type of treatment: denitrification...</td>
</tr>
<tr>
<td></td>
<td>- leakage rate</td>
<td>- cost of damages caused by abstraction</td>
</tr>
<tr>
<td></td>
<td>- population connected to public water system</td>
<td>- turnover of water supply companies</td>
</tr>
<tr>
<td></td>
<td>- population with self-supply</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- number of drinking water supply companies</td>
<td></td>
</tr>
<tr>
<td></td>
<td>...</td>
<td></td>
</tr>
<tr>
<td>Wastewater treatment</td>
<td>- population connected to sewerage system</td>
<td>- cost/m³, global and detailed (operating costs, financial costs, etc.)</td>
</tr>
<tr>
<td></td>
<td>- population connected with wastewater treatment plant</td>
<td>- cost of specific treatments: nitrogen, phosphor...</td>
</tr>
<tr>
<td></td>
<td>- number of treatment plants</td>
<td>- cost of damages caused by discharges</td>
</tr>
<tr>
<td></td>
<td>- population with individual wastewater treatment systems</td>
<td>- turnover of wastewater treatment companies</td>
</tr>
<tr>
<td></td>
<td>- number of wastewater treatment companies</td>
<td></td>
</tr>
<tr>
<td></td>
<td>...</td>
<td></td>
</tr>
</tbody>
</table>
QUESTIONS TO TACKLE WHEN COLLECTING DATA

Scale issues / (dis)aggregation
- e.g. when describing impacts and pressures: work at the scale of significant pressures, water uses/services
- e.g. when aiming at public participation: work at the (local) scale people feel concerned and get involved

Be pragmatic: adjust to your needs

Uncertainty
- Accuracy
  - depends on the significance of the impact described: limited accuracy is negligible when impact has little significance
  - depends on the use of the data: limited accuracy of individual data may be acceptable when data is aggregated at large scale
- Reliability
  - who produces/stores data? under what form?
  - how often is it updated?
  - ...

Always be transparent about methods you use, the degree of uncertainty, etc.

For 2004: apply cost-effective methods
For the future: consider new organisation for data production, storage and collection
WHAT IS THE USE OF THE DATA?

- employment in various economic sectors; demographic evolution...
  - appraise future water demand when constructing baseline scenario
- volume of effluents discharged; of raw water abstracted...
  - determine pressures and impacts of activities
- income / inhabitant; willingness to pay for higher water quality...
  - estimate the ability to pay to assess whether costs of possible measures are disproportionate
- cost of environmental damages; opportunity cost of water...
  - assess cost-benefit ratios when comparing / selecting the most cost-efficient measures
  - determine whether costs are disproportionate or not
- detailed structure of the price of water / m³; cost of specific treatments for drinking water production (denitrification...)
  - identify cross-subsidies and externalities when assessing the level of recovery of costs of water services
- daily expenses by tourists; turnover of fishing industry...
  - assess the benefits linked to a water body

When ultimate use of data is not obvious, explain it clearly to all actors.
## Baseline Scenario Up to 2015

<table>
<thead>
<tr>
<th>Trends</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuation of past trends</td>
<td>Present: demography - changes in land planning…</td>
</tr>
<tr>
<td>Impact of water policies</td>
<td>2015: implementation of water directives - planned investments in the water sector - new technologies…</td>
</tr>
<tr>
<td>Critical uncertainties</td>
<td>Present: new CAP - climate change…</td>
</tr>
</tbody>
</table>

**Impact in terms of water status**

Source of original map: Agence de l'Eau Seine-Normandie
**Example of Projection of Certain Changes in Water Policy Variables: Application to Urban Discharges**

**Hypothesis:**

*Full implementation of urban wastewater directive (91/271/EEC)*

- **Actions**
  - 306,000 more inhabitants connected to pipes
  - Rehabilitation of pipes
  - Creation, extension, improvement of 270 existing treatment plants (2,175M EH)
  - Improvement of stormwater collection

- **Impacts**
  - Better collection rate ⇒ more effluents to treat
  - Increased treatment performances ⇒ higher depollution rate

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**Discharges of organic matters from urban origins: projection in 2015**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Charge</th>
<th>Depollution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stormwater treatment</td>
<td>71</td>
<td>7</td>
</tr>
<tr>
<td>Urban wastewater treatment plant</td>
<td>1,487</td>
<td>1,347</td>
</tr>
</tbody>
</table>

Figures: x1000 EH

Source of original map: Agence de l'Eau Seine-Normandie
EXAMPLE OF PROJECTION OF CERTAIN CHANGES IN WATER POLICY VARIABLES: APPLICATION TO URBAN DISCHARGES

**Hypothesis:**
full implementation of urban wastewater directive (91/271/EEC)

**Estimation of costs**

<table>
<thead>
<tr>
<th>Actions</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>306 000 more inhabitants connected to pipes</td>
<td>610 M€</td>
</tr>
<tr>
<td>rehabilitation of pipes</td>
<td>75 M€</td>
</tr>
<tr>
<td>creation, extension, improvement of 270 existing treatment plants</td>
<td>323 M€</td>
</tr>
<tr>
<td>improvement of stormwater collection</td>
<td>110 M€</td>
</tr>
<tr>
<td><strong>Total estimated costs</strong></td>
<td>1 113 M€</td>
</tr>
</tbody>
</table>

**Impacts**

- 69 M€/yr if actions are phased between 2000 and 2015
- 185 M€/yr if directive deadline (2005) is implemented
- 101 M€/yr if implementation is "postponed" until 2010

Figures to be compared with actual investment: 46 M€ in 2000
CURRENT COST RECOVERY

Estimate all costs of water services:

- financial costs: operating, maintenance and capital costs
- environmental costs: damages caused by the water service
- resource costs: opportunity costs

E.g. 1m³ in the household sector: 2,63€/m³

<table>
<thead>
<tr>
<th>Financial costs</th>
<th>Ratio</th>
<th>Amount (€)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operating cost</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wages</td>
<td>35%</td>
<td>0,74</td>
</tr>
<tr>
<td>Electricity</td>
<td>10%</td>
<td>0,21</td>
</tr>
<tr>
<td>Outsourcing</td>
<td>21%</td>
<td>0,45</td>
</tr>
<tr>
<td>Misdemeanours</td>
<td>8%</td>
<td>0,17</td>
</tr>
<tr>
<td><strong>Sub-total</strong></td>
<td>74%</td>
<td><strong>1,57</strong></td>
</tr>
<tr>
<td><strong>Capital costs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investment</td>
<td>16%</td>
<td>0,34</td>
</tr>
<tr>
<td>Depreciation</td>
<td>10%</td>
<td>0,21</td>
</tr>
<tr>
<td><strong>Sub-total</strong></td>
<td>26%</td>
<td><strong>0,55</strong></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>100%</strong></td>
<td><strong>2,12</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Environmental costs</th>
<th>Fee</th>
<th>Amount (€)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstraction</td>
<td>0,03</td>
<td></td>
</tr>
<tr>
<td>Discharge</td>
<td>0,48</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>0,51</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Resource costs</th>
<th>Amount (€)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Not covered</strong></td>
<td>0</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>0</td>
</tr>
</tbody>
</table>
Identify financial flows in main sectors

- households
- agriculture
- industry

**E.g.: household sector**

- **Agriculture**: transfers (33), taxes (13)
- **Industry**: transfers (19)
- **Water Agency**: envir’al fund (18)
- **State**: water fund (12)
- **Environment**: protection expenses (18)
- **Municipalities**: transfers (91)
- **Households**: taxes (840), tariffs (690), subsidies (300)
- **Drinking water supply utilities/companies**: 840
- **Wastewater treatment utilities/companies**: 690

**CURRENT COST RECOVERY**

- **State**: Households (336), Environment (33)
- **Water Agency**: Industry (321)
- **Environment**: Water Agency (333)
- **Industry**: Agriculture (275)
- **Agriculture**: Industry (328)

**Actors involved financial flows amounts (M€/yr)**

- **Environment**: 18
- **Water Agency**: 19
- **State**: 12
- **Municipalities**: 91
- **Households**: 840, 690
- **Drinking water supply utilities/companies**: 300
- **Wastewater treatment utilities/companies**: 336
**RECOVERY RATE OF THE ECONOMIC COSTS**

Cost Recovery Rate = \( \frac{\text{Total revenues} - \text{subsidies}}{\text{Total costs}} \times 100 \)

Source: WATECO Guidance

<table>
<thead>
<tr>
<th>Elements</th>
<th>Figure (M€)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total revenues</td>
<td>1915</td>
<td>Service paid + internalised environmental costs through fees paid to water agency</td>
</tr>
<tr>
<td>Subsidies</td>
<td>&gt; 391</td>
<td>Supplementary subsidies may be awarded in rural municipalities. Not fully included here.</td>
</tr>
<tr>
<td>Total costs</td>
<td>&gt; 1921</td>
<td>Financial costs are estimated. Environmental costs are only partially accounted and estimated. Resource costs are not included</td>
</tr>
</tbody>
</table>

Cost Recovery Rate: < 79 %
FLOW CHART OF THE USE OF ECONOMICS

2004

Characterisation

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Identification of significant water issues

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IDENTIFICATION OF POTENTIAL GAPS IN STATUS

No likely gap in 2015

- identification of water bodies concerned
- pre-estimation of the cost of the measures
- pre-identification of the impact on socio-economic groups

Likely gaps in 2015

- identification of water bodies concerned
- identification of the main drivers of pressures
  - e.g.1: salted effluents from former mines discharging in an aquifer
  - e.g.2: dam for flood protection in an estuarine...
- pre-identification of supplementary measures
  - e.g.1: removal of salt tips, pumping wells...
  - e.g.2: removal of dam and mitigation measures: higher dikes, new water resources...

Source of original map: Agence de l’Eau Seine-Normandie
FLOW CHART OF THE USE OF ECONOMICS

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**BASIC MEASURES**

Measures required for the implementation of directives

E.g. drinking water directive (98/83): nitrates < 50mg/l; pesticides < 10µg/l

Which measure could best achieve compliance with these norms at the lowest cost?

<table>
<thead>
<tr>
<th>Measure</th>
<th>Effectiveness</th>
<th>Costs</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Preventive</strong></td>
<td>Full compliance with norms due to the improvement of the quality of raw (ground)water</td>
<td>0,29€/m³</td>
<td>Action at source enhances likeliness of using this resource in the long term and facilitates compliance with potential future stricter norms</td>
</tr>
<tr>
<td>Co-operative agreement with farmers: change in cultivation methods vs. compensation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Curative</strong></td>
<td>Full compliance with norms due to higher effectiveness of new facilities (once they will be in operation)</td>
<td>0,21€/m³ (nitrates) 0,06€/m³ (pesticides)</td>
<td>Treatment facilities may not suffice if nitrates concentrations in groundwater keep increasing</td>
</tr>
<tr>
<td>New treatment facilities: filtration, denitrification</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Associated benefits of preventive measures may also be considered: improvement of raw water quality, potential better protection v. floods, farmers' awareness...
SUPPLEMENTARY MEASURES

Measures required to fill the gap in water quality between the result of business-as-usual evolution and GES.

E.g. given existing uses and their likely evolution, it is necessary to increase the water flow of a river (+50 l/sec.) to reach GES.

What possible measures for improving the water flow?

M1. Reduce water demand
   A- Water Saving Programme (WSP) in the agriculture sector:
      × reduce the demand
      × implement more efficient technologies
      × ...
   B- Water saving programme (WSP) in the urban sector

M2. Increase the efficiency of the water distribution networks
   A- In urban areas
   B- In rural areas

M3. Import water from another basin
**SELECTION OF SUPPLEMENTARY MEASURES: COST-EFFECTIVENESS ANALYSIS**

Which measures could ensure the greatest increase in water flow at the lowest cost?

<table>
<thead>
<tr>
<th>Measures</th>
<th>Maximum water saving (m³)</th>
<th>Annual Equivalent Cost (€)</th>
<th>AEC/ m³</th>
<th>Maximum flow increase (l/sec.)</th>
<th>AEC/ l/sec.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water imports</td>
<td>unlimited</td>
<td></td>
<td>0.224</td>
<td>unlimited</td>
<td>7 560</td>
</tr>
<tr>
<td>Efficiency in water networks</td>
<td>695 258</td>
<td>58 072</td>
<td>0.260</td>
<td>1.11</td>
<td>5 232</td>
</tr>
<tr>
<td>Installation of meters</td>
<td>88 989</td>
<td>25 376</td>
<td>0.280</td>
<td>2.8</td>
<td>8 993</td>
</tr>
<tr>
<td>Saving campaigns for consumers</td>
<td>103 820</td>
<td>17 744</td>
<td>0.170</td>
<td>3.3</td>
<td>5 390</td>
</tr>
<tr>
<td>Saving programme for households</td>
<td>136 330</td>
<td>20 805</td>
<td>0.150</td>
<td>4.3</td>
<td>4 813</td>
</tr>
<tr>
<td>Saving programme for firms</td>
<td>48 589</td>
<td>5 201</td>
<td>0.110</td>
<td>1.5</td>
<td>3 376</td>
</tr>
<tr>
<td>Saving programme for institutions</td>
<td>27 822</td>
<td>5 300</td>
<td>0.190</td>
<td>0.9</td>
<td>5 896</td>
</tr>
<tr>
<td>Water recycling</td>
<td>350 000</td>
<td>92 855</td>
<td>0.260</td>
<td>11.1</td>
<td>8 367</td>
</tr>
</tbody>
</table>

Goal: +50l/second to achieve GES

Source of the original table: "Scoping and testing key elements of the economic analysis for the WFD", Ministry of the Environment, Government of Navarra, Spain, 2002

Ranking may change depending on the indicator

choose it carefully
ASSESS THE DISPROPORTION OF COSTS

### Description of the case

<table>
<thead>
<tr>
<th>Type of water body</th>
<th>Aquifer close to former salt mines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure</td>
<td>Discharge of salted water from salt tips</td>
</tr>
<tr>
<td>Measure 1</td>
<td>Construction of lines of pumping wells downstream the highly polluted areas</td>
</tr>
<tr>
<td>Measure 2</td>
<td>Construction of lines of pumping wells downstream the highly polluted areas + in the centre of the pollution plume</td>
</tr>
</tbody>
</table>

### Estimated costs (M€)

<table>
<thead>
<tr>
<th>Cost Item</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction of the wells</td>
<td>9</td>
</tr>
<tr>
<td>Operation of the wells</td>
<td>8,9</td>
</tr>
<tr>
<td>Connection of wells (11km)</td>
<td>2,5</td>
</tr>
</tbody>
</table>

### Estimated benefits (M€)

#### For direct users

<table>
<thead>
<tr>
<th>Benefit Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture: avoided damages to equipment, soil and crops due to salinisation</td>
<td>3,1</td>
</tr>
<tr>
<td>Public water supply: no further treatment required</td>
<td>13,8</td>
</tr>
</tbody>
</table>

### Cost-benefit analysis for each measure

<table>
<thead>
<tr>
<th>Measure</th>
<th>Total cost (M€)</th>
<th>Cost/surface restored (k€/ha)</th>
<th>Cost/household (€/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure 1</td>
<td>32</td>
<td>6,7</td>
<td>39,2</td>
</tr>
<tr>
<td>Measure 2</td>
<td>44,3</td>
<td>9,2</td>
<td>54,3</td>
</tr>
</tbody>
</table>

Cost-benefit analysis includes financial and environmental costs; direct/indirect; present/future.
**ASSESS THE DISPROPORTION OF COSTS**

Are costs disproportionate regarding benefits, willingness to pay and affordability?

<table>
<thead>
<tr>
<th>Measure</th>
<th>Total cost (M€)</th>
<th>Cost/surface restored (k€/ha)</th>
<th>Cost/household (€/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure 1</td>
<td>32</td>
<td>6,7</td>
<td>39,2</td>
</tr>
<tr>
<td>Measure 2</td>
<td>44,3</td>
<td>9,2</td>
<td>54,3</td>
</tr>
</tbody>
</table>

If costs are judged disproportionate...

... Does phasing of the implementation allows to reach the goal under acceptable conditions?

⇒ *seek a time derogation*

... Do costs remain disproportionate despite phasing of the implementation?

⇒ *seek a less stringent objective*

Potentially disproportionate compared to ability to pay: 36€/year/household

⇒ more accurate assessment of costs and of future benefits

Do costs remain disproportionate despite phasing of the implementation?
COST-EFFECTIVENESS OF POTENTIAL MEASURES

Assess the cost-effectiveness of individual measures
- direct / indirect costs and benefits
- economic and non-economic impacts...

Compare (sets of) measures targeting the same goal

Combine the selected best measures to construct the programme of measures

E.g. goal: improve the quality of water

* M1- Restoration of wetlands
  ⇒ 1ha treats 21.7kg BOD5/day
  ⇒ restoration/maintenance costs?

* M2- Wastewater treatment plant
  ⇒ depollution cost of 1kg BOD5~0.45€

* M3- ...

* Set 1- Improve water flow by reducing water demand, importing water...

* Set 2- Restore wetlands, promote individual treatment systems...
  ⇒ benefits generated by wetlands vs. wastewater treatment plant: 9700€/ha

* Set 3- ...

- Basic measure
- Supplement measure
- Supplement measure
- Supplement measure
FINANCIAL IMPLICATIONS OF THE PROGRAMME OF MEASURES

- What are the socio-economic implications?
  - impact on cost recovery

- What are the financial implications for water users?
  - impact on water prices may lead to re-assess cost-effectiveness of selected measures
    - E.g. pricing policies

- Are accompanying measures needed for the implementation of the plan?
  - institutional adjustments
  - legal changes...
MAIN OUTPUTS FROM WFD "ECO PROCEDURE"

2004

Characterisation

Economic "weight" of water uses now / in 2015

2006

Identification of significant water issues

Assessment of the cost of basic measures
Identification of socio-economic groups likely to be affected by gaps / mitigation measures

2008

Identification of measures and of their economic impact

Cost-effective programme of measures

Main steps of WFD "eco procedure"
- Characterisation
- Identification of significant water issues
- Identification of measures and of their economic impact

Key outputs
GO FURTHER

- How to cope with uncertainty?
HOW TO COPE WITH UNCERTAINTY?

**In the short term**
- Use available data with all necessary care: extrapolation, experts' saying, aggregation...
- Produce lacking data when essential
- Identify clearly the key data gaps and costs to fill them in / the uncertainty to prevent from misunderstanding / ease future updating

**In the mid-term**
- Organise/plan the permanent collection / production of data
- Update initial data and results as soon as possible

**In the long-term**
- Organise capacity-building
- Integrate data production in the continuous process of updating the management plan