Plan Bleu - UNEP/MAP Regional Activity Center

Water demand management

Selecting the measures to implement in your region

November 2014

A DECISION-MAKING SUPPORT GUIDE FOR LOCAL AUTHORITIES

MAP

Plan Bleu

Publication produced under the leadership of Plan Bleu's director, Hugues Ravenel.

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Foreword

Issues surrounding Water Demand Management (WDM)

A SITUATION OF WATER STRESS AND INCREASING PRESSURES ON WATER RESOURCES IN THE MEDITERRANEAN

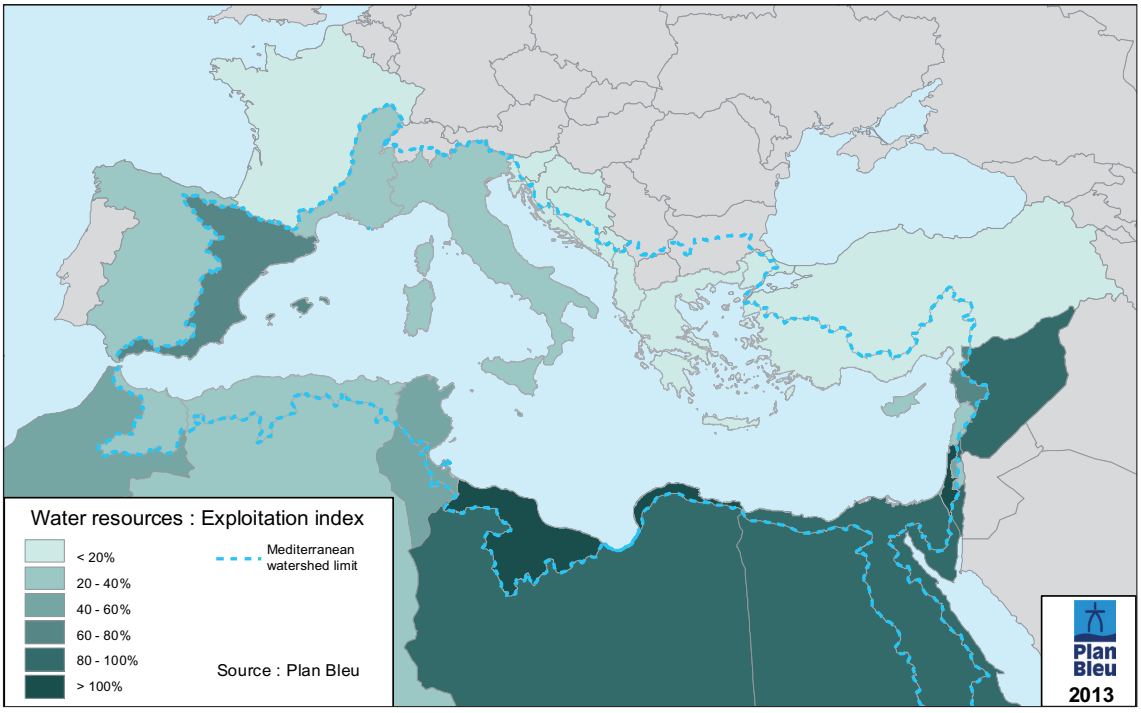
Most Mediterranean countries (particularly Southern and Eastern Mediterranean countries) have reached a situation of water stress[1] where water resources of satisfactory quality are insufficient to meet human and environmental needs.

In addition to water scarcity, which is inherent to the Mediterranean climate, there are anthropological pressures, such as rapid growth, an increasingly urban and coastal population and the development of polluting economic activities that consume large quantities of water (agriculture, tourism, industry, transport, etc.).

These factors have an impact on both the **quantity of available water** (most of the region's resources are overexploited and some groundwater reserves have already reached an exploitation index of over 100%) and its **quality** (environmental pollution and degradation of resources and the environment). **Climate change** is also adding to the threat and shortening timeframes.

Together, these phenomena constitute a **threat for the economic growth of these countries, particularly with regard to meeting the vital needs of populations**, making it essential for suitable measures to be adopted.

Figure 1: Water index for natural renewable resources in Mediterranean cathment areas (2005-2010)



1 The water scarcity threshold set by the UN (less than 1,700 m^3 of fresh water available per inhabitant per year).

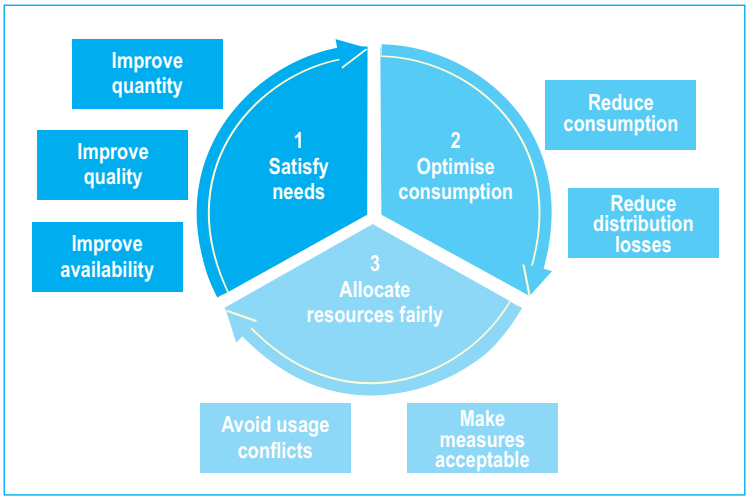
It is no longer possible to meet all water demand simply by increasing supply. An **integrated approach based on Water Demand Management (WDM) and the sustainable use of resources** therefore emerges as a major, even crucial instrument for action.

WATER DEMAND MANAGEMENT AS A RESPONSE TO THREATS

WDM is defined as **all measures aiming to increase the technical, social, economic, environmental and institutional efficiency of the various water uses**. It seeks to reduce losses and optimise uses, in order to better meet the demands (in terms of quantity and quality) of both current and future generations.

The implementation of WDM measures is a response to **three major challenges**:

Figure 2: The challenges acted upon by WDM



Source: Nomadéis

WDM represents significant potential water savings, estimated at 85 km^3 per year in 2025, a quarter of total water demand, (with irrigated agriculture accounting for over 65% of this potential)[2]. WDM measures are often cost-efficient compared with mobilising new water resources. This is why **WDM is at the heart of the regional objective to achieve 25% water savings by 2025**, which was adopted by 21 Mediterranean countries and the European Union as part of the 2005 Barcelona Convention, and **selected as one of the priorities of the Strategy for Water in the Mediterranean (SWM) project**.

The analysis of WDM measures is currently often limited to purely technical and quantitative considerations (reducing the volumes of water used).

- **Qualitative and environmental** benefits: reduction of waste, reduction or stabilisation of abstractions from ecosystems and resources, etc.;
- **Social** benefits: contribution to higher agricultural revenues, job creation and ensuring the access of the poorest populations to water (particularly by reducing supply costs);
- **Economic** benefits: the cost per m^3 of water saved is often well below the cost per m^3 of newly mobilised and/or generated water;
- **Energy** benefits: reduction in energy consumption, hydropower, etc.

Water Demand Management (WDM) requires a holistic approach and a system of governance that takes into account the complexity of the relationships between the various stakeholders and considers the needs and uses of all parties. It also involves recognising the economic value of water in its various uses, and the universal right of access to water.

2 Source: Plan Bleu, 2005 and 2007

Foreword

Guide context and objectives

In 2010, Plan Bleu produced a study entitled "Economic Evaluation of Water Demand Management in the Mediterranean"[3], which primarily uses cost-effectiveness analyses for the financial and economic comparison of the costs of water savings (WDM policy) and the costs of newly mobilised water resources (policy of increasing water supply).

The results of this report needed to be supplemented with **cost-benefit analyses on a regional scale** (e.g. municipality, catchment area). Plan Bleu decided to conduct a study to develop a **decision-making support tool for the various options for Water Demand Management (WDM)**. During the study, a panel of 20 WDM measures were subjected to a **cost-benefit analysis on a Mediterranean pilot site, the Sfax catchment area, Tunisia**[4]. We recommend that readers refer to the study report for illustrations of the various points presented in this guide and to broaden their knowledge of the subject.

This methodological guide draws on the main results of this pilot study and is **written for local authority managers who have questions concerning the implementation of WDM measures in their region**.

The guide aims to:

- **Present an overview of** the WDM measures that can be applied in the Mediterranean;
- **Suggest a methodology for characterising, assessing and ranking WDM measures using a multi-criteria cost-benefit analysis** (profitability, positive or negative social and environmental externalities, opportunity cost, etc.);
- **Support local policymakers in selecting the WDM measures** most suited to their region's priority needs. The guide offers insight into decision-making, but is in no way exhaustive. The main limits of cost-benefit analysis are presented in the section entitled "Abritating between the various measures" (see page 23)

3 The study report may be viewed on the Plan Bleu website: http://planbleu.org/sites/default/files/publications/waterdemandmanagementplanbleu_gwp_fr.pdf

4 Plan Bleu, *Etude coûts-avantages intégrant les impacts environnementaux et sociaux à court et long termes - Zone d'étude: Région de Sfax, Tunisie*, 2013.

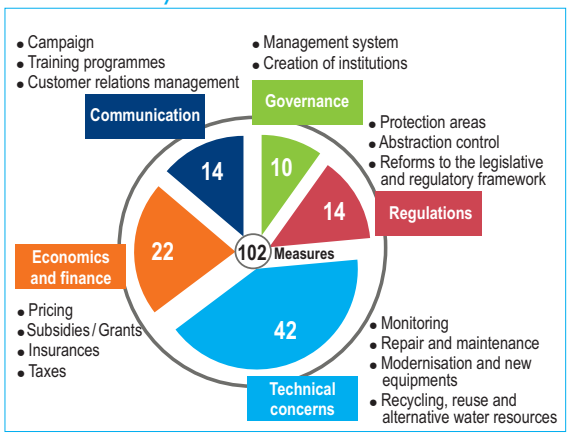
Overview of water demand management measures

There are many ways for local authorities to improve the effectiveness and efficiency of water uses. WDM measures can target one or more uses (agriculture or industry, etc.) and are performed in different fields of action.

The "*Etude coûts-avantages intégrant les impacts environnementaux et sociaux à court et long termes - Zone d'étude : Région de Sfax, Tunisie*" study **listed the WDM measures used in the Mediterranean basin** (a total of 102 measures), and provides an overview of possibilities for WDM action.

The typology used is based on a **double-entry approach**. The measures are organised into summary tables (see section "*Typology of WDM measures identified in the Mediterranean basin*", p. 25) and presented in accordance with 5 main fields of action, according to the type of tool used:

Figure 3: Distribution of WDM measures in the Mediterranean by field of action



Source: Nomadéis, 2013

- **Governance**: management systems, creation of management and monitoring institutions;
- **Regulations**: creation of protection areas, abstraction control and reforms to the legislative and regulatory framework;
- **Technical concerns**: network monitoring, infrastructure repair and maintenance, modernisation and installation of new equipment, water recycling and reuse, use of alternative water sources;
- **Economics and finance**: charging for water, awarding subsidies and grants, taxes;
- **Communication**: information and awareness-raising campaigns (for the general public, end customers, industry, etc.), training programmes.

The tables also identify the type(s) of use for each measure (agriculture, domestic, tourism or industry). The five tables can be viewed from page 25.

Figure 4: Example of a table of measures for the "Governance" field of action

Typology	Measure code	Measures identified in the Mediterranean basin	Uses			
			Agriculture	Domestic	Tourism	Industry
FIELD OF ACTION GOVERNANCE						
Management system	G1	Implementation of water resource guidance, management and preservation documents: master plans, IWRM		■		
	G2	Operational management support tool (corporate environmental policy, ISO 14001)				■
	G3	Management contracts / groundwater, river or bay contracts	■			
	G4	Ratification of agreements / multi-user conventions	■			
	G5	Policy for shifting farming to crop types requiring little water	■			
Creation of institution	G6	Creation of local decentralised institutions for resource management	■	■		
	G7	Creation of user or irrigator associations	■	■		
	G8	Creation of participatory institutions: local water commissions	■	■	■	■
	G9	Creation of water use mediation and conflict management bodies	■	■	■	■
	G10	Creation of a water police / anti-pollution mission	■	■	■	■

Source: Nomadéis

What measures for my region's priority need

All WDM measures work to optimise water consumption and uses, but **their scope of action and targets are different, and are closely linked to local contexts**.

1st step: Producing a regional inventory

In order to select the most suitable measures, a regional inventory needs to be produced first, with the aim of:

- Defining the region's geographical and hydraulic characteristics;
- Identifying the short-, medium- and long-term needs of all user categories and the natural environment;
- Listing the measures already in place, in the pipeline or previously abandoned.

CHARACTERISING THE RESOURCE

➤ HYDRO-CLIMATIC CHARACTERISTICS

The inventory begins with **analysis of the region's geographic and climate characteristics**. This report must especially include information and figures on the following points: site topography and geology, annual precipitation, thermal regime and temperature variations, mean evaporation, etc.

The inventory then lists all available water resources in the region. It shows the boundaries of the water network, estimates the capacity of catchment areas and the flow rate for major water courses, and includes precise information (map) showing the location of resources (surface water, shallow, intermediary and deep groundwater).

These hydro-climatic diagnostics conclude with the identification of **strategic issues for resource management**. They particularly highlight environmental issues for quantity (resource scarcity, low infiltration rate, etc.) and quality (turbidity, salinity, etc.)

➤ WATER SUPPLY

The inventory of the region's water resources then focuses on water supply. It lists the main resources used and any key supply points, showing the current rate of resource exploitation and use. It also lists the **equipment and infrastructure used for water production and treatment**. Finally, the inventory includes **any programmes for increasing water supply** (planned or existing programmes), such as supply using new resources (transfer from other regions / countries or exploitation of previously unused resources), desalination programmes, reuse of treated wastewater (reclaimed water) or construction of reservoirs, etc. The costs and benefits associated with these so-called "supply" measures will later be compared with the costs and benefits of demand management measures (comparison of the marginal cost per m^3 of water).

The final step in characterising the region's water resources consists of a quantifying exercise, **determining the overall capacity of the region's water resources**. We recommend including both the region's own resources and any external resources currently in use.

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CHARACTERISING NEEDS AND THE ALLOCATION OF WATER RESOURCES

The second part of the inventory focuses on characterising water demand.

➤ DEMOGRAPHIC AND ECONOMIC ASSESSMENT

The inventory must include a report on **demographics** (population, density, growth rate, urban sprawl, etc.) and **economics** for the region (distribution of economic sectors (primary, secondary and tertiary sectors), main activities and industries, typology of agricultural production, etc.)

➤ DIAGNOSTICS OF NEEDS AND DISTRIBUTION OF USES

On the basis of this report, the inventory presents **diagnostics of the distribution of water uses**, with special attention paid to the following questions:

- How is consumption shared between domestic, industrial, tourism and agricultural uses?
- What jobs and activities have the highest water consumption?
- Is consumption seasonal?
- Are uses complementary and/or coordinated (e.g. reclaimed water)?

DEFINING CHANGES AND TRENDS

Analysis must be dynamic in order to be relevant. The inventory therefore presents **quantitative and qualitative changes** to:

- Water resources;
- Consumption.

Projections can be made using observations carried out over previous years and by taking into account current projects and measures. We recommend making projections for the **short, medium and long term** (e.g. in 5, 20 and 50 years) and **distinguishing between each type of use** (agricultural, domestic, tourism or industrial use).

Projections must help forecast changes to water needs per inhabitant and determine whether water supply is sufficient to meet the anticipated demand.

Together, these estimates form the basis of the reference situations (scenarios) used in the cost-benefit analysis performed later (*see page 16*).

IDENTIFYING CURRENT WDM POLICIES AND MEASURES

The final stage in the inventory is to **list and characterise the various measures in place** at the time of diagnostics.

Analysis must particularly take into account **national and regional strategies and programmes** for resource management. It also studies the **regulatory framework in place** and **current water charges**.

On a local level, the inventory presents all measures carried out (we recommend working from a detailed map of the target area) and, if possible, includes the following information for each of the measures:

- The date of implementation and duration;
- The nature and scope of intervention;
- The objectives and target users;

What measures for my region's priority need

- The overall cost (the human, financial and technical resources used for measure implementation and management/maintenance);
- The results (multi-dimensional analysis): volumes saved, environmental preservation, improved productivity and health, etc.

We recommend including **analysis of any measures that have been abandoned or considered ineffective**. These measures are a precious source of information as they help identify any obstacles or problems that are specific to the region. They also provide **operational insight on a local level into the implementation of WDM measures**.

Example from the pilot study in Tunisia: a measure concerning reclaimed water for agriculture

Extract from context (selection of information from the inventory with particular interest for analysis of the measure):

- Reclaimed water is largely promoted in Tunisia for agricultural irrigation, golf courses and green spaces.
- In 2010, 68 Mm^3 of reclaimed water was used across 9,500 ha for various uses.
- Reclaimed water was first used in 1965 in the suburbs of Tunis for the irrigation of citrus fruit. Since the 1980s, a reclaimed water policy has been implemented on a broader scale. This has enabled larger projects to be developed, including one in Sfax in 1989 in the irrigated El Hajeb area (537 ha).
- Reclaimed water for agricultural irrigation is encouraged via attractive price signals (lower sales price than conventional water).

Data and resources

The regional inventory can draw on various sources of information:

- **National and local institutions:** Ministries for the economy or industry, etc.; National statistical institutes; Research institutes; Basin agencies, Ministries for the environment or agriculture, etc. ;
- **International institutions and organisations:** World Bank, OECD, African Development Bank, UNEP, Plan Bleu, Mediterranean Water Institute (IME), Programme Solidarité Eau (pS-Eau), International Network of Basin Organizations, International cooperation agencies: GIZ, AFD, etc.

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2nd step: Define needs and objectives

The second step in the process seeks to determine which uses will be subject to priority measures and why. "Angles of attack" and action levers will be identified in accordance with priorities, and the needs and objectives for WDM measures will also be quantified (number of m^3 to be saved or better used, percentage of users who should benefit from the measure, percentage of environmental risk reduction, etc.) in an operational approach.

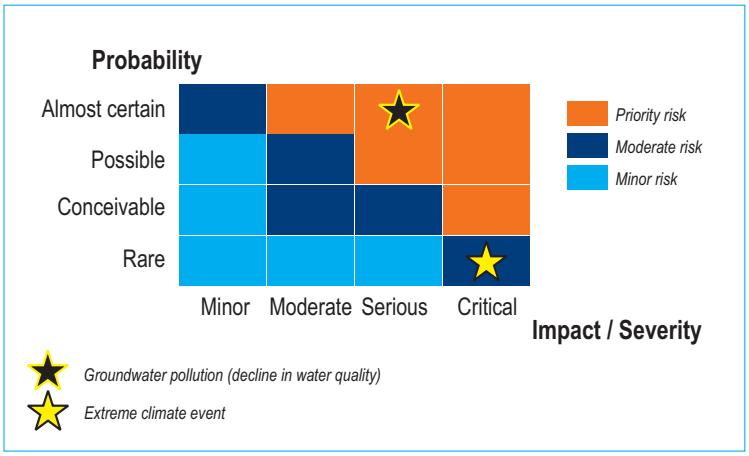
PRIORITISE NEEDS

In order to determine which WDM measures will be priority, the region's **water needs must first be prioritised**. This can be achieved by asking the following questions :

- What are the qualitative and quantitative needs of each use or user group?
- Can all needs be met using current resources or those planned for 5, 20 or 50 years' time?
- Are these needs exclusive or complementary (for reclaimed water)?
- What are the region's main water risks?

Water risks can be evaluated with the help of a tool known as a **risk matrix**. It involves characterising the probability of the risk occurring and the intensity of its impact, on varying scales from 1 to 4, for each risk identified. The risks are then placed in order of priority (priority, moderate and minor risk) and analysed to reveal the region's **main issues** in terms of water management and needs: groundwater overuse by an economic sector, pollution and water quality degradation due to waste discharge, etc.

Figure 5: Example of risk matrix taking into account two problems identified and characterised by Tunisian stakeholders in the Sfax catchment area



Source: Plan Bleu Seminar, Tunis, February 2014

A risk matrix is one of the tools available for the **pragmatic definition of an operational action plan that identifies and prioritises issues, allocating water in accordance with the resources and means available in the local authority**.

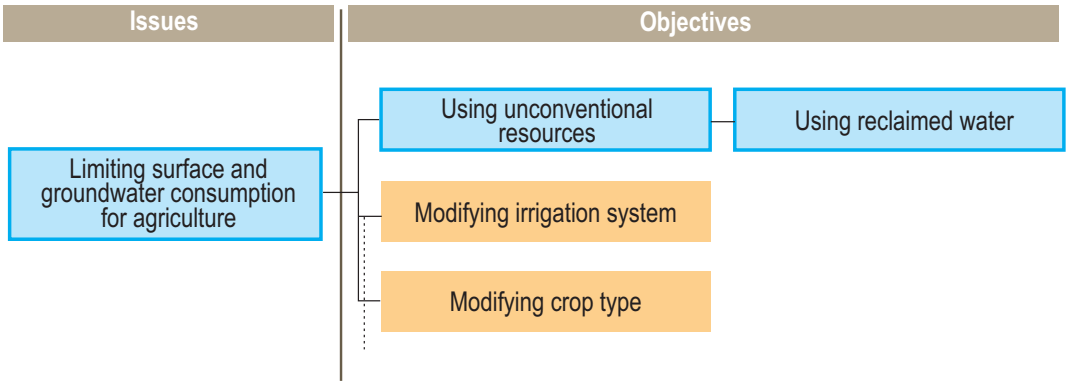
What measures for my region's priority need

DEFINING OPERATIONAL OBJECTIVES

At first, we recommend listing all **operational objectives that can be brought together** for each issue identified. This inventory must remain open and creative (do not be limited to what exists already). Objectives can then be prioritised, in order to select the most relevant ones.

Figure 6: Example of a selection of objectives for measure T42

Example from the pilot study in Tunisia: a measure concerning reclaimed water for agriculture



Finally, the **objectives adopted must be quantified** (volumes to be reached, etc.) and **all stakeholders must be identified**.

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3rd step: Pre-selecting appropriate WDM measures

Once the priority needs have been identified, it is possible to **select a panel of measures that respond to the problems identified** from the 102 measures presented, **while ensuring that they are in line with the economic, social and environmental strategies in place in the region**.

In order to obtain a detailed analysis of each measure, while retaining a broad, yet manageable number of possibilities, we recommend **creating a panel of between 5 and 10 measures**.

A non-exhaustive selection of methodological decision-making tools is presented below:

Figure 7: Table summarising the 4 methodological tools proposed, outlining their main advantages and disadvantages

Tool	Objectives	Advantages	Disadvantages
Multi-criteria analyses	Quickly eliminate unsuitable measures	• Easy to implement • Uses a rational decision-making method	• Criteria weighting is relative • Requires prior cost/benefits assessment
Régnier's Abacus	Make collective decisions	• Include all opinions • Reveals collective opinion	• Dual nature of the positions adopted
SWOT analysis	Reposition a measure according to the resources available to community and the local context	• Summarises information • Contextualises the measure	• "+/-" classification is relative • Factors are not prioritised
Decision tree	Imagine what a measure could look like and see the needs and implications	• Increases the transparency of the operations to be performed • Has an operational dimension	• Users must have good knowledge of the subject • Time consuming

SWOT: Strengths Weaknesses Opportunities Threats

MULTI-CRITERIA ANALYSIS

Objective: Multi-criteria analysis helps to **quickly eliminate the measures that do not act on the priority needs identified**.

How does it work?

1. Various selection criteria are defined (e.g. cost, duration, scale of intervention, etc.);
2. Criteria are allocated a number of points depending on their relevance.

There are then two options:

➢ Any measures without a given number of points are eliminated;
➢ Any measures that do not meet some of the criteria listed are eliminated.

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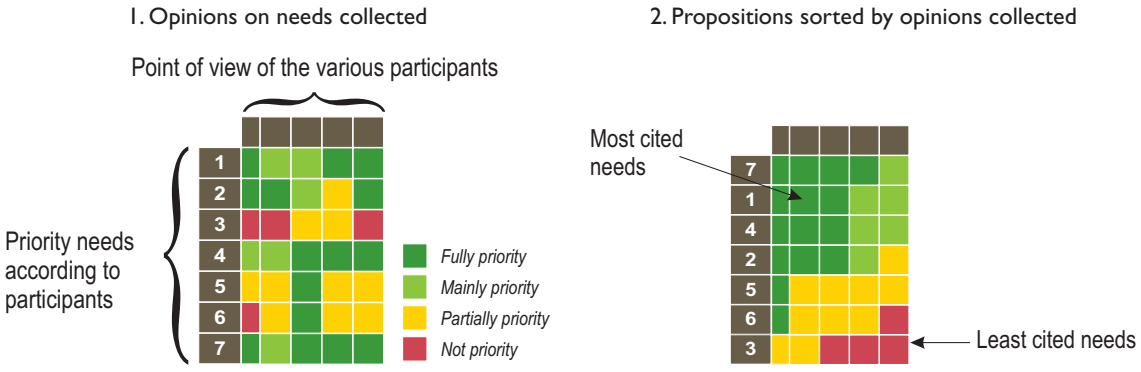
RÉGNIER'S ABACUS

Objective: Tool for **revealing various opinions and considering them in real operational situations**, by prioritising and ordering needs.

How does it work?

1. **The opinions of all participants are gathered** for the needs expressed;
2. **The needs are then sorted by answer, both mathematically** (the most cited needs are considered priority) **and visually** (participants can understand how needs are prioritised using coloured labels).

Figure 8: Example of a consultation process using the Régnier's abacus method



STRENGTHS/WEAKNESSES/OPPORTUNITIES/THREATS (SWOT) ANALYSIS

Objective: SWOT analysis **positions a measure according to the resources available in a local authority** (human, technical, financial resources and know-how) and the (local, national and international) **context**. It also helps policymakers to plan the various steps required to **bring about change** (gap between the existing situation and the planned objective).

How does it work?

1. List the **strengths and weaknesses** of a local authority for implementing a measure (e.g. experience of similar measures, resources, etc.);
2. Identify external environmental factors that could constitute an **opportunity or threat** (e.g. introduction of a new law);
3. **Prioritise the various factors** depending on their intensity, number and probability of occurrence. **Compare the region's strengths / weaknesses** (existing situation) **and the opportunities and threats** (e.g. agronomic research shows that reclaimed water can improve the productivity of some locally grown crops);
4. Identify **obstacles to overcome and potential levers to be used**.

These steps can be carried out in **workshops**.

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DECISION TREE

Objective: **A decision tree** is an **effective planning tool**. It helps imagine **what a given measure could really be like** by anticipating the issues and visualising the implications of each decision. A decision tree also **determines the degree of reversibility** for various possible solutions (is the choice defining or is there only a marginal impact on a selection of other factors?).

How does it work?

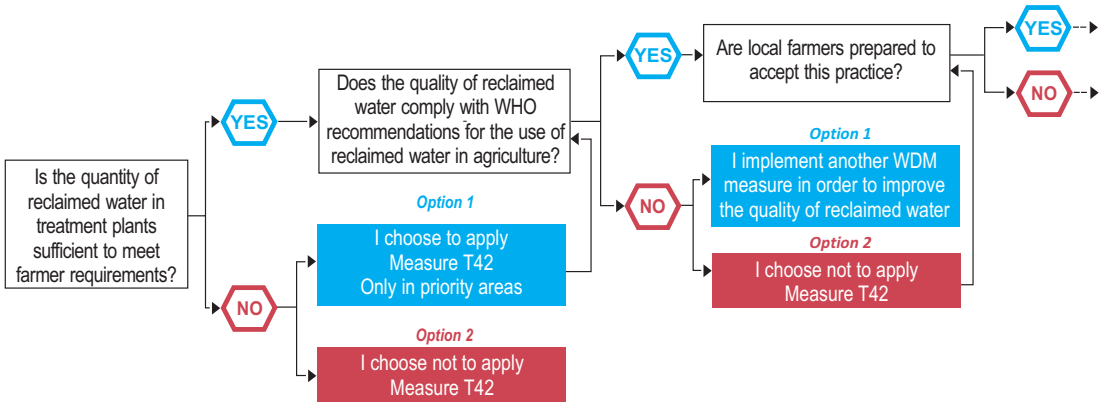
1. **Several reference situations are defined**, which will be used as the basis for reasoning (e.g.: situation 1: the tertiary sector is the region's major economic activity);
2. **The main steps for implementing a measure are identified**;
3. **For each step, the various prerequisites are identified using closed questions (yes/no). Each major step is shown using a "knot" or interconnection** describing the various decisions to be made and presenting the potential results associated.

The questions and steps can be developed by policymakers and their teams during brainstorming workshops.

4. A "**critical path**" is created on the basis of the answers developed, showing the various tasks to be completed in order to implement the measure.

Figure 9: Example of a decision tree for Measure T42

Example from a pilot study in Tunisia: a measure concerning reclaimed water for agriculture



What measures for my region's priority need

4th step: Assessing the pre-selected WDM measures

After pre-selecting measures that could meet a region's needs, the fourth step involves assessing the usefulness of these measures with the help of a methodology and calculation tools, and choosing the most relevant measure depending on the results.

Assessment is performed via a **cost-benefit analysis**, a method for estimating the relevance of a measure by **comparing the total costs incurred with the associated benefits**.

In order to get a good overview and take into account all stakeholders of a measure, this methodology calculates the **economic costs** (productivity, economic profitability), but also considers **technical** (water efficiency), **social and environmental criteria**.

Note: *the information and data required for the cost-benefit calculation are taken from step 1 of the process.*

DEFINING A GEOGRAPHICAL AREA, TIMEFRAME AND REFERENCE SITUATION

In order to ensure regional consistency and an integrated vision, the geographical area selected should ideally be a **catchment area**.

The timeframes selected depend on various factors, particularly:

- **The duration of investment depreciation**. For example, in the pilot study in Tunisia, irrigation was considered over a 30-year timeframe, given the significant investments made to convert to a pressure irrigation system;
- **The reliability of projections** (it is difficult to have a reliable estimate of some indicators, such as changes to prices over a period longer than 25 or 30 years).

A reference situation (or scenario) will be used to **compare the expected effects of a WDM measure with no action**. The reference represents the hypothesis in which the planned WDM measure is not implemented. It is different to a do-nothing situation as it **takes into account changes to some data** (demographics, climate conditions, etc.)

Example from the case study in Tunisia: a measure concerning reclaimed water for agriculture

- **Geographical area:** El Hajeb (Delegation of Thyna on the southern coast of Sfax): 537 ha.
- **Timeframe:** 30 years (investments to be made for transporting water from the treatment centre to farms).
- **Reference** :
  - The same area (El Hajeb) is irrigated using classic irrigation water;
  - The irrigation type is not changed during the change over to irrigation using reclaimed water (pumping system from public boreholes).

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IDENTIFYING AND LISTING ALL COSTS AND BENEFITS OF A MEASURE

First we use a **"logical framework"-type approach**, where the measure is broken down into a series of chronological steps for project management (staff training, pipe installation, etc.) Each step is then assigned all of the resources required and associated with its **economic, social and environmental** impacts:

- **Implementation of the measure**: human, financial and technical resources used, changes to the environment (e.g. water course diversion), etc;
- **Impact of the measure** (results): changes to the volume of water available to all stakeholders (including the natural environment), consequences to changes to water access rights, water price increases, changes to agricultural yields, etc.

The different types of costs and benefits are then sorted: positive and negative externalities for the various stakeholders, opportunity costs, ex ante and ex post transaction costs, etc.

CHOOSING A METHOD FOR ASSESSING AND QUANTIFYING MONETARY VALUE

After identifying the relevant costs and benefits, a monetary value must be assigned to each of them, in order to **measure the preferences of the various stakeholders using the same unit of measurement**. The method varies depending on the type of goods studied (commercial or non-commercial).

➤ COMMERCIAL GOODS

Examples of commercial goods include the purchase of goods and services, employment of staff, construction or maintenance work, operating costs, etc.

The economic assessment of the costs and benefits of this type of goods is achieved by **using their market price**. The calculation will include **direct and indirect costs and advantages**, and also **fixed and variable costs**. When the measure requires the purchase or installation of equipment with a service life of several years, we recommend calculating a mean annual cost.

➤ NON-COMMERCIAL GOODS

Examples of non-commercial goods include environmental pollution, health or landscapes.

The value of non-commercial goods is harder to define and to turn into a monetary value. The distinction is made between a good's use value and non-use value

- **Use value:** benefits obtained by consumers or those in direct contact with goods (direct use value) and benefits linked to preservation of goods (e.g. ecosystem services) (indirect use value);
- **Non-use value:** value given to resource preservation for the sake of future generations (bequest value) and nature (existence value).

What measures for my region's priority need

Example from the pilot study in Tunisia: a measure concerning reclaimed water for agriculture

Name	Type of good	Formula	Data source	Unit price	Quantity	Annual value
Cost of reclaimed water distribution	Commercial cost	Distribution unit price * Volume of water distributed	National study into reclaimed water in Tunisia	0.1 DT/m^3	2,770,000 m^3	277,000 DT
Increase in agricultural yields	Commercial benefit	(Yields with reclaimed water- yields without reclaimed water) * Surface area	National study into reclaimed water in Tunisia	1,900 DT/ha	537 ha	1,020,383 DT
Nitrate pollution in Chaffar groundwater	Non-commercial cost, treatment cost method	Cost of water treatment per m^3 * Volume of Chaffar groundwater	International: French study by the Ministry for Sustainable Development	0.015 DT/ m^3	500,000 m^3	72,500 DT
Increase in groundwater level	Non-commercial benefit, contingent valuation method	Value allocated per household * Number of households using Chaffar groundwater	International: Contingent valuation led by Canada	0.390 DT/ménage	335 households	131 DT

SELECTING A DISCOUNT RATE

WDM measures are implemented in the medium or long term. The costs and benefits are discounted to **take into account the preference of individuals for current concerns and their tendency to prioritise short-term costs and benefits** (economic hypotheses).

Example from the pilot study in Tunisia : a measure concerning reclaimed water for agriculture

The pilot study used a discount rate of **4**%, the rate often chosen for measuring an environmental impact (Centre d'analyse stratégique, France, 2009).

TRANSPOSING INTERNATIONAL FIGURES

Two methods are used to correct data from the results of measures implemented in other regions or countries, depending on the type of goods or service :

- **Use of the monetary exchange rate (central bank exchange rates)**:
  - Goods and services whose cost does not depend on the quality of life in the country in question (e.g. imported equipment, such as pressure irrigation equipment);
  - Goods and services whose cost depends on the quality of life in the country in question, but which was established in studies carried out in countries with a similar quality of life (e.g. Morocco for the pilot study).
- **Use of the World Bank purchasing power parity database** (in the pilot study, the 2005 "Global Purchasing Power" was used) for other goods and services.

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CALCULATING INDICATORS TO REVEAL THE BENEFITS OR COSTS OF EACH MEASURE

Three complementary indicators are often used to estimate the usefulness of the various measures and for their comparison:

➤ BENEFIT-COST RATIO (BCR)

This is calculated by dividing total discounted benefits by total discounted costs. If the sum is greater than 1, the project is generally considered to have a positive impact on the region, and the measure is therefore considered efficient (relationship between the resources used and the result). The BCR particularly allows for the comparison of projects of very different types on different scales (ratio comparison).

➤ NET PRESENT VALUE (NPV)

This is calculated by subtracting total discounted costs from total discounted benefits. If the sum is positive, the project is generally considered to have a positive impact on the region, and the measure is therefore considered **efficient**. The differences in NPV between various measures helps obtain figures and compare benefits. They give an idea of the volumes in question.

➤ COST-EFFECTIVENESS RATIO

This is calculated by dividing total discounted costs by the volume of water saved. It measures the cost per m^3 of water saved and helps assess the **efficiency** of a measure (relationship between the result and the objective).

Example from the pilot study in Tunisia: a measure concerning reclaimed water for agriculture

COSTS						
Description		Assessment method	Unit amount	Unit	Numerical application	Unit
Network	Cost of distributing reclaimed water for irrigation by the CRDA	Distribution unit cost * volume distributed	0,1	TND/m^3/ year	277,000	TND/year
	Cost of the environmental impact study					
Agricultural plot	Cost of technical training for new irrigation practices using reclaimed water	Labour cost per hectare	161	TND/ha	86,259	TND every ten years
Agricultural sector	Additional work (weeding due to higher nitrogen quantity, cleaning blocked pipes, etc.)					
	Opportunity cost: cultural constraints (usage restrictions: no market gardening)	Opportunity cost	2,700	TND/ha/ year	1,449,900	TND/ha/ year
Environ-ment	Increased salinity of artificially refilled groundwater	Cost of loss of agricultural productivity for the region irrigated using Chaffar groundwater	27	TND/ha/ year	31,320	TND/year
	Increased soil salinity	Negligible: compensated for by increased yields				
	Acceptance of the practice	Not estimated				
	Risk of accumulating nondegradable toxic substances in the soil (heavy metals)	Treatment cost	236	TND/ha/ year	126,954	TND/year
	Excessive soil fertility and leaching of surplus nitrate into groundwater	Treatment cost	0.0145	TND/m^3/ year	72,500	TND/year
	Health risk for agricultural users of reclaimed wate	Treatment cost	13.5	TND/cas/ year	167	TND/year
Amenities	Reduced regional attractiveness: reduced land prices	Unknown: uncertain effect				

CRDA: Regional Agricultural Development Commission - ONAS: The National Sanitation Utility - GDA: Agricultural Development Group

What measures for my region's priority need

ADVANTAGES						
Description		Assessment method	Unit amount	Unit	Numerical application	Unit
Network	Low-cost wastewater removal method	Cost of water removal avoided	0.06	TND/m³/year	166,200	TND/year
	Reduced irrigation water production	Price of reclaimed water sold for irrigation * Volume of water saved	0.1	TND/m³/year	270,000	TND/year
Agricultural plot	Increased added value per m³ of water due to lower cost of reclaimed water with regard to classic irrigation water	Drop in water unit price * Volume of water saved	0.08	TND/ha/year	221,600	TND/year
	Variation of agricultural production gross margin: increased yields	Yield difference with and without reclaimed water per hectare	190.155	TND/ha/year	1,020,383	TND/year
	Reduced fertiliser quantities	Avoided cost	120	TND/ha/year	64,440	TND/year
Environment	Increased quantity of available surface water	Negligible				
	Increased groundwater level through artificial refilling and gain for ecosystems	Non-use value	0.390	TND/household/year	131	TND/year
	Reduced discharge of untreated water into the environment: discharged into the marine environment in this case	Avoided cost of reduced fishing production	0.089	TND/m³ of reclaimed water discharged	247,500	TND/year
Amenities	Gradual adaptation to climate change					

Total benefits (TND)	35,918,049
Total costs (TND)	35,400,503
Annualised discounted cost (TND)	1,958,467
Volume of water saved per year (L)	2,770,000
BCR	**1.01**
NPV (TND)	**517,546**
Cost-Effectiveness Ratio (TND/m³)	**0.71**

Note: the total economic cost given in the table does not reflect the real cost of the measure for the local authority, for two reasons: first, it takes into account all costs borne by the various stakeholders; second, it includes some items that are useful for economic analysis, but without budget requirements, such as the opportunity costs.

COMBINATION OF MEASURES

The individual assessment of the various WDM measures is a necessary step in the process of choosing a measure. However, it is vital to take the following aspects into account :

- **The water cycle is presented as a zero-sum game**: the volume of water abstracted from somewhere reduces what is abstracted elsewhere ;
- **The effect of a measure may be increased, reduced, or even offfset by the implementation of one or more other WDM measures** (with prior, simultaneous or subsequent action);
- **The implementation of some measures is required for the application of other measures.** For example, individual meters need to be installed before being able to implement an individual consumption-based pricing system.

For these three reasons, adopting a segmented "measure by measure" approach is considered to be limited and unsatisfactory. **In most cases, combining WDM measures offers synergies**, supporting the implementation of a comprehensive and consistent water policy and activating additional leverage (technical improvement, economic incentives, regulatory measures, etc.) A combined approach is also an effective means of **reducing or compensating for the possible negative impact(s) brought about by some measures**.

Nevertheless, some measures may have redundant effects and be **considered alternatives** (the same result is achieved by applying one or other of the measures indifferently) even if the resources used are different. Local context and strategic priorities for the region must help establish the optimal choice between measures acting on

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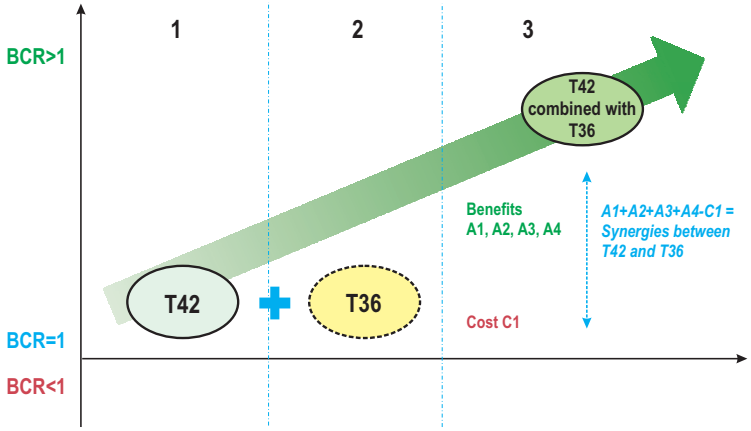
similar objectives. In rare cases, some measures may be **incompatible** as their effects fully or partially cancel one another out. The combined cost-benefits analysis is especially accurate as it is limited to groups of two or three measures. Their consistency may be chronological, technical or even economic (cost pooling).

Synergies between measures are easier to implement and assess when they act on the same water use (agricultural, domestic, industrial or tourism use). However, combining measures that act on complementary or successive uses **has a high potential for synergies**, particularly when it allows for resource redistribution (to meet different quantity, availability and quality demands), for example, the use of reclaimed domestic water in agriculture.

This reuse of the resource is very positive for water savings, on condition that suitable governance is implemented (healthcare regulations, etc.), and it requires a detailed understanding of complex water movements. The creation of inter-dependencies between users subjects all stakeholders to higher risks in terms of water security (particularly for industrial ecology projects). Strategies must be developed to anticipate and deal with possible variations that could be caused by reasons unrelated to water policy (e.g. activity stopped for economic reasons) or the introduction of new WDM measures.

An example of combined analysis is shown below, displaying the synergies between Measure T36 for improving the efficiency of plot irrigation techniques (for the part entitled "switching to drip irrigation") **and Measure T42 for the use of reclaimed water for agriculture**.

Figure 10: Synergies resulting from combining two WDM measures (T36 and T42)



Step 1: When considered in isolation, Measure T42 for the use of reclaimed water for agriculture has a benefit-cost ratio just above 1.

Step 2: By adding T36 to T42, four cost items related to T42 decline and one increases*.

Step 3: The benefits generated by T36 are greater than the costs; the BCR of T36 + T42 is higher, without affecting the costs and benefits of the individual measures.

* **Benefits generated by T36**:

- **A1**: Lower salinity for artificially refilled groundwater (Less salt leachate remaining in surface soil layers)
- **A2** and **A3**: Better acceptance of reclaimed water and lower health risk for farmers (Water does not come into direct contact with users)
- **A4**: Reduced risk of accumulating nondegradable toxic substances (Water is transported by porous underground pipes and has less contact with soil)

Costs generated by T36 :

- **C1**: Increased soil salinity (Increased salt concentration in surface layers close to roots)

What measures for my region's priority need

LIMITS AND POINTS FOR ATTENTION

It is not always possible to quantify the costs and benefits associated with the implementation of a given WDM measure:

- **Some data does not exist on the scale of the study area**, or is only available on a regional, national or international scale;
- **Some measures are too recent and/or their impact has not been assessed**;
- **It is difficult to isolate the impact of some measures,** due to combined effects associated with the simultaneous application of several WDM measures;
- **It is difficult to transpose some calculations and observations from one country to another** due to socio-economic, geographic or cultural differences, etc.

Example from the case study in Tunisia: a measure concerning reclaimed water for agriculture

Reclaimed water measures help limit abstraction from the environment, thereby maintaining or even increasing local groundwater levels. As no Tunisian data was available concerning the value given by the population to maintaining or increasing groundwater levels, the pilot study used the results of a Canadian study (contingent valuation). The data was adapted to the Tunisian context (consideration of resource scarcity) via a linear transfer function (coefficient of variation).

In the light of these various constraints, we recommend using a **strict methodology**, following well-defined and explained guidelines to help the various stakeholders understand all thinking.

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5th step : Arbitrating between the various measures

The results of the various cost-benefit analyses (ratios or NPV) give an **indication of the most efficient/effective measures** to implement in a region.

Example from the pilot study in Tunisia: comparison of two measures

The pilot study compared the various indicators from **two measures working on the same objective via different means**:

- **Technical Measure T36**: Improving the efficiency of plot irrigation techniques (sprinkler system, switching to drip irrigation, etc.): repair or replacement of existing equipment;
- **Economic Measure E15**: Subsidy for the installation of water-saving irrigation systems: investment grant

	T36	E15
Benefit-cost ratio	1.03	1.12
NPV	2,505,016	16,741,342
Cost-effectiveness ratio (TND/m³)	1.11	1.18

According to calculations, Measure E15 saves less water than Measure T36, from a purely physical standpoint (lower cost-effectiveness ratio). However, all stakeholders considered, Measure E15 is more efficient to implement: it requires the use of fewer resources in order to achieve a satisfactory result. The resulting economic benefit is also greater in terms of the Net Present Value.

However, this result must be placed into perspective, due to analysis limits. For example, costs/benefits categorisation remains very relative, particularly depending on the status and viewpoints of the various stakeholders. Similarly, it is difficult, perhaps even unrealistic, to allocate precise economic value to strategic or geopolitical factors (e.g. how to quantify a benefit such as limiting the external dependence of a region without using new water transfers?)

Beyond the final result, it is therefore the entire process that supplies information. Assessing WDM measures especially helps **improve regional knowledge, identify all stakeholders, anticipate the main obstacles and levers for implementation of a measure**, or **plan the main items of expenditure and income for both the medium and long term**.

MONITORING AND ASSESSMENT

In order to best manage the WDM measures implemented in a region and determine which actions should be performed, policymakers must introduce a **monitoring and assessment system**. This system must supply **detailed, representative and reliable information** showing how and to what extent the measures impact water demand, and also the region's economic, social and ecological conditions.

A monitoring system is implemented in four stages:

➤ DEFINING WDM MEASURE OBJECTIVES

The first step in defining adequate monitoring indicators consists of **defining the WDM measure's objectives quantitatively** (number of people impacted, volumes saved, etc.) **and qualitatively** (ability to meet stakeholder needs, governance reliability, etc.)

➤ SELECTING THE INDICATORS

Depending on the objectives established, two types of indicators can be used by policymakers:

- **Performance indicators** for monitoring the progress of measures and estimating the efficiency of the resources implemented (project cost, timeframes and quality monitoring);
- **Results indicators** for judging the performance and effectiveness of the WDM measure by entering a selection of assessment criteria (multi-dimensional analysis): social criteria (public health, drinking water access, user satisfaction, etc.), environmental issues (water quality, state of aquatic biotopes and environments, etc.) and economic factors (costs, prices, etc.).

The selection of information to be collected is crucial for operational and relevant monitoring and assessment. Policymakers must find a balance between overly detailed information that is difficult to understand and complex to analyse, and overly superficial information that does not allow them to make informed decisions. The indicators must also remain **stable over time** (the same indicator must be able to be monitored over several years) **and act within a set area** (similar data must be able to be compared).

➤ IMPLEMENTING A MONITORING SYSTEM

In order to supply information on the various indicators, **the monitoring system comprises**:

- **A steering body:** strategic planning team, managers, experts, etc.
- **Collection and analysis tools:** surveys, samples, databases, software, etc.
- **Procedures** : audits, certifications, reports, etc.

Information collection and analysis must be part of a dynamic process. Depending on the type of indicator, data can be supplied continuously (e.g. monitoring of climate variations) or **periodically** (e.g. customer satisfaction surveys). In both cases, the **analysis frequency chosen for the data collected must be neither too high** (processes would have restrictive time limits or excessive costs) **nor too low** (data must be able to reflect potential seasonal factors, such as variation in climate conditions or peaks of activity in some sectors).

As far as possible, we recommend using an open data system (collected data open and accessible to the general public), which improves the transparency of public action, helps involve the various stakeholders and maximises the potential of public data (use of data by economic stakeholders or charities, etc. and generation of capital gain).

➤ ASSESSING THE MEASURE

Assessment of the WDM measure implemented must determine whether the actions undertaken should be continued, strengthened, corrected or even stopped, in a continuous improvement process.

There are three major assessment periods: *ex ante* (initial situation before implementation of the measure); *in itinere* (assessment during implementation) and *ex post* (after implementation).

Typology of WDM measures identified

in the Mediterranean basin

Typology	Measure code	Measures identified in the Mediterranean basin	Uses			
			Agriculture	Domestic	Tourism	Industry
FIELD OF ACTION: GOVERNANCE						
Management system	G1	Implementation of water resource guidance, management and preservation documents: master plans, IWRM		■		
	G2	Operational management support tool (corporate environmental policy, ISO 14001)				■
	G3	Management contracts / groundwater, river or bay contracts	■			
	G4	Ratification of agreements / multi-user conventions	■			
	G5	Policy for shifting farming to crop types requiring little water	■			
Creation of institutions	G6	Creation of local decentralised institutions for resource management	■	■		
	G7	Creation of user or irrigator associations	■	■		
	G8	Creation of participatory institutions: local water commissions	■	■	■	■
	G9	Creation of water use mediation and conflict management bodies	■	■	■	■
	G10	Creation of a water police / anti-pollution mission	■	■	■	■

Typology	Measure code	Measures identified in the Mediterranean basin	Uses			
			Agriculture	Domestic	Tourism	Industry
FIELD OF ACTION: REGULATIONS						
Protection area	R1	Strengthening restrictions in urban planning documents to reduce villa housing in favour of high-rise, shared accommodation		■		
	R2	Allowing the Government to refuse building permits if resource-related restrictions are not met		■		
	R3	Quantitative protection areas: declaration, authorisation, ban on agricultural boreholes	■			
	R4	Redesign of green areas with Mediterranean vegetation		■	■	
	R5	Protection zones for storage areas: reservoir monitoring, anti-pollution mission	■	■	■	■
Abstraction control	R6	Meters required to measure the volumes of water abstracted by users	■	■		■
	R7	Organisation of water towers: agricultural irrigation water, swimming pools, golf courses		■		
	R8	Seasonal, climate-based restrictions and bans: swimming pools, golf courses, agricultural irrigation water	■	■		
	R9	Special monitoring and quotas (bans) for public and private green areas during dry season		■		■
	R10	Declaration regime / Groundwater use authorisation	■			
	R11	Inspection of existing boreholes: valid declaration / authorisation	■			
	R12	Quotas: volume, flowrate, time, surface area irrigated	■			
Reforms to the legislative and regulatory framework	R13	Implementation of regulatory policies for agricultural production	■			
	R14	Water laws including groundwater	■	■	■	■

Typology of WDM measures identified in the

Typology	Measure code	Measures identified in the Mediterranean basin	Uses			
			Agriculture	Domestic	Tourism	Industry
FIELD OF ACTION: TECHNICAL CONCERNS						
Monitoring	T1	Improvement of network data knowledge: implementation / update of a Geographic Information System		■	■	■
	T2	Improvement of measuring and metering equipment for production and distribution systems		■	■	■
	T3	Monitoring of the volumes produced and distributed by analysing data collected from macro-metering	■	■	■	■
	T4	Distributor monitoring of the consumption of corporate accounts		■	■	■
	T5	Improvement of measuring and metering equipment for consumers: installation of sub-meters, replacement of old or blocked meters, piracy prevention		■	■	■
	T6	Implementation of statistical monitoring of network failures: broken and old pipes		■	■	■
	T7	Leak detection campaign across the network: acoustic, thermographic, fluorescein or G amino acid testing, tracer gases, inspection		■	■	■
	T8	Leak detection in accommodation		■	■	
	T9	Study of user consumption: analyses, statistics, cross-checks, programme assessments		■	■	■
	T10	Technical assistance for users		■	■	■
	T11	Monitoring of driller activity	■			
	T12	Monitoring of volumes abstracted from individual boreholes: electricity consumption	■			
	T13	Audit of hotel water systems			■	
Repair and maintenance	T14	Optimisation of production schedules		■	■	■
	T15	Rehabilitation and improved efficiency of water distribution networks (pipe replacement, materials, diameter, network length, etc.)		■	■	■
	T16	Connection replacement		■	■	■
	T17	Pressure regulation (switch to lower pressure levels, installation of pressure-reducing valves)		■	■	■
	T18	Preventive maintenance		■	■	■
	T19	Operations in private residences: repairs		■	■	■
	T20	Improvement of the hydraulic operation of agricultural irrigation canals (minimising losses): concreting, gates, cleaning canals, better management of sluice valves, etc.	■			
	T21	Optimisation of existing pressure networks (replacement of lining and concrete parts, filling of cracks; replacement or cleaning of filters and gratings; cleaning, unblocking, rodding)	■			
	T22	Modernisation of gravity-fed irrigation networks: connection to a pressure network (connection, implementation of a pipe network, pumping station)	■			
	T23	Modernisation of gravity-fed irrigation networks: switch to low pressure (heightening, reservoirs, and distribution network)	■			
	T24	Removal of unused branches	■			
	T25	Improvement of measuring and metering equipment (installation of meters in pressure systems)	■			
	T26	Leak repair	■			

Mediterranean basin

Typology	Measure code	Measures identified in the Mediterranean basin	Uses			
			Agriculture	Domestic	Tourism	Industry
FIELD OF ACTION: TECHNICAL CONCERNS						
Modernisation and new equipment	T27	Network automation and regulation: CTM; automatic control system; sensors; volume-sensitive valves; electrically-operated valves		■		
	T28	Water management support software across an irrigated area: irrigation management and planning tools	■			
	T29	Installation of water-saving systems: flow restrictors; dual flush systems; self-closing taps; shower heads in the public domain		■		
	T30	Distribution of water-saving kits to private accommodation: dual flush system; self-closing tap; shower head		■		
	T31	Replacement of evaporative air conditioners by air-cooled refrigerant condensers or deep water air cooling in appropriate public buildings (hospitals, administrative establishments, schools)		■	■	■
	T32	Automation of watering for green spaces: time, volume, flowrate		■	■	
	T33	Management of industrial processes				■
	T34	Equipment modification, change of technologies used				■
	T35	Installation of water-saving systems: flow restrictors; dual flush systems; self-closing taps; shower heads in the tourism and industry sectors			■	■
	T36	Increased efficiency of plot irrigation techniques (sprinkler system, shift to drip irrigation)	■			
	T37	Reduced vulnerability of agronomic models and crop systems: optimised crop rotation; revised crop management and intercropping; better species grown; additional irrigation	■			
Recycling, reuse and alternative water	T38	Installation of small-scale desalination units (producer-consumer)		■	■	■
	T39	Collection, storage and reuse of rainwater: collection basins; tanks for green spaces and public and private cleaning	■	■	■	■
	T40	Specific greywater reuse systems (cars, garden watering, toilets)		■	■	■
	T41	Wastewater recycling programme				■
	T42	Policy encouraging the use of brackish and reclaimed water for agriculture	■			

Typology of WDM measures identified in the

Typology	Measure code	Measures identified in the Mediterranean basin	Uses			
			Agriculture	Domestic	Tourism	Industry
FIELD OF ACTION: ECONOMIC AND FINANCIAL CONCERNS						
Pricing	E1	Block-tariff system based on consumption		■	■	■
	E2	Use of a fixed or variable bonus: single-tier, two-tier and three-tier tariffs		■	■	■
	E3	Social water tariffs		■		
	E4	Increased water prices	■	■	■	■
	E5	Seasonal or night tariffs	■	■	■	■
	E6	Agricultural irrigation tariffs: price per hectare irrigated, volume-based tariff	■			
	E7	Tariff for individual groundwater abstraction: included in taxes; three-tier tariff system; via the electricity bill	■			
	E8	Fees	■			
	E9	Implementation of water quota trading	■			■
Subsidies /Grants	E10	Grant for leak diagnostics		■		
	E11	Maintenance contract for internal water systems (annual / multi-annual; valves / flushing systems)		■		
	E12	Subsidies for houses which have been granted a hydro-performance label that guarantees the use of efficient equipment (taps, shower heads, flushing systems, hot water system, outdoor watering system, swimming pool cover)		■		
	E13	Subsidy for water-saving diagnostics and equipment		■	■	■
	E14	Financial incentives for renewal or purchase of low-energy or water-saving household appliances		■		
	E15	Support for the reconversion of farms towards use of more efficient irrigation techniques (particularly localised irrigation): subsidies, subsidised loans	■			
	E16	Agri-environmental measures	■			
	E17	Agricultural aid and support subject to environmental conditions: CAP	■			
Insurance	E18	Implementation of an insurance mechanism in the event of harvest losses due to drought	■			
Taxes	E19	Land tax on individual boreholes		■		
	E20	Tax benefits for improving rural supply	■	■	■	
	E21	Tax benefits for water-saving investments	■		■	■
	E22	Incorporation of the notion of virtual water in trade: tax	■			

Mediterranean basin

Typology	Measure code	Measures identified in the Mediterranean basin	Uses			
			Agriculture	Domestic	Tourism	Industry
FIELD OF ACTION: COMMUNICATION						
Information and awareness-raising campaigns: awareness, understanding and compliance	C1	Raising awareness among school children (school programmes, teaching kits)		■		
	C2	Providing information (on saving water, water-saving products, behaviour that causes excessive water consumption)		■	■	■
	C3	Sending information leaflets with water bills		■	■	■
	C4	Raising awareness of saving water via national campaigns (radio, television, newspapers, internet, posters)		■		
	C5	Creation of debate and information forums to involve the public (seminars, local meetings, information points, etc.)		■		
	C6	Raising awareness of purchasing low-energy and water-saving household appliances or replacing old ones that are not economic		■		
	C7	Carrying out studies into virtual water: monitoring and measuring scales; raising awareness among farmers and retailers	■			
Training: getting people to act	C8	Training stakeholders from the water-saving sector	■		■	■
	C9	Training and informing apprentice plumbers on leak detection and comparative analysis of equipment	■	■	■	■
	C10	Training farming professionals, technicians and engineers	■			
	C11	Educating farmers (continuous training of farmers, personalised advice for farmers)	■			
	C12	Training staff			■	■
Management of customer relations	C13	Outsourcing laundry			■	
	C14	Changing sheets and towels less often			■	

Find out more

Useful contacts

- African Development Bank: http://www.afdb.org/en/
- Euro-Mediterranean Information System on know-how in the Water sector: http://www.semide.net/en
- Euro-Mediterranean Regional and Local Assembly (ARLEM): http://cor.europa.eu/en/activities/arlem/Pages/arlem.aspx
- French Agency for Development (AFD): http://www.afd.fr/lang/en/home
- Institut méditerranéen de l'eau (IME): http://www.ime-eau.org/en/
- International Network of Basin Organizations: http://www.riob.org/spip.php?sommaire&lang=en
- Marseille Center for Mediterranean Integration (CMI): http://beta.cmimarseille.org/
- MedCities: http://www.medcities.org/
- Mediterranean Commission of United Cities and Local Governments http://www.commed-cglu.org/?lang=en
- National Water Distribution Utility (SONEDE): http://www.sonede.com.tn/index.php?id=12&L=2
- Plan Bleu: http://planbleu.org/en
- Union for the Mediterranean: http://ufmsecretariat.org/
- World Bank: http://www.worldbank.org/

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Plan Bleu

Building the Mediterranean future together

Plan Bleu: let the Mediterranean be an area of cooperation for sustainable development

The objective of the Plan Bleu/RAC is to contribute to raising awareness of Mediterranean stakeholders and decision makers concerning environment and sustainable development issues in the region, by providing future scenarios to assist in decision-making. In this respect and through its dual functions as an observatory of the environment and sustainable development and a centre for systemic and prospective analysis, the PB/RAC's mission is to provide the Contracting Parties with assessments of the state of the environment and development of the Mediterranean and a solid basis of environmental and sustainable development data, statistics, and indicators to support their action and decision making process.

Decision IG.19/5 of the16th Meeting of the Contracting Parties to the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (Marrakesh, 2009)

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