A QUESTION OF DEVELOPMENT
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Facing Water Scarcity in the Mediterranean

THE ECONOMIC INSTRUMENTS OF DEMAND-SIDE MANAGEMENT

Pressure on water resources has reached critical levels in many countries in the Mediterranean Basin. Sophisticated water mobilization strategies have been implemented but physical, financial and environmental constraints linked to such supply-side approach demonstrate that better management of already mobilized wateris necessary. Acting upon demand is a cost-effective way of improving availability and promoting a more efficient use of water resources. What are the instruments that are used, their practical results, their potential, and their limitations for the future?

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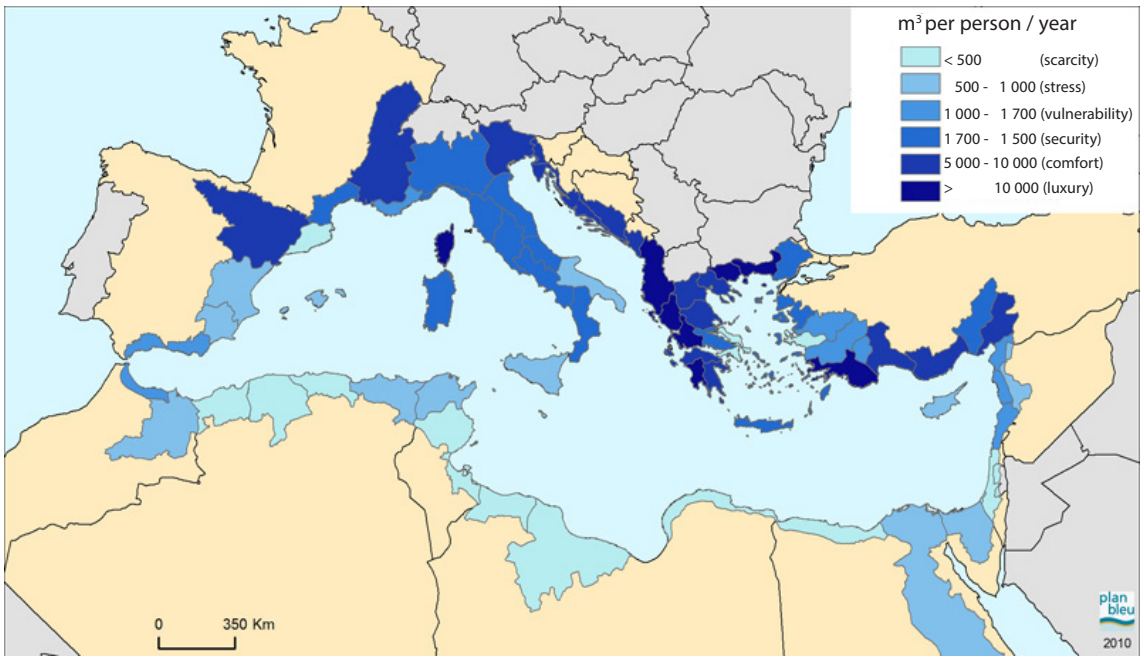
Managing the Demand for Water is Now Essential

The water resources in the Mediterranean Basin are under high pressure, both in the case of surface water and that of groundwater. This issue is soon to be aggravated by the increase in demand and the probable decrease in availability due to climate change. Agricultural water demand, which represents an average of 80% of total water withdrawal, should continue to increase due to demographic growth and changing food diets.

National policies and strategies have focused on increasing water supply by building infrastructure for the storage and distribution of surface water, by abstracting groundwater, including fossil sources, and, more recently, by using non-conventional resources such as the reuse of treated wastewater and the desalination of seawater. Groundwater extraction has grown exponentially and is now the main water resource for a third of all Mediterranean countries, including Croatia, Cyprus, Libya, Malta and Tunisia. Initially promoted to increase pressurized irrigation, private bore wells for agriculture have flourished in a context of lack of regulation that often amounts to *de facto* open access. These rationales are gradually being pushed to their limits, be they physical (as in resource availability, and the scarcity of sites available for the construction of new dams), financial (as in ever-increasing costs), or environmental (as in overexploitation, saltwater intrusion, and the deterioration of water ecosystems).

An integrated approach for the management of resources is essential. Water demand management is becoming a top priority in many Mediterranean countries. It means focusing on the proper use of already-mobilized water, attempting to limit physical losses, curbing water consumption, and promoting an economically-efficient and more productive use of water.

Currently, there is a lot of room for improvement. Potential savings have been calculated to amount to one-fourth of demand, with irrigated agriculture amounting to more than 65% of that amount (GWP & Plan Bleu, 2012). However, in practice, water demand management is first addressed from a technical point ...



Source : Plan Bleu, 2010.

of view through physical performance indicators such as hydraulic efficiency. What must be better understood are the financial, economic, social and environmental aspects of water management and allocation.
An economic approach to water demand management 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 of Water Demand Management

As a standard, water demand management is based on the management of water volumes—through quotas, temporary restrictions, and licences—, with priority first given to drinking water and second to commercial uses, including agriculture. Often, the very same volume-based approach is employed to manage scarcity within a given sector use. In order for the quantities used to reflect the social optimum, as it is perceived by the regulatory agency, this type of instrument requires an excellent level of information on the resource, its uses, the end users, in addition to the monitoring of withdrawals. In a Mediterranean context, applications rapidly find their limits. Information is indeed imperfect and asymmetrical, and the increasing and direct mobilization of subterranean resources has diversified and multiplied users to a considerable extent.

Economic instruments of water demand management rely on price signals—enabling users and regulators to take into account resource scarcity, the internalization of the externalities, and the incentivization of water-efficient practices—as well as market-based mechanisms.

Six non-exclusive categories emerge: tariff, subsidies to water-saving practices or technologies, water royalties and environmental taxation, payments for ecosystem services and water markets. In practical terms, the three first instruments are favoured in the Mediterranean Basin.

Tariff: An Instrument with a Qualified Impact, Particularly for Agriculture

Tariff defines the price that users will pay for their water. It is a widely-used instrument in Mediterranean countries. Its primary role is to cover the costs of the service, including minimum operating and maintenance costs, and capital costs in favourable situations. Many factors restrict its scope, especially in the case of

By improving water demand management, a quarter of the current water demand could be averted, *i.e.*, circa **85** cubic kilometres of water per year in **2025** (GWP & Plan Bleu, 2012).

agricultural water in irrigated areas:

- The revenue per cubic meter used in irrigation (the value of the water for farmers) is well beneath what is earned from other uses such as industry and tourism and the price of water must take this into account;
- Highly diverse choices of crops and the volatility of agricultural prices cause a high variance in agricultural income, making it difficult to determine a single rate;
- Quality of service (reliability, flexibility) is often poor, yet pricing only makes sense if the resource is indeed made available;
- Water prices have historically been low, which limits the acceptability of even moderate increases in tariff;
- Finally, groundwater can be used as an alternative source of supply if water prices are high, which leads to an increase in water extraction and thus introduces an additional constraint.

Frequently, the tariff required to recover operating and maintenance costs alone exceeds what users are able to pay. The tariff of water shall then be set at a price at best equal to, and generally far beneath, the users' ability to pay. Such a price will not cover maintenance costs, let alone cover capital costs, which will have to be subsidized. Such a subsidy reflects the implicit social value of irrigated agriculture in the light of its contribution to economic objectives (exports, employment, food security), to social objectives (balanced regional development, poverty reduction) and to environmental costs, as the case may be (land conservation, amenity value of agricultural landscapes). It is this social value that provides the economic justification for the use of subsidised water in agriculture.

The impact of tariff on water demand is still being debated by economists. It is reflected in the price elasticity of water demand, *i.e.*, the percentage of variation of water demand for a 1% increase in water prices.

At the prices that are generally applied, the elasticity of agricultural water demand is low to nil. Irrigators often operate under a system of low tariffs but *de facto* rationing. They are willing to pay more to get water, as can be seen from the high costs incurred by some users to drill private bore wells. In this configuration, water tariffs are well beneath, by orders of magnitude, the tariffs levels required to act as an incentive to water conservation. As a result, low water prices act as a financial transfer system in favour of the agricultural sector *via* capital subsidies or even operating subsidies, as noted above.

In the case of intensive agriculture, the increase of revenue generated by an additional cubic meter of water can allow for a higher price of water, conducive to water savings. This effect is likely to be limited by an acceleration of private pumping of groundwater resources if their cost of access becomes lower than the price of surface water, which would favour the farmers who are most endowed in capital and technology.

In the case of potable water, high water tariffs are more often an incentive to conservation, decreasing use to varying extents in different countries, and according to different types of consumers. Such assertive pricing of municipal water can lower the demand of higher-income households, which have many non-essential or recreational uses (watering lawns, car washing, and so on) with higher elasticity. In the facts, however, total demand is rising steadily in urban centres due to a combination of population growth and the relatively low proportion of affluent households.

Subsidizing Water Saving: Potentially Perverse Effects

Subsidizing water-efficient practices or technologies has many clear advantages for farmers (lower labour costs and nutrients costs, yield increases, revenue increases, possibility of intensifying production and diversifying crops) and for the community (increasing agricultural output, stabilizing employment, and, ideally, encouraging water conservation).

However, subsidies do not necessarily lead to decreased demand if the water recovered is directly reused for the very same agricultural purposes. Indeed, the amount of volume saved can be reused for the expansion of irrigated areas (if land is not a limiting factor), or, without increased acreage, by intensifying production and diversifying to higher value crops that require more water (orchards, horticulture) when capital and technology is available. Furthermore, some of these crops require daily, or even continuous, irrigation, and farms may be brought to want to secure their access to water by seeking a complementary supply from groundwater.

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In this situation, total water consumption tends to increase, particularly for groundwater. Windfall effects are to be expected for irrigators who benefit from the subsidy but who would have committed themselves to the same investments without it—thereby concentrating wealth amongst the better-endowed farmers (in terms of land, capital, and technology), as well as generating opportunity costs on downstream users who may experience usage restrictions due to increased upstream use.

Withdrawal fees and Environmental Taxation: Seldom-Used Tools

Withdrawal fees collected by regulatory authorities aim to apply the "user-pays" principle where the user bears the cost of the scarcity of the resource and, when appropriate, the cost of management by the regulatory authority. Environmental taxation aims to have the cost of negative externalities (pollution, overdrafting) be borne by the agent who generates them, thus increasing their usage costs and pushing them to decrease their use overall.

Their application, established under the EU's Water Framework Directive, faces difficulties in contexts where users are numerous and difficult to identify, and where human, technical and financial resources are limited (accuracy of measuring instruments, organization of fee collection, instituting the policing system, and the like). Presently, these instruments are seldom used in the Mediterranean Rim and their impact on water demand management is still very limited.

What is the Current Situation of Economic Instruments and What Are Their Prospects?

Economic instruments must not be idealized in the name of a narrowly market-centric perspective, which remains inapplicable to the water sector, nor brushed aside due to lack of results for which they are not intrinsically responsible. Their efficiency is conditional on five main factors:

- Coherence with sectoral policies beyond the water sector: water demand management cannot be defined without taking into account both energy prices and potentially perverse subsidies that lower extraction costs. In the case of irrigation water, it requires a coordinated approach with agricultural policies, trade policies (including international trade), food policies, and regional development. It is also linked to tourism (specific pricing) and to industrial policies (upstream incentives to save water);
- Governance framework: the economic instruments require, as is the case for volume-based management, information, measuring and control systems, as well as efficient enforcement;
- Combinations: the most significant progress is made by combining measures, including organizational and legal change, user awareness and support campaigns, volume-based management and economic instruments;
- Prioritization: a given instrument must be focused on achieving a limited number of objectives (recovering costs, decreasing water use, increasing production and revenue, contributing to fair and balanced development, conserving the environment, and the like);
- Targeting: in order for economic instruments to effectively contribute to water demand management, they need to be applied in conditions where they are likely to have a real incentive effect. If price increases are to contribute to water savings, prices must be high enough to lie within a range where the elasticity of water demand is substantial; the same applies in the case of subsidies to local irrigation, which must be carried out along with specific measures (water meters, law enforcement, and limiting access to land) in order to monitor the reuse of the water that has been successfully conserved.

Beyond the instruments that are currently in use, further thought must be given to a broader application of existing but rarely-used instruments, such as withdrawal fees and environmental taxation, as well as the introduction of new high-potential instruments such as payments for ecosystem services and water markets.

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