

Challenges of Developing a European Union Strategic Approach to Water Scarcity

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Abstract: Water scarcity is a serious and growing problem in a number of EU Member States. EU water law has traditionally focused on water quality issues. However, the introduction in 2000 of the Water Framework Directive has provided the first coherent legal tool to address water scarcity and this has been supported by further policy aimed directly at water scarcity. However, there are also many local policy issues which need to be addressed, such as the patterns of agriculture and upgrading water distribution networks. Some issues are also outside of the control of most authorities, such as changing household size and population demography. This presents major complexities in the policy landscape. Therefore, not only must a range of policies for water scarcity be considered for each country or region, but there must be a clear understanding not only of the opportunities afforded by those policies, but also their limitations. Such policies must include investment in innovation, new infrastructure, water saving technology, implementation of full cost recovery for water supply and, not least, strict regulation. The complexity of the policy environment and the complexity of the dynamic social and economic interaction with hydrological systems present a major challenge for addressing water scarcity. Meeting this challenge, therefore, requires a partnership between EU, Member State and regional authorities as well as with the public and other stakeholders.

Key words: Water Framework Directive · Water scarcity · Water pricing · Agriculture

INTRODUCTION

The European Union (EU) (in particular the Mediterranean region) is facing increasing longer-term water resource pressures and short-term drought impacts due to changes in domestic, industrial and agricultural water use, driven by a range of factors, such as changing population patterns. It is also likely that problems will become more acute in the future. Addressing these problems has formed a new direction in EU water law and policy over the last ten years.

EU water law has traditionally focused on water quality issues. However, the introduction in 2000 of the Water Framework Directive (WFD) 2000/60/EC [1.2] has provided the first coherent legal tool to address water scarcity by requiring long-term planning on water resources as well as short-term Drought Management Plans. The key tool to foster water efficiency introduced by the Directive is water pricing. The strategic approach

of the EU has since been taken forward with a 2007 Commission Communication on water scarcity and droughts, which presented a set of policy options at EU, national and regional level to address and mitigate water scarcity and drought within the EU. It identified key challenges to move towards a water efficient and water saving economy.

However, bringing together all of the actions needed to address water scarcity in a strategic approach is problematic. The need for action at River Basin level is clear, but details are only just emerging on whether countries are prepared to meet the challenge. Similarly, while changes to some sources of EU funding are muted, the need to overhaul the Common Agricultural Policy to protect water resources is still at the discussion stage. Mediterranean initiatives are progressing, such as under a joint EU Water Initiative and WFD working group on water scarcity with MEDA partners, but challenges remain in changing funding support for initiatives in these neighbouring countries.

This paper sets out the main strategic directions being undertaken within the EU and analyse the problems and opportunities that remain to allow for the development of a coherent strategic approach to water resource management.

Water Scarcity in the EU: Across Europe as a whole, the total freshwater resource is around 2,270 km³/year, of which only 13% is abstracted [3]. However, problems of water scarcity and droughts arise in many European regions, due to imbalances between abstraction and availability. Reduced river flows, lowered groundwater levels, etc., occur in many locations. Less water exacerbates water quality problems and over-abstraction increasingly results in saline intrusion. Over the past thirty years droughts have also increased in both intensity and frequency in the EU. The number of areas and people affected by droughts increased from 6 per cent in the period 1976-1990 to 13 per cent in 1991-2006. The overall economic impact of these droughts was estimated to be about _ 100 billion, without even including social and environmental costs [4].

Total EU water abstraction is about 247,000 million m³/year, with 44% for energy production, 24% for agriculture, 17% for public water supply and 15% for industry [3] although these vary significantly across the EU. In southern Europe the agriculture sector accounts for more than 50% of abstraction (80% in some regions). Domestic water use has benefited from increased metering and use of water saving measures. However, changes to population, household size, tourism and behaviour all affect this sector. Tourism is a major driver because in France, Greece, Italy, Portugal and Spain tourist arrivals have increased by approximately 90% over 20 years [5]. Manufacturing industry has reduced water use (by 19% in southern Europe) due to improved technologies and water recycling. Water use for energy production is high in some countries, though much is returned to water bodies and improved technology (and alternative energy sources) have reduced this sectoral use by about 10%.

The water exploitation index (WEI) varies across Europe and provides a useful measure of bringing together water use and availability. Where the WEI is around 20 % a country is water stressed and where it exceeds 40% water use is unsustainable [6]. Nine European countries were water-stressed for the period 1997-2005. Of these in Cyprus, Italy, FYR Macedonia, Malta and Spain most of the abstraction is for irrigation. Some regions have extreme WEIs, e.g. 164% in Andalusia [5].

It is clear, therefore, that a significant number of countries and regions experience water stress and that this problem is increasing. This problem is driven by a range of sectors, each with their own social and economic driver and policy frameworks.

Key EU legislation and policies in place to address water scarcity

The Water Framework Directive: The most important EU legislation regulating water use is the Water Framework Directive 2000/60/EC (WFD) [1]. The Directive covers rivers, lakes, groundwater as well as coastal and transitional waters. It bases water management on 'river basins' with the overall objective of achieving 'good ecological status'. It aims to prevent deterioration and enhance ecosystems and promote sustainable water consumption. To achieve this, the WFD further requires that, within each river basin district, a programme of measures to achieve the Directive objectives is developed (Article 11). Compulsory measures include those appropriate to take into account of recovery costs for water use and to achieve sustainable water use and controls over water abstraction.

The WFD requires that water management is undertaken in a comprehensive, integrated manner through the development of River Basin Management Plans (RBMP) by 2009 (Article 13). Each plan, which is to be updated every six years, should define the character of the waters and identify measures to improve their status. Furthermore, plans should specify a monitoring programme both for a general assessment of water status and for specific threats to it. The plan also acts as a vehicle for consultation with the public. When and where needed, specific 'Drought Management Plans' (DMPs) should be developed (Article 13.5). These should include indicators and thresholds, measures to be taken and organisational framework to deal with drought, including information on prolonged droughts (European Commission, 2007b). The key tool to foster water efficiency introduced by the WFD is water pricing (see below).

The European Commission has stated [7] that reports from the Member States on their initial obligations under the WFD show some encouraging results. They have already made significant steps towards sustainable water management. Most of them have deployed considerable efforts to develop an initial analysis of the state of river basins, producing a large information base which did not previously exist at EU level. However, there is currently little evidence that land use challenges are being fully

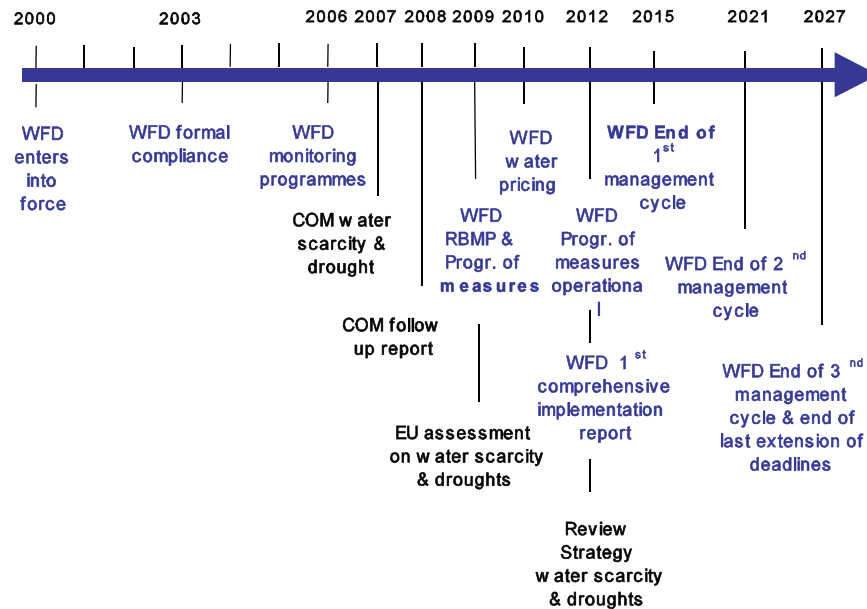


Fig. 1: Key deadlines on water-scarcity related policy

integrated into the water management decisions taken by Member States. A few Member States have taken some steps to reduce the pressure on water resources, such as a ban on increases in water abstraction in overexploited areas, an assessment of the volumes that can be sustainably abstracted and a review of the abstraction authorisations and an obligation to put in place collective irrigation organisations to control abstraction among irrigators. However, only a few Member States have taken action and these initiatives have yet to be evaluated.

On the other hand flaws in the implementation of the WFD requirements have been highlighted by NGOs [8]. They stressed that consultations on RBMP were delayed and, where they have started, they raised concerns over their quality and effectiveness. They also pointed out that draft management plans seen so far are inadequate, as they provide few mechanisms and little funding to achieve a good status for European water bodies.

The WFD, therefore, provides a strong legal framework for addressing water resource management. However, while it has helped to take some steps forward in some countries, there are concerns over implementation and, in particular, over cases where ‘hard choices’ need to be made.

Policy on Water Scarcity and Droughts: In June 2006 the Environment Council called for EU action on water scarcity and droughts. In response, on 18 July 2007 the European Commission issued a Communication on water scarcity and droughts [4] which presented a set of policy

options at EU, national and regional level to address and mitigate water scarcity and drought within the EU. The Communication identified seven key challenges to move towards a water efficient and water saving economy, namely: the need fully to implement the WFD; improving water pricing policies to better reflect the ‘user pays principle’; moving towards sustainable land use planning; the need to base policy making on a clear water hierarchy, giving priorities to water savings and water efficiency measures; further integrating water issues into all sectoral policies; and improving knowledge and information.

The Communication identified a number of ways to tackle these challenges. A key imperative in the short term is the full implementation of the WFD-especially the provisions on water tariffs and compulsory metering, River Basin Management Plans and Drought Management Plans (Articles 9, 11 and 13). The Commission also encourages the efficient use of EU and national funds to improve water demand management and respond to droughts, the development of a European Drought Observatory by 2012, the introduction of water efficiency provisions in EU legislation (e.g. legislation on non-energy using products including water saving devices and performance standards for buildings) and the development of new water infrastructures (when other options are not available).

A timetable of (past and future) key dates related to the Water Framework Directive and other relevant policies is provided in Fig. 1.

The effective implementation of the Directive on Environmental Impact Assessment [9] (EIA) and the Directive on Strategic Environmental Assessment [10] (SEA) by all Member States is also considered to be important in order to avoid any adverse impact of water management projects on water resources. The Commission also stresses the importance of sustainable agriculture (including the inter-linkages with biofuel development) and the potential of reform of the Common Agricultural Policy to promote improved water management (see below). In October 2007 the Council supported the options identified in the Communication and invited the Commission to review and further develop the strategy for water scarcity and drought by 2012. The Commission published a follow-up report in 2008. This addressed implementation, progress, etc., but no change in policy direction.

To support this policy development, the Commission published a report on the potential for water saving [11]. This concluded that in the Mediterranean, the water saving potential represents 45% of the 2025 demand (330 km³/year) and is significantly larger than the expected increase in demand over the same period (+50km³/year). For Northern Mediterranean countries the largest potential is in the irrigation sector (60%), followed by the industrial (25%) and domestic (15%) sectors. These savings could be achieved by:

- Increasing the efficiency of water networks in irrigation (transport losses reduced to 10%, efficiency raised to 80%).
- Increasing efficiency in public water supply (loss reduced to 15%, user leaks reduced to 10%).
- Improving the use of water for industrial purposes (recycling generalized at 50%).

This is, therefore, an important study indicating the benefits of the potential for water savings. The European Commission is keen to stress action on water savings before other actions (e.g. new infrastructure). However, investment is often required, which can be problematic for some, such as low income households and farmers. Furthermore [12] assessed four alternative water supply options in Europe, namely desalination, wastewater re-use, ground water recharge and rainwater harvesting. The potential problems and mitigation options differ between locations and technologies. They concluded that additional water supply infrastructures

(such as storage of water, water transfers or use of alternative sources) should be considered as an option when other options, including effective water pricing policy and cost-effective alternatives, have been exhausted. Also the selection of new infrastructure should be based on a full impact assessment. This must include energy use, as it was estimated that address water needs would increase the energy consumption of some Mediterranean countries by between 15% and 45%.

Complexities of Implementing Policy: While there is an increasing body of EU law and policy related to the protection of water resources, it is important to stress that the implementation of such policies presents many challenges. A key factor affecting those seeking to take action is the complexity of the policy environment surrounding water use in each sector.

Figure 2 is a conceptual policy map of water use for domestic consumers. This illustrates a range of factors through which policies are expressed in the provision of water for domestic consumption. There are important EU legal drivers, such as the Water Framework Directive, which affect the availability of water resources and there is a relationship with EU law relating to the quality of drinking water (competing for public and private investment) and waste water (thus available for re-use). However, there are also many local policy issues, such as upgrading the distribution network and support for education. Finally, some issues are outside of the control of most authorities, such as changing household size and population demography.

Similar complexities exist for provision of water to agriculture and industry. However, the key point to stress is that no single policy can address all of the factors leading to changing water use. Hence the WFD is a framework policy within which Member States must develop the necessary policy mix to achieve its objectives. Not only must a range of policies (indeed a policy landscape) be considered for each country or region, but there must be a clear understanding not only of the opportunities afforded by those policies, but also the limitations. This type of flexibility in EU law is increasingly supported by the European Commission as a means to allow for development of local and lower cost policy solutions to environmental problems [13].

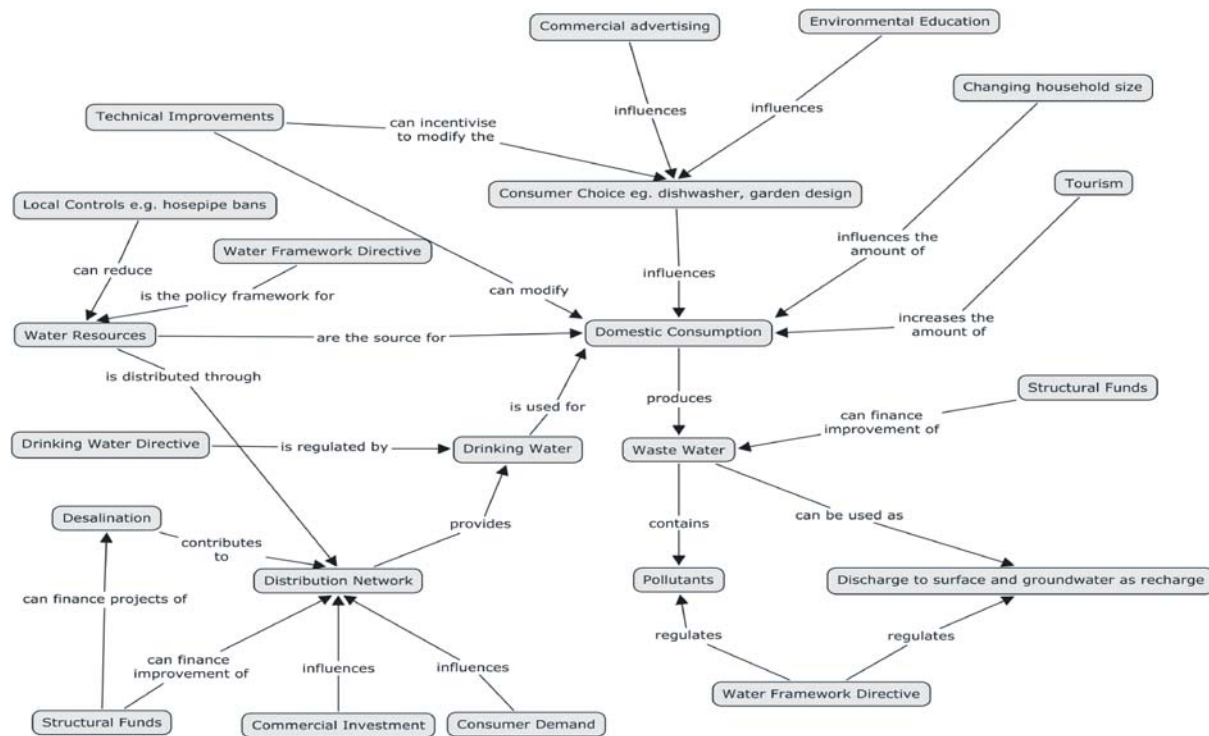


Fig. 2: A conceptual policy map of policies and other factors related to domestic water consumption

Prioritising Water Uses: Where there is insufficient water, different water users are potentially in competition. Laws and policies may be adopted to prioritise one user over another in cases of drought and long-term water scarcity planning. In both of its Communications on water scarcity and drought, the European Commission did not provide a detailed hierarchy for the prioritisation of water uses as these are evolving and can vary across the territory of Member States. Instead, it stated that public water supply should be an overriding priority. More practically it advised regulators to adopt a preventive approach, but if that is not enough, it is up to the Member States to decide which form restrictions would take and which sectoral use they would affect.

Suggestions concerning prioritisation were, however, made in a technical report from the report of the Water Scarcity and Drought Experts Network [14]. Member States were encouraged to take into account the evaluation of water demands, monitoring water use so that regulators can take efficient decisions based on the actual needs of the various users (as well as identifying water losses and waste). The report repeated the importance that a minimum volume was “provided to the population whatever the climatic conditions are.” Member States

were also encouraged to study the different impact of prolonged drought in their territory to decide on the prioritisation.

The practical prioritisation of water use needs to take account of the priorities identifiable in EU law. Essentially, the legal obligations are those that can be derived from the WFD:

- Health-so the need to maintain domestic drinking water (and safety water) supplies.
- Ecological objectives-the need to deliver good ecological status.

A survey of countries conducted under the EU SCENES project showed that where Member States have established priorities, the first of the above priorities is consistent with these. The focus on ecological objectives is less apparent in some countries. It is not appropriate for EU level policy to set further priorities, e.g. between water and industry. However, any profligate use of water by any sector would be unjustifiable if there was a risk not to achieving the objectives that are set out in EU law. Countries clearly vary in how they prioritise industry and agriculture and may distinguish between these

Table 1: Suggested water prioritisation with declining availability for different water users

Priority	Water User	Comment
High	Domestic supply	This supply should be maintained as far as possible to protect health and maintain supplies for fire fighting
High	Ecological objectives	The need to achieve Good Ecological Status and protect Natura 2000 sites are strong drivers in EU law-more so than protecting economic sectors
High-medium	Power sector	Of more importance than other industry, given the number of individuals and businesses relying on it
Medium	Industry	Of reasonable priority due to its employment and economic importance
Medium	Agriculture that is water efficient	This part of agriculture would be prioritised over less efficient agriculture (e.g. drip irrigation compared to spray irrigation)
Medium	Agriculture that has high numbers of workers	Its position is due to social and economic concerns
Medium	Agriculture reliant on permanent crops	This position is due to the long-term potential damage. However, if water availability is permanently reduced, this sector would be a lower priority
Low	Other Agriculture	Such as water inefficient agriculture
Low	Navigation	If this is threatened, maintaining water levels would be extremely difficult to achieve
Low	Recreational water use	This includes measures to restrict non-essential use at home (e.g. car washing) as well as some communal activities

(e.g. different crop types). Where agriculture is prioritised over industry, this tends to reflect the importance of the sector in the area. For the purposes of future analysis and modelling, the priorities set out in Table 1 provide a reflection of the range of practice in countries, while addressing priorities from EU law (which will come to impact on the countries).

Water Pricing: The key tool to foster water efficiency introduced by the WFD is water pricing. The WFD requires Member States to ensure, by 2010, that water pricing provides adequate incentives to ensure efficient water use and that this is spread across different sectors (Article 9). This implies that the price of water should be increased to cover at least the financial cost of water provision and possibly externality costs as well. The WFD hence aims to ensure full recovery of the water cost, including environmental and resource costs, in line with the polluter pays principle.

In many countries water charges have historically been very low, reflecting the view that the provision of basic services, such as water, is seen as a duty of government and the access to them is considered a right. Hence final users often pay less than the full costs of provision. This, in turn, has led in many cases to water over-use and wastage. In the agriculture sector in particular the price of irrigation water has been generally low in many countries. A low price for irrigation water, which does not even cover financial costs of provision, let alone environmental costs, is a subsidy. In some cases

these subsidies have been reformed and some Member States have adopted water prices in line with full cost recovery.

A key challenge for Member States will be to deliver water pricing policies that provide adequate incentives to use water resources efficiently. The [7] highlighted that some countries (e.g. Portugal and Spain) are taking actions to set tariffs that are consistent with the level of water scarcity at local level, the season and/or the level of consumption. Others are conducting reviews and assessing the effectiveness of different types of tariffs in water stressed areas. Progress is also being made in the area of water metering. A few Member States (e.g. Spain) are developing national strategies for the metering of water abstraction in agriculture, or otherwise extend metering for domestic users. On the other hand, Member States still need to take further action. For example, Member States are required to implement systematic control over water abstraction (Article 11(3) (e) WFD), but it is not clear how far this has yet been addressed in implementing the WFD.

There is a wide range of factors that can affect water pricing. A number of these are described in Figure 3. While pricing may be most closely related to the immediate comparison of available supply with major sectoral demands (agriculture, domestic, industry, etc.), each of the sectors' demand and ability (and willingness) to pay is influenced by a wide range of drivers. This makes setting overall prices and, in particular, prices that are acceptable and equitable between sectors especially difficult.

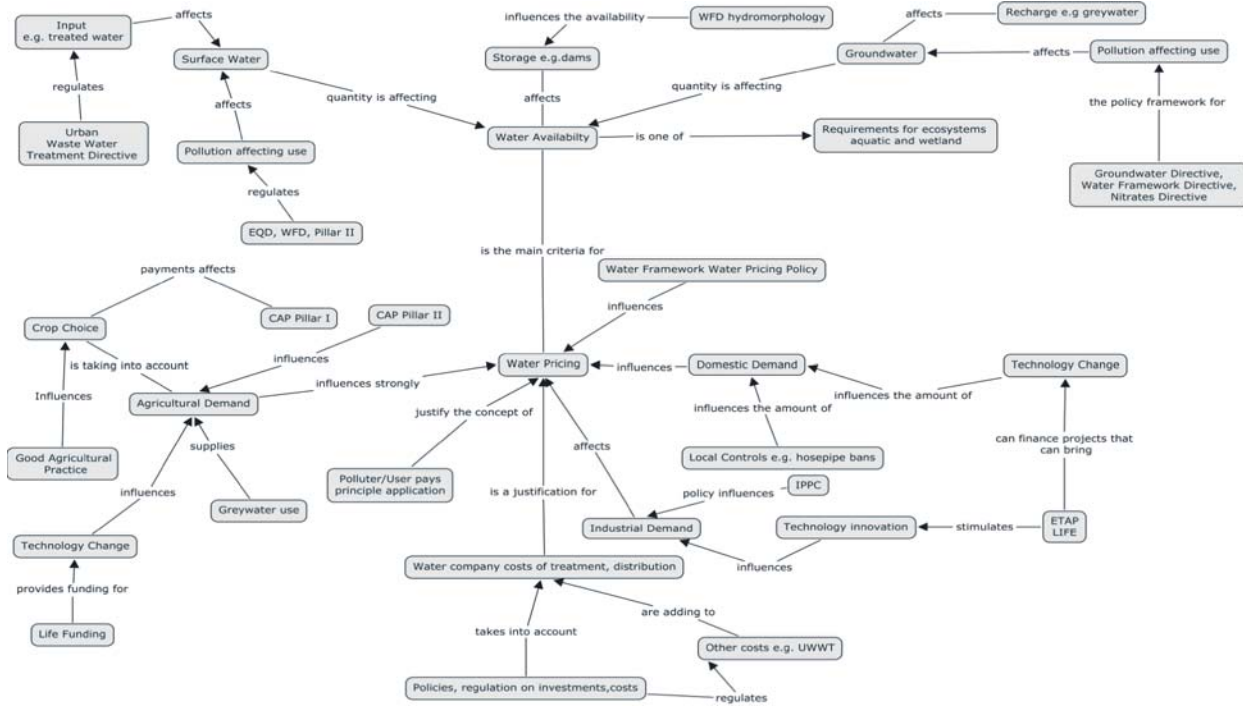


Fig. 3: A conceptual policy map of the policies and factors affecting water pricing

Even where other measures are implemented, pricing will remain an important signal to influence demand. For instance, when financial support exists to stimulate the use of water saving technologies (e.g. subsidies for drip irrigation), the low price of water may still induce farmers to increase the size of irrigated surfaces or to opt for more water intensive crops, hence frustrating the aims to reduce consumption. Water pricing, therefore, needs to provide the right price signals.

The issue of affordability and potential social impacts will be significant in some countries and for certain sectors. Irrigation subsidies in southern Europe for instance have been a significant support to farmers' income. However, they have incentivised the cultivation of water intensive crops in many water scarce areas and led to significant wastage. Some studies [15,16] have demonstrated that increases in water pricing in Spain would dramatically erode farmers' income before having any significant effect on water demand. On the other hand, existing irrigation subsidies benefit indiscriminately both low and high income farmers. Additional measures may be needed if prices are increased in order to protect low income farmers.

The effectiveness of water pricing on water use is dependent on a range of factors. In some cases water demand can remain unaffected even when prices rise

considerably, e.g. when water is used for tourist activities (like golf courses), or for the cultivation of profitable crops. In these cases regulatory measures, e.g. abstraction limits, may be more effective in influencing water demand. Also, water wastage may be due to old and/or inefficient infrastructures. In this case investments will be essential. Funds could for instance be earmarked from water payments. Water pricing is, therefore, an important tool to address water scarcity management. However, negative effects would need to be ameliorated and pricing alone will not tackle all cases of over abstraction. Pricing is, therefore, one tool amongst others that regulators and water managers will need to develop. The Common Agricultural Policy (CAP): Water use in Europe by the agricultural sector has increased over the last two decades, partly because farmers have rarely had to pay the full cost of water and partly due to past EU subsidies to water-intensive crops through the Common Agricultural Policy (CAP). Demand for energy crops (biofuels and biomass) also has the potential to increase agricultural water use still further in the future.

Water abstraction for irrigation has increased about 6% in southern Europe between 1990 and 2007. This increase is only one fifth of the percentage increase of irrigable land, indicating greater use of efficiency measures such as water saving technologies and smart

irrigation systems [11,17]. For example, the use of recycled water and desalination are becoming more widespread (e.g. in Spain). However, unregulated/illegal water abstractions occur in many southern European countries (e.g. Italy) [18].

Historically, the Common Agricultural Policy (CAP) has in many cases exacerbated the issue of water scarcity, especially when payments were coupled with the production of water intensive crops. The 2003 reform of the Common Agricultural Policy introduced decoupled payments to farmers, reducing the link between a given production and the amount of subsidies received and increasing emphasis on rural development. It introduced cross-compliance, whereby farmers receiving subsidies are required to ensure certain legal obligations are complied with, although this did not, at the time, include water use. Policy changes agreed in November 2008 as part of the CAP Health Check introduced a new issue on water under the Good Agricultural and Environmental Conditions (GAEC), which are part of cross-compliance. The new standard concerning the respect of authorisation procedures for using water for irrigation has the potential to help expand water metering in agriculture. In agriculture, water savings can be carried out with improvements in irrigation infrastructure and technologies. [11] indicate potential water savings from irrigation of 10-25% and 15-60% from improved application. Further savings are possible from re-use of grey water and use of water resistant crops.

Under the CAP farmers are also given payments to support specific environmental outcomes. The rural development programmes funded by the European Agricultural Fund for Rural Development (EAFRD) [19] offer the possibility of supporting improved water demand management practices through appropriate measures to be adopted within Axes 1 (support to improve competitiveness) and 2 (improve environment and countryside). Potentially, such funds could be used to improve water efficiency in the agriculture sector, where this is deemed to be a priority 'new challenge'. However, the European Commission has noted that the budget allocated to rural development is not yet sufficient to properly address water quantity issues.

As part of the discussions on the post 2013 CAP, the Commission will assess which water quantity related obligations need to be addressed to meet the objectives of the WFD and, therefore, which should be treated in the framework of the cross-compliance system. As regards biofuels, specific sustainability criteria are being discussed by the Council and the European Parliament.

Agricultural policy represents a major challenge for water resources. While measures may be introduced in cross-compliance or within Rural Development to support improved efficiency, these would not deliver the requirements needed for highly water stressed areas. Water pricing, as noted above, is an important tool, but again it cannot ensure the necessary outcomes. A mixture of support and adequate tariffs will improve efficiency of water use, but it will be necessary for some countries to adopt politically uncomfortable regulatory decisions in order to protect water resources, not only for other key users but also to achieve the WFD objectives of good ecological status.

EU Funding: Support for investment for different sectors to deliver water savings can come from a range of EU funds. The current review of the EU budget and the discussion about the future financial perspectives will provide additional opportunities to address water quantity issues. In the past, for instance, a number of LIFE projects have worked directly or indirectly to improve the efficiency of water use. In July 2008 the European Investment Bank (EIB) adopted a new lending policy [20] for the water sector in line with the key challenges of the Commission Communication on water scarcity and drought. Further opportunities to fund water related initiatives may also be offered by the EU budget review and the possible revision of the Community strategic guidelines on Cohesion 2007-2013, which may lead to voluntary amendments of the operational programmes by the Member States.

Some Member States are also taking a range of actions to develop fiscal incentives for the promotion of water efficient devices and practices [7]. Some have put in place schemes to support the purchase of rain water harvesting and waste water reuse equipment in private and public buildings or aquifer recharge, others are developing schemes allowing businesses to claim allowances for investments in water efficient technologies.

However, the investment to date has been piecemeal, with little strategic direction. Revision of guidelines for EU regional funding may help, but such support will only be delivered through programming documents developed by the Member States. Therefore, it is to this level that strategic thought is required and investment relating to water scarcity will compete with other investment requirements. EU funding is, therefore, likely to become more important generally and is likely to be important in

individual cases. However, it is unlikely to deliver the broad strategic investment necessary to address the wide ranging water scarcity problems identified by the European Commission.

CONCLUSIONS

Water scarcity is a serious and growing problem in a number of EU Member States. Over abstraction has been driven by changing agricultural patterns, changing household use (appliances, household size and behaviour), tourism and industrial activity. It is not, therefore, surprising that water scarcity is an issue that has risen sharply up the EU's policy agenda. However, addressing the problem in a strategic policy framework is difficult.

The Water Framework Directive (WFD) is the main tool developed at EU level to address water scarcity. At a fundamental level it is wide-ranging in scope and ambitious in its objectives. A strict interpretation of achieving Good Ecological Status and protection of groundwater resources should present major challenges to Member State authorities. However, as River Basin Management Plans only had to be finalised at the end of 2009 (and a number are late) it is far from clear how ambitious Member States have been in reality. It is highly likely that tough decisions will be delayed until later planning cycles under the Directive, that is achieving objectives for 2021 or 2027 rather than 2015.

The complexity of the legal and policy environment is a further challenge. The Commission's own Communication on water scarcity and droughts illustrates this. While it highlights the importance of the WFD, other EU policies are fragmentary or there is a less than clear objective relating to sectoral policies such as agriculture. Further measures are only able to be developed and implemented at Member State and regional level because they reflect detailed land use planning, investment and other needs that cannot be directed centrally. There is, therefore, a gap between what is desired at EU level and what can be delivered at EU level.

It is important that water scarcity issues are integrated into sectoral policies and that systems are put in place to monitor how this is progressing. It is likely that new forms of data will be required to determine this and these will need to be identified. A key integrating tool is water pricing and, while some countries in Europe have made important strides on this, it clearly remains a challenge for some sectors, such as agriculture. It is also

important to recognise that water pricing alone may not be sufficient to deliver water resource outcomes. Pricing will only marginally affect high income, high water use activities.

The agriculture sector needs particular attention. Pricing and regulatory controls are needed, alongside encouragement for investment and monitoring. It is likely that in some cases, subsidies for equipment and modern irrigation systems will be needed as well as awareness-raising and education for farmers. However, even where water savings can be made, future patterns of agricultural activity may need to change and the reform of the Common Agricultural Policy is essential.

There are a number of further measures that can be taken at EU level, such as on efficiency of water using devices and use of EU funding. All of these will contribute to the strategic objective of tackling water scarcity. However, the complexity of the policy environment and the complexity of the dynamic social and economic interaction with hydrological systems present a major challenge for addressing water scarcity. Meeting this challenge, therefore, requires a partnership between EU, Member State and regional authorities as well as with the public and other stakeholders.

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