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Gestion durable des bassins versants méditerranéens face aux impacts des changements sociétaux et climatiques

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# Case studies of irrigation agriculture in Mediterranean countries: limits, achievements, and perspectives

## Résumé

The contribution of economic tools to a sustainable Integrated Water Resources Management is analysed. By shortly reviewing some case studies of irrigation agriculture in Mediterranean countries, limits, achievements, and perspectives of the most used tools - tariffs and subsidies- are presented in order to better mainstream economic issues in future action plans and strategies in water policies.

# The Economic Perspective of the Integrated Water Resources Management: the case of Mediterranean Irrigation Sector

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**Sustainable Management of Mediterranean Watersheds Faced with the Challenges of Social and Climate Change**

# Introduction

- An **integrated approach** for the **management of water resources** is essential.

**Integrated Water Resources Management (IWRM) is the process that promotes the coordinated development and management of water, land and related resources in order to maximise economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems**

# Introduction

- **Inside the IWRM approach, Water Demand Management** is a top priority in many Mediterranean countries to:

  - focus on the **proper use** of **already-mobilized water**, attempting to limit physical losses,
  - **curb water consumption**,
  - and promote an **economically- efficient** and **more productive** use of water

# Introduction

General Framework for IWRM


*Source: https://www.gwp.org*

# Introduction

- Mainly addressed from a technical point and regulatory point of view, water management and allocation ask for **a more comprehensive perspective.**
- **An economic approach** to WDM gives instruments to policy makers which enable them to make **rational and informed decisions** for the **socially optimal allocation** of water resources

# The Economic Instruments for a sustainable WDM

- Six tools: **quota**, **tariff**, **subsidies** to water-saving practices or technologies, water and environmental taxes, payments for ecosystem services and water markets.

- **In practical terms, the three first instruments are favored in the Mediterranean Basin.**

# Quota

- A **volume-based (limit/allocation**) approach can be employed to manage scarcity— quotas, temporary restrictions, and licences—, both between sectors and within a given sector.
- This type of instrument requires an **excellent level of information** on the resource and its uses, a **small numbe**r of **homogeneous** users.
- **In the Mediterranean context, application of this tool rapidly finds its limits** (*see groundwater and un-metered irrigation water examples*).

# The Economic Instruments for a sustainable WDM

## Using value and prices for efficiency and equity

- Changing the behaviour of water users towards more sustainable practices
- Providing incentives to water users to use water carefully, efficiently, and in a manner consistent with the public interest
- By acting as signals for users and regulators they allow to take into account resource scarcity and internalise the externalities
- They have both positive and negative effects

# Subsidizing Water Saving Practices and Technologies

Direct or indirect financial aid (eg. tax or social exemptions, loans at subsidized rates) proposed by the public sector to economic agents to influence their production levels, their prices or to enhance the **adoption of more water efficient irrigation systems** (*i.e. from surface to drip irrigation, to on demand pressurized system, equipment for volume measurement etc).*

They require available **financial resources** coming from the state budget and put the question of the general allocation of public financial resources that are more and more difficult to mobilize in times of crisis.

# Subsidizing Water Saving Practices and Technologies

**The NATIONAL WATER- SAVING PROGRAMME (PNEEI) in MOROCCO**
Established in 2007 on a voluntary basis, it aimed to convert about 500,000 hectares to localized irrigation by 2022. It provides subsidies for investments in water-saving techniques. Subsidies have been gradually increased to reach 80 to 100% of the investment costs in 2010. Procedures are simplified in order to facilitate conversion to localized irrigation, in particular for small and medium farms.

- ***PROS:*** lower costs, yield and farmer's revenue increases, intensification of production and diversification of crops, stable employment, water conservation, innovation.

- ***CONS:*** no or little decreases in water consumption: the water recovered can be reused to expand irrigated areas (if land is not a limiting factor) or to intensify the production of higher value water-intensive crops; increase in unequal distribution of water; carry-over effect on groundwater withdrawals

# Tariff

**Widely used in Mediterranean countries with different schemes** *(i.e. according to the volume of water used, its source, or the time of day or the season in which it is used etc)*

- They often (partially) cover the OPEX while CAPEX are rarely recovered and have to be subsidized.
  - Subsidies reflect the **implicit social value of irrigated agriculture** and **its contribution to economic growth** (exports, employment, food security), **to social development** (balanced regional development, poverty reduction) and to **environmental objectives** (land conservation, amenity value of agricultural landscapes).

# Tariff

- In irrigation sector,  the tariff often exceeds what users are able and willing to pay
  - the value of the water for farmers (i.e. the revenue per $m^3$ used in irrigation) is low compared to industry and tourism
  - Quality of service (reliability, flexibility) is often poor
  - Water prices have historically been low
  - Groundwater can be used as an alternative (uncontrolled and priceless) source of supply

# Tariff

- The **impact** of tariff on **water demand** can vary
  - Under water scarcity conditions, the elasticity of agricultural water demand is low to zero as irrigators are already rationing.

    Tariff doesn’t act as an incentive to save water but as a financial transfer system to the agricultural sector.

  - In the case of intensive agriculture, higher water price can lead to saving water.

    This effect can be limited by an acceleration of the private pumping of groundwater resources if their cost of access becomes lower than the price of surface water. It could benefit farmers with more capital and technology.

# TWW reuse and water pricing policies

- Reuse projects introduce a new complexity in pricing for the **interconnection of different water services**: water moves through the urban water supply and sewage systems to be reused and distributed in other sectors
- Often the "suppliers" and the "beneficiaries" are located in different areas **on-site and off-site effects**
- The tariff for conventional resource may not be or appropriate for water reuse since **objectives can be different**: encouraging the use of recycled water and cost recovery may be mutually conflicting objectives (Molinos-Senante et al. 2013)

# TWW reuse and water pricing policies

- The most common tariff in use is the volumetric one. Progressive rate is often applied
- The price ranges and the structures for agricultural use are extremely different (the problem of scale)
- In most cases, unit prices only recover part of the O&M costs, so some forms of subsidy are very often in place

**TUNISIA'S EXPERIENCE: OUARDANINE TWW PLANT**

**Cost recovery via wastewater use is constrained by water pricing**. In 1997, the Government set a tariff of 0,02 TND/$m^3$ at that time and of 0.15 TND/$m^3$ in 2010). **The target was to keep the price for reclaimed water significantly below the one of the subsidized freshwater** which was about 3 to 4 times higher for irrigation, and 7–40 times higher for domestic and industrial use in the year 2000. The price for reclaimed water has remained unchanged since 1997 and **covers only a fraction of the real cost of wastewater treatment,** estimated at TND0.3–0.7/$m^3$.

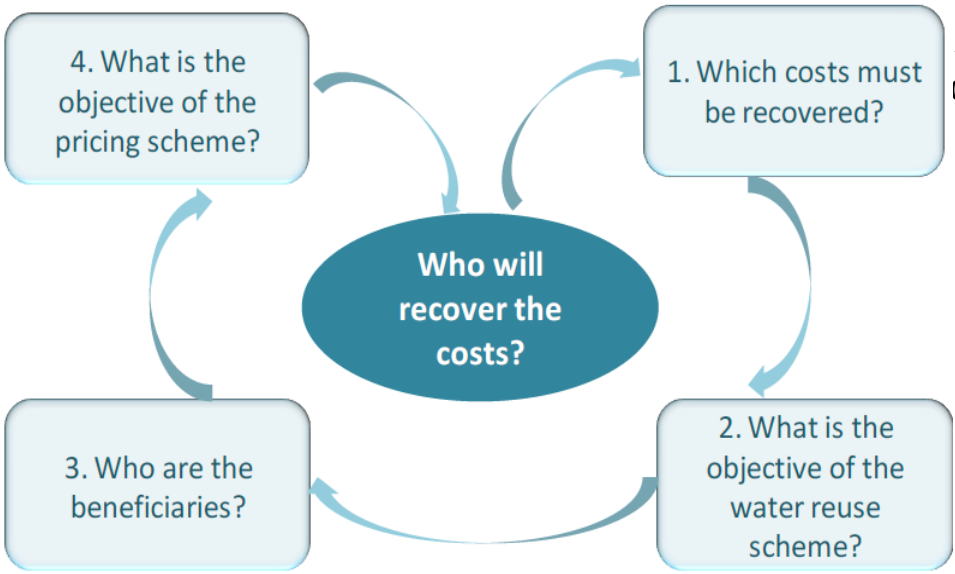
# TWW pricing strategy

A suitable pricing strategy for water reuse depends on the specific characteristics of the site, the cost-profile and policy decisions.

## General steps

## Key questions

To incentivize consumers? To rely on recycled water? To guarantee access to water to all groups in the society? To cover the costs?




A full understanding of the cost (social, environmental and financial; on-site and off- site) profiles.

Users can be the direct beneficiaries of the system but also reuse schemes deliver indirect benefits to other user groups.

The objectives of a reuse scheme can be different (aquifer recharge, irrigation, reduce discharge, etc)

# The Economic Instruments: What‘re Their Limits?

- Many **factors** and issues **limit** their application compared to the ambitious declarations for the sustainable management of water resources:
  - **Social issues, acceptability and ability to pay**
  - The **historical context and the institutional framework**
  - The **inadequacy of resources (human, technical and financial**) mobilized for their implementation (e.g. for the collection of water bills)
  - **The opposition of the different stakeholders and organisation**, for fear of losing their status and legitimacy, the emergence of technical issues difficult to control or for fear of imbalances financial resources for their organization

# The Economic Instruments: What're Their Achievement?

- Positive impacts on the **adoption of water-saving irrigation techniques** and on the **efficiency of irrigation** at the plot scale

- Significant **volumes of water have been reallocated** between different users, inside and outside the agriculture sector, following the establishment of water quota transfer mechanisms or user rights.
- Water pricing and taxes contribute **to mobilization financial resources for the water sector.** This mobilization allows to reduce on the one hand the budgetary burden of the states and, on the other hand part, to strengthen the financial autonomy of water services and overall water management
- Subsidies for the modernization of irrigated areas have to them contributed to **the development of the agricultural sector** in countries that apply them.

# The Economic Instruments: What're Their Prospects?

- Economic instruments must not be idealized nor put aside.

  Some factors can increase their effectiveness:

  - **Coherence with sectoral policies beyond the water sector:** in the irrigation sector, it means a **coordination** with energy, agricultural, and food policies.
  - **Governance framework**: the economic instruments require effective **participation** of all SHs, **information, measuring** and **control** systems, efficient **enforcement**
  - **Combinations**: the most significant progress is made by **combining organizationa**l and **legal** change, user **awareness** and support campaigns, and **economic** instruments *…."the market is a good servant but a bad master"*
  - **Prioritization and Targeting**: each tool must be focused on achieving a **limited number of objectives** and should be applied in conditions where it proved to have a **real incentive effect**.

# Thanks for your attention